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„The Dividend of Democracy in Collective Decisions:
An Experimental Study“

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Abstract

The efficiency of direct democracy depends on whether voters are willing to make an effort and inform themselves about the issue at stake. This master's thesis examines if collective choices improve when the decision-making process is chosen endogenously. This question is addressed in a laboratory experiment: In one treatment, voters decide endogenously whether they want to implement a majority vote or delegate the decision to a computerized expert. In the other treatment, the decision-making process is exogenously imposed on voters. In both treatments voters are able to improve the collective choice by acquiring costly, private information. I find that allowing groups to choose the decision-making process endogenously triggers conditional cooperation, which significantly increases the number of informed voters. Consequently, information aggregation enhances efficiency of the majority vote. The results suggest that a society which chooses direct democracy ensures political participation, as well as voters' interest in the political process.

Abstract

Direkte Demokratie funktioniert effizient, wenn sich die Bevölkerung informiert und an Wahlen partizipiert. Diese Diplomarbeit untersucht, ob sich die Qualität von kollektiven Entscheidungen verbessert, wenn der Entscheidungsprozess endogen ausgewählt wurde. Ich untersuche diese Frage im Rahmen eines Laborexperiments: In einem Treatment ist es zufällig gepaarten Gruppen möglich, sich endogen für eine Mehrheitsentscheidung auszusprechen, während im Vergleichstreatment die Mehrheitsentscheidung den Gruppen exogen auferlegt wird. Die kollektive Entscheidung kann in beiden Treatments durch den Erwerb von kostspieliger, privater Information verbessert werden. Die Ergebnisse zeigen, dass bedingte Kooperation verstärkt und somit die Anzahl von informierten Wählern steigt, wenn die Mehrheitsentscheidung endogen bestimmt worden ist. Daraus folgen zugleich eine erhöhte Informationsaggregation und eine verbesserte Entscheidungsqualität innerhalb der Gruppe. Die Resultate legen nahe, dass sich eine Gesellschaft, welche sich aktiv für direkte Demokratie ausspricht, verstärkt auf politische Partizipation und Interesse bauen kann.

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1. Introduction

This master's thesis contribution to the literature is to combine two features of direct democracy and two strands of experimental research, the *dividend of democracy* and *information aggregation*. The dividend of democracy refers to endogenous institutions, democratically chosen by decision makers, which are able to increase efficiency compared to identical institutions that are exogenously imposed on decision makers (Tyran and Feld, 2006; Dal Bó *et al*, 2010; Sutter *et al*, 2010; Markussen *et al*, 2014a; Kamei *et al*, 2015). Secondly, work on information aggregation has examined whether individuals' private, independent information accumulates in a majority vote and leads to improved decisions (Condorcet, 1785; Feddersen and Pesendorfer, 1996; Mukhopdhyaya, 2003; Martinelli, 2006; Gerardi and Yariv, 2008). However, recent experimental research has shown a strong propensity towards uninformed decision-making by participants when information is endogenously acquired (Großer and Seebauer, 2013; Elbittar *et al*, 2014)¹. This finding undermines the epistemic value of information aggregation, as uninformed votes cannot improve group choices, but can even decrease efficiency in pivotal events. While experimental research so far has treated these aspects separately, I argue that a combined examination offers reinforcing effects.

In broad terms, my master's thesis examines under which circumstances direct democracy works efficiently, and when a society would be better off with an expertocracy. From a simplified economic perspective, I can pin down three main problems in direct democracies: People may not be willing to inform themselves, informed people may not participate, or the uninformed participate.² In this thesis, I use the features of an *experiment* for the purpose of abstraction. This enables me to deal with the three core problems of direct democracy, outlined above, in a controlled way.

¹ Experimental findings regarding information aggregation are typically published in the literature on "committee voting". The name refers to majority votes examined in the laboratory, which usually have a relatively small group size. I use the term "majority voting" and "group" rather than "committee voting", "committee" or "jury" for my own experiment, as the subject of this work is direct democracy.

² Obviously at this stage I disregard more multifaceted levels of the issue. For example, it does not only matter that I inform myself but also how and where I do that.

I implemented and conducted the laboratory experiment between October and November 2014 under the supervision of Jean-Robert Tyran and Lydia Mechtenberg, who had already developed a design for this economic experiment. In the experiment, groups of seven participants vote on two options. One of these options gives a payoff for the whole group, while the other gives nothing. In order to choose the beneficial payoff, participants are able to acquire an imperfect signal. In the endogenous treatment, voters are able to decide between a majority vote and an alternative, which is an expert represented by the computer. The expert's probability of success and the information costs vary within a given session. Groups decide endogenously beforehand whether they want to implement the majority vote or the computerized expert via a separate vote. In the exogenous treatment, the decision-making process (majority vote or the computerized expert) is imposed on voters. The results of the two treatments are compared. Based on the results, I evaluate two major questions: Under which conditions do participants prefer a majority vote and how well does the majority vote perform in comparison with the computerized expert? Additionally, how do results in the endogenous treatment differ from the exogenous treatment, especially in terms of information acquisition and efficiency?

The experimental design profited from insights of Mario Krapfenbauer's master's thesis. He conducted a similar experiment with endogenous institutions and endogenous information. However, there are three main differences: Firstly, in my design, the setup is colorfully framed in order to help participants understand the complex game. Secondly, irrational strategies are allowed, e.g. uninformed voting or voting against the own signal is possible. Thirdly, I conducted separate sessions for the endogenous and exogenous treatment, while in Mario Krapfenbauer's experiment all subjects participated in both treatments within each session.

In regard to the literature on the dividend of democracy, the results concerning the decision for a majority vote can be interpreted along the lines of the existing literature on endogenous institutions. Experimental literature on the matter is still scarce. Yet, scholars have found that democratic institutions, i.e. common rules or social orders chosen directly by the participants within an experiment, strengthen cooperative behavior. A typical example would be an instrument of punishment within a public goods game, which leads to more efficient outcomes on the group level if a majority chooses it

endogenously. With regard to the second issue – information aggregation – the part of my thesis concerned with majority voting itself is informed by the literature on committee voting. In this sense, direct democracy is abstracted simply as a majority vote on a binary decision problem with one beneficial outcome. Condorcet (1785) proves that under costless, exogenous information such a vote leads to higher efficiency when the number of informed voters increases.

Taken together, this master's thesis combines two strengths of direct democracy in order to demonstrate under which conditions direct democracy leads to pro-social and cooperative behavior, and ultimately to efficiency gains for society as a whole (i.e. the whole group in the laboratory). In other words, I control the input and the output of a democratic political process (Kittel and Marcinkiewicz, 2012) in the experiment. The endogenous decision determines the democratic decision-making process (input), and the majority vote mirrors a decision on the course of action made collectively (output). Previous experiments have shown that democratic institutions motivate cooperative behavior in simple frameworks. However, this suggestion should be challenged in a more complex setting. The specific framing procedure used in this research might help participants in understanding the public goods nature of the game (Persico, 2004), as well as alter the uninformed voting dominance observed in previous experiments on committee voting.

The master's thesis is structured in the following way: First, I briefly review the literature on the two aforementioned experimental strands. Section 3 moves on to the design of the experiment and explains the specific framing procedure in detail. Section 4 discusses standard theoretical predictions and hypotheses of the given coordination game. Then, I present the results of the research. Finally, I interpret the general applicability of my experiment's findings –without losing sight of experimental limitations for external validity.

2. Literature Review

In this section I outline the most relevant experimental literature related to this study. Firstly, I review findings on the effect of democratic institutions. Secondly, I focus on related experiments in committee voting.

A relatively small experimental literature has dealt with what Markussen *et al* (2014a) dub the “dividend of democracy”. What they mean is that an elected institution is able to increase efficiency, compared to an identical, exogenously imposed institution. To the author’s knowledge, the first to present the effect were Tyran and Feld (2006). They examine the effects of non-deterrent and deterrent sanctions on the provision of a public good in a laboratory experiment. They find contribution rates of 64 percent for non-deterrent sanctions that are endogenously chosen, while contribution rates drop to 38 percent when exogenously imposed. In a related study Markussen, *et al* (2014a) extend the previous experiment by incorporating a dimension of formal sanctions. They find that average contributions and earnings are about 30 percent higher for endogenously applied informal sanctions. Furthermore, significant differences exist for formal sanctions, albeit lower in magnitude. In a follow-up study conducted by Kamei *et al* (2015), the design is again extended, as it is now possible to vote on the parameters of the formal sanctions. Results of the previous study are replicated, the contributions increase when informal sanctions are endogenously chosen. In another public goods game with endogenously implementable punishment and reward possibilities, Sutter *et al* (2010) confirm findings of significant contribution differences between endogenous and exogenous implementation of the institution. In addition, Kamei (2014) studies spillover effects of endogenous informal sanctions in two consecutive public goods games. He finds that subjects contribute significantly more when sanctions are endogenous chosen, even in the second game when these participants are assigned to new group members who experienced exogenous informal sanctions in the first game.

Dal Bó, *et al* (2010) study a version of a repeated prisoner’s dilemma game. Their results show that in the endogenous treatment individuals choose the cooperative strategy 50 percent more often than in the control treatment, while in the exogenous treatment they play the cooperative strategy only 36 percent more often than in the control treatment. In particular, their paper contributes to the problem of selection effects, which is a common issue in these experiments.³ Riedl and Ule (2002) also study the repeated prisoners’ dilemma game, but in a network framework. They observe that cooperation increases significantly when the network structure is endogenously chosen,

³ I will address the selection problematic further below.

in contrast to an exogenous network treatment. Probably the most interesting evidence towards the external validity of the institutional effect is the field experiment conducted by Olken (2010). He examines Indonesian villagers who were randomly assigned to choose development projects. The decision procedure of projects differed as they were chosen either in a representative based meeting or in a direct election-based plebiscite. A representative decision does not perfectly mimic an exogenously imposed treatment; nevertheless, he concludes that projects which were directly chosen substantially increased legitimacy and satisfaction among villagers, who also reported a higher willingness to contribute.

A study which does not replicate significant efficiency improvements of endogenous institutions has been conducted by Markussen, *et al* (2014b). Their results suggest that endogenous implementation of competition in a public goods game does not foster cooperation compared to exogenous implementation of competition. They reason that choosing a competitive institution does not provide information about the group member's cooperativeness.

The second line of research on which the experiment is based has a richer literature. Committee voting is a research area that deals with electoral institutions and aims to predict the outcome of a vote depending on the voting rule, the aggregation mechanism and agenda control.⁴ The focus lies on the institution, which in experimental settings might include variations in the voting rule, such as compulsory and voluntary voting, or majority and unanimity voting rule. Further variations may involve group sizes, signal quality, or information costs. Some experimental work has tested the predictions of Bayesian Nash equilibria of a theoretical framework and other independent experimental studies have examined their own design. Independent of the framework, I focus on studies on group voting with a common interest and private information and refrain from discussing work on agenda control and studies on multicandidate elections with distinct preferences.

Building on the work of Condorcet (1785), Austen-Smith and Banks (1996) as well as Feddersen and Pesendorfer (1996, 1997) were some of the first scholars to relax

⁴ The analysis of aggregate outcome is based on the analysis of individual voting behavior (for example, the paradox of voting, the swing voter's curse, strategic voting, learning, etc.), for a summary see for example Kittel and Marcinkiewicz (2012).

assumptions and extend the theoretical model of information aggregation. Feddersen and Pesendorfer show that less informed agents rationally prefer to abstain from a vote even when voting is costless, a phenomenon they call the “swing voter’s curse”. It is rational to abstain in the sense that the vote of less informed agents undermines the vote of better informed agents. The predictions of the model are tested in a laboratory setting by Battaglini *et al* (2010). They vary information quality and group size among other parameters, and their results support the Feddersen and Pesendorfer model. Morton and Tyran (2011) replicate the experiment of Battaglini *et al* (2010), and in particular show that less informed voters also abstain when the difference between less informed and better informed voters is low, which is not Pareto optimal. In a related study Morton and Tyran (forthc.) show that abstention decreases if there is a chance that the expert is corrupt. Further theoretical research introduces information costs to Condorcet’s basic model, such as Mukhopdhyaya (2003), Persico (2004), Martinelli (2006) or Gerardi and Yariv (2008). In addition, experimental research has also examined costly information acquisition. Bhattacharya *et al* (2013) experimentally study compulsory and voluntary voting and differentiate between costless and costly information within the category of voluntary voting. They find that in their design, strategic, insincere votes increase in the compulsory voting treatment, in contrast to the voluntary voting treatment, where subjects are able to abstain strategically. Furthermore, in voluntary voting treatments participants vote more often than predicted by theory. Shineman (2013) also conducts an experiment in order to compare compulsory and voluntary voting modes with costly information acquisition. Participants individually play the game against the computer. Her results suggest that informed voting increases in compulsory ballots, without increasing uninformed voting.

The two studies most closely related to the author’s approach in terms of the experimental design are by Großer and Seebauer (2013) and Elbittar *et al* (2014). Both papers deal with binary decision problems of groups, with costly, imperfect signals. The groups need to choose between alternatives, and in accordance with a majority vote. Most importantly for comparison with the experiment presented here, voters are able to acquire independent information endogenously, but abstention and uninformed voting is equally possible. Großer and Seebauer (2013) compare 4 treatments, varying the institution by compulsory and voluntary voting within a session and group size with 3 and

7 committee members, respectively. Their results suggest that uninformed voting is quite common among individuals. In more than 25 percent of all cases with voluntary voting, subjects vote without any information. The share of uninformed voting is even higher in compulsory votes, with more than 50 percent. Elbittar, *et al* (2014) also compare 4 treatments and vary the group size (three and seven) and the institution by majority and unanimity rule. Information costs are assigned randomly and individually to each participant each round. They find that uninformed voting exceeds 40 percent, but claim that their model, which makes use of the quantal- response equilibrium (McKelvey and Palfrey, 1995), accounts for the observed errors. In contrast to both studies, this thesis compares the institution, whether it is endogenously chosen or exogenously imposed, with a fixed group size of seven and varying, but non-random, information costs.

As mentioned above, I combine the two strands of literature together with a novel framing procedure, which will be explained in detail in the following section.

3. Experimental Design

The experiment consists of three consecutive parts. The first part is the main subject of interest and the experimental procedure will thus be explained in great detail. In the following I will discuss the overview of the underlying design, the framing of the experiment, the selected parameters, and the decision sequence. After the main part, participants play a one shot public goods game followed by a short questionnaire. Lastly, I discuss potential controversies related to the design.

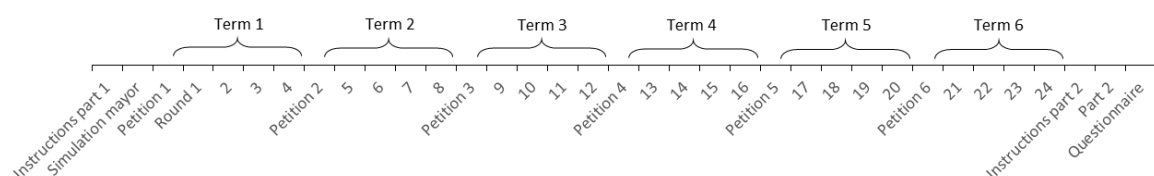


FIGURE 1
Timeline of the experiment (endogenous treatment)

3.1. Main experiment

In groups of n players and 24 consecutive rounds, the participants' task is to come to a decision regarding two alternatives, A and B . A priori, either of these alternatives is equally likely, independent of previous rounds and the subjects do not know the state of the world, ω_A or ω_B . If ω_A is the true state of the world and the group reaches alternative A , or if ω_B is the state of the world and the group reaches alternative B , each member receives a payoff $b_i = b > 0$. In this case, the payoff corresponds to the beneficial or "correct" decision of the group. Otherwise, when the state of the world does not correspond to the alternative, each group member receives a payoff of zero.⁵

There are two possible paths to reach a decision. One possibility is that the computer decides for the group. The computer's choice is equal to the correct state of the world with a probability of $q \in (0.5, 1)$. The other option is for the group to hold a majority vote over the alternatives. In order to make a decision, subjects have the possibility to simultaneously acquire a private, independent signal $s_i \in \{s_A, s_B\}$. The signal s_i in the state of the world ω_i states the correct alternative with a probability of $p \in (0.5, 1)$.⁶ The costs of the signal are identical for all group members $c_i = c > 0, \forall i$. As stated in the Condorcet Jury Theorem, the expected probability that the decision of the majority vote is correct increases with the number of informed participants, i.e. subjects who acquired a signal. Whether it is rational to acquire a signal depends on the number of informed group members m , the level of c and q . The game theoretic predictions of individual behavior and hypotheses are provided in the theory section of this thesis.

Whether the group or the computer makes the decision is resolved differently in the two treatments. In the *endogenous treatment* subjects vote whether they want to have a majority vote or let the computer decide between the two alternatives. The decision depends on the level of p, q, c and the individual belief β about the number of group members who will get informed. If at minimum four members of the group are in favor of a majority vote of the group, it is executed; otherwise the computer decides. In the *exogenous treatment*, the way the decision is to be resolved is imposed on the

⁵ $U(\omega_A, A) = U(\omega_B, B) = b, U(\omega_A, B) = U(\omega_B, A) = 0$

⁶ $Pr(s_i = s_A | A) = Pr(s_i = s_B | B) = p \in (0.5, 1)$ and $Pr(s_i = s_B | A) = Pr(s_i = s_A | B) = 1-p$

participants. The main analysis in the results section of the master's thesis addresses the differences between these two treatments.

Framing

In order to help participants understand the instructions in a non-abstract way, the experiment is framed. I will explain the framing of the instructions in detail for two reasons: Firstly, it is unusual in economic experimental research to have such a “colorful” explanation of the design and it can be regarded as a novelty compared to previous empirical research on committee voting.⁷ Secondly, it is important to understand how the experiment is framed, as I discuss the framing procedure further in the “potential controversy” section and when discussing the results.

Each group represents seven citizens in a city. The city plans to construct 24 buildings in the following rounds. If a project is built successfully every member of the city benefits from the new building equally. For example, one project could be constructing a bridge which expedites deliveries between the inner city and the suburbs. For each project two construction firms apply, one of which has the necessary expertise to construct the building, and the other makes mistakes resulting in the project not being approved by the building authority. The aim of the city is to assign the projects to the firms such that as many projects as possible are successfully constructed. At the end of the experiment one round is picked at random and every member receives 25 Euros if and only if the project was successfully constructed in that very round.

The project may be assigned by the mayor, represented by the computer, or through a majority vote of the seven citizens. There are two types of mayors – experienced and inexperienced. The experienced mayor chooses the more competent firm in 90 percent of cases, whereas the inexperienced mayor only chooses the more competent firm in 60 percent of cases. Before the start of the experiment the subjects learn to assess these percentages. In a simulation, experienced and inexperienced mayors make decisions for 24 buildings. The outcome can be observed and repeated as often as the participant wishes within two minutes.

⁷ Other experimental studies have made use of a colorful framework before, such as Deck and Johnson (2002).

In the majority vote scenario the participants are able to privately make inquiries that help them to choose the better firm in 60 percent of the cases. The costs of acquiring information are 0.10, 0.90 or 1.70 Euros and are subtracted from the total payoff if the round is drawn. The participants are told that the likelihood of choosing the more competent firm increases with the number of informed voters. The 24 projects are divided into 6 legislative terms, with 4 projects each. During every legislative term information costs and the experience of the mayor stay constant. Participants are fully aware of the parameters in every situation of the experiment.

To ensure that the participants understand the instructions, they also have to answer control questions. The experiment only starts once all questions have been correctly answered by all subjects.⁸

Parameters

There are two levels of p : $p_e = 0.9$ and $p_u = 0.6$; three levels of c : $c_l = 0.1$, $c_m = 0.9$ and $c_h = 1.7$; and $q = 0.6$, $n = 7$; $b = 25$. In the six legislative terms the combinations of these parameters stay constant: $p_u \times c_l$, $p_u \times c_m$ (twice), $p_u \times c_h$, $p_e \times c_l$, $p_e \times c_m$. Since it is assumed that the participants will prefer to let the computer decide with $p = 0.9$ in most cases, $p_e \times c_h$ is relinquished and a second combination, $p_u \times c_m$, is implemented instead. Computerized decisions do not provide observations which can be compared across treatments. Parameter combinations are conducted in random order in the endogenous treatment. The exogenous treatment basically mirrors the endogenous treatment in the ordering of the parameter combinations, in order to test and for possible ordering effects later. Each group $G_{i,exo}$ corresponds to exactly one group $G_{i,endo}$. In other words, the order of parameter combinations (say $p_u \times c_h$, $p_e \times c_m$, ...) in the first session of the endogenous treatment for example, is exactly equal to the first session of the exogenous treatment (also $p_u \times c_h$, $p_e \times c_m$, ...).

Sequence of a Legislative Term⁹

Each of the six legislative terms includes exactly four rounds. There are two paths to determine the course of action in these four rounds. In the endogenous treatment, at the beginning of each legislative termsession, the group can decide whether they want the

⁸ The full instructions and control questions are provided in the appendix.

⁹ The decision tree is depicted in Figure 12 in the appendix.

computerized expert, or the majority in a vote, to assign the project for the next legislation. In the terminology of the experiment this is called *petition* (“Unterschriftensammlung”) and turns the following institution into a democratically chosen one. They receive a pseudonym for the entire experiment and write the name in a box if they are in favor of a group vote. If they are in favor of the expert, they have to type “No, thanks” (“Nein, danke”) into the box. If four or more subjects prefer a majority vote, it is executed. In fact, the collective decision is akin to a vote on the institution. In the exogenous treatment decision-making is imposed on the group. Each path in group $G_{i,exo}$ corresponds to the selection of the path in group $G_{i,endo}$.¹⁰

During a decision sequence carried out by the computerized expert, the participants in each round receive a multiple-choice question with four possible answers, of which only one is correct, which they can answer voluntarily. The intention is to give the participants an alternative to voting, to ensure that results are not driven by boredom. No additional payoff can be earned by answering the questions, and the correct answers are given after the experiment. At the end of the round, participants see the firm selected by the expert, as well as the competent firm and the payoffs. The sequence is repeated in four rounds until the next legislative term begins or the first part of the experiment ends.

In the other path, the majority vote, each member is able to purchase costly information. The subjects have to give an estimate, between zero and six, of the number of group members who they believe are going to purchase information. If the estimate is correct they receive 0.10 Euros additionally in this round.¹¹ Afterwards, independent of information acquisition, the participants are asked whether they want to vote or abstain. If a participant abstains she receives a single choice question with two choices, which she can answer voluntarily. A correct answer brings no additional payoff. Otherwise, one of the two alternatives has to be voted on. The votes are counted and the alternative favored by the majority is selected. In case of a tie, an alternative is selected randomly. Finally, subjects observe the results of the round, which include the number of informed group members, the selected firm, the competent firm and their payoffs. The sequence is

¹⁰ This is discussed in more detail in the “potential controversy” section.

¹¹ The belief premium is chosen as a small amount greater than zero. Therefore the estimate is theoretically incentivized without affecting equilibria.

repeated in four rounds until the next legislative term begins or the main experiment ends, after six terms.

3.2. Public Goods Game and Questionnaire

After the main experiment a standard one shot public goods game follows:

$$\pi_i = (e - x_i) + a * X, \text{ where } n = 3, e = 8, a = 0.5, \text{ and } X = \sum_{i=0}^n x_i.$$

Participants receive the instructions after the main experiment has finished.¹² Subjects are randomly matched in groups of three. Before allocating a share x of the endowment e to the public good, they have to provide an estimate of the average contribution of the other group members. The contribution of all group members X is multiplied by the factor a and distributed to all group members. Profit π_i is added to the total payoff of the experiment and paid in Euros at the end of the experiment. Finally, before getting paid, the participants have to answer a short questionnaire on social capital, for which they are paid 3 Euros. Questions are related to the experiment, individual attitudes to direct democracy, democracy in general, reciprocity and trust.¹³

3.3. Potential Controversy Related to the Experimental Design

Two points of potential controversy can be detected. For, due to framing, control over the experiment might be lost. Secondly, groups who select into the endogenous treatment can only be compared imperfectly to the exogenous groups, since the latter might not have selected into the same path had they been able to choose. I will discuss the general problems here and return to some of the problems in the results section.

Typically, experimental research aims to keep laboratory situations artificial in order to analyze the question of interest under complete control of incentives (Camerer, 2003). Only if all incentives are controlled, causality between two effects can be detected accurately. In the case of this study however, the preceding experiment by Mario Krapfenbauer, which was carried out in line with the common research tradition, shows that boredom may drive the results. Groups which leave the decision to the computerized expert are not engaged in any decision making, which leads to latencies. In

¹² The full instructions are provided in the appendix.

¹³ The list of questions is provided in the appendix.

order to avoid long waiting times and to have something to do instead, subjects are willing to give up part of their payoff. Unfortunately, it is not possible to compensate for latencies by raising incentives since the magnitude of this effect is not entirely clear. Without knowing the exact magnitude, control over the other incentives is lost. In turn, an intuitively understandable framework and trivia tasks may have more advantages, even though some control is lost. The challenging task for the experimenter is to keep any kind of impact on behavior due to framing effects as low as possible.¹⁴ Another interesting argument in favor of experimental framing is made by Eriksson and Strimling (2014). In their online experiment they replicate label framing effects of a public goods game, when the game is labeled “The Teamwork Game” participants contribute more than without any label. However, the share of participants who independently and spontaneously associated the game as a teamwork game in the neutral treatment contributed almost as much as framed participants. This suggests that framed experiments provide more control, as it is not possible to control for spontaneous associations in artificial experiments.

Groups which select into a path in the endogenous treatment can only be compared to groups of the exogenous treatment if these would have selected into the same path had they been given a choice. Since people are not homogenous in their preferences to vote, it is a theoretical possibility that 4 or more subjects with the same unobservable trait form part of a group. This can be either a special sort of person who strongly prefers to delegate decisions to others, or who gains additional benefit by making decisions. For example, Dittmann *et al* (2014) find that subjects are willing to pay a premium for participating in a vote without gaining further benefit.

In a simple example, assume a population $\Omega = \{a, b\}$, in which people of a -type and b -type are identical except in one characteristic, that is the utility function of type b increases when they are able to vote. Let α be the number of a -types and β be the number

¹⁴ For example, to obtain the names for the pseudonyms in the experiment, a list of last names were read to a small sample beforehand. The names should not be associated with anyone and be as neutral as possible. Additionally, the multiple-choice question should not attract a special sort of person, e.g. be related to education or intelligence. One of the 24 questions is: “Which of the following sports has the longest field: basketball, tennis, volleyball or water polo.” People generally do know these sports and have some idea about the length of the fields but rarely have precise knowledge. The full list of questions is provided in the appendix.

of b -types, with $\alpha \gg \beta$, i.e. there are much more a -types than b -types in the population Ω . Both types have a concave utility function $U_a(w)$ and $U_b(w,v) = U(w) + U(v)$ with $U' > 0$, where w is the total payoff and v is an additional payoff received through the voting process. By chance a group $G_{i,endo} \in \{a,b \mid \alpha < \beta\}$ is compiled and compared to a group $G_{i,exo} \in \{a,b \mid \alpha > \beta\}$. If $EU(w(p)) > EU(w(q))$, but $EU(w(p)) - EU(w(q)) < EU(v)$, then $G_{i,endo}$ and $G_{i,exo}$ would select into two different paths, because the majority decides. Of course, if $G_{i,exo}$ is forced exogenously to hold a group vote, then it is not possible to assign differences in behavior solely to the treatment effect, but behavior will also differ as a consequence of the different utility functions. Generally the process of randomization on average neutralizes these sorts of problems; however, the design does not allow realization of the opposite case. If $G_{i,endo} \in \{a,b \mid \alpha > \beta\}$ and $G_{i,exo} \in \{a,b \mid \alpha < \beta\}$, then $G_{i,exo}$ is forced to delegate the decision and no differences between $G_{i,endo}$ and $G_{i,exo}$ can be observed. To put it in a nutshell, the design faces the theoretical problem of not being able to ascribe causality solely to the treatment. Nevertheless, I argue that given the research question, it is, practically speaking, still an appropriate design. Group constellations with a majority of people with such a trait are probably rare. Furthermore, if differences between $U(w(p))$ and $U(w(q))$ are large, then the threshold of additional utility of v needs to become very high in order to be effective. If $U(v)$ has a natural upper bound, which I regard as realistic, and $U(w(p)) - U(w(q))$ is above that bound, the theoretical problem vanishes. In other words, if there is a maximum c that people are willing to give up in order to vote, and the expected difference between utility of voting and delegating is higher than this value, there is no selection effect. An experimental study which addresses this theoretical problem in particular was conducted by Dal Bó *et al* (2010). They found that 8 percent of observed behavior can be ascribed to self-selection and that democratic institutions still drive cooperative behavior significantly.

4. Predictions

While the previous section explains the design of the experiment, I will now focus on game theoretic predictions and hypotheses. Firstly, individually rational behavior and game theoretic equilibria in pure and mixed strategies within the majority vote are examined.¹⁵ In a second step, if predictions of the majority vote are known, they are compared to the computerized expert and theoretical preferences between the two paths are declared.

The main idea of the experimental design is based on the *Condorcet Jury Theorem* (1785). The theorem states that a group's probability of arriving at a correct decision increases with the number of voters. It refers to a majority vote on a binary decision problem and the condition is that the voters have an independent probability above 50 percent to choose the correct answer. In a vote with simple majority rule the person who is pivotal determines the outcome of the vote. Intuitively, the more people vote the more likely the pivotal voter has the correct information, because the distribution of correct information converges to the probability that the information is actually correct. In the experimental framework, even when information is costly, it might in expectation be individually beneficial to arrive at a decision through a majority vote rather than a costless decision with a fixed probability of success. In the terminology of the design, it is sometimes preferable to decide on the firm through a majority vote; and sometimes it is preferable to delegate the decision to the mayor. This depends on the cost level, the quality of the computerized expert and the individual belief about the number of group members who will become informed. Basically, acquiring information has a similar nature to contributing to a public good and since it is costly, there are free rider incentives. While the aggregate has a strong impact on the payoffs, voters realize that their own influence is low. Literature deals with that problem in the "paradox of voting": the larger the group the more they are able to improve the decision in aggregate but the lower the incentive of one individual is to vote, as the probability to be pivotal decreases. In this and the following part, equilibria within the majority vote are examined.

¹⁵ I will focus on symmetric mixed strategies.

4.1. Pure Nash Equilibria

First, let the individual strategies be defined. Acquiring information and voting against the signal, acquiring information and abstaining from voting as well as uninformed voting is always irrational for the “homo economicus”, because expected payoffs decrease. Voting against the signal decreases the probability of making the correct decision, while purchased information which is not used has costs without any benefits that are reflected in higher payoffs. Whether uninformed voting decreases the probability of choosing the correct state of the world or leaves the probability equal depends on the number of informed participants, but as the quantity of informed voters is a priori not known it is still the dominant strategy to abstain. In this sense, these strategies are disregarded in the analysis, which means that acquiring information implies voting too and not getting informed implies abstaining.

Hypothesis 1: *Group members who do not acquire information abstain from voting and committee members who acquire information vote according to their signal.*

Therefore an individual i has the following strategy set: $\sigma_i = \{\sigma^i, \sigma^u\}$, where σ^i denotes the informed and σ^u the uninformed strategy. Let m be the sum of players with strategy σ^i . The aggregate probability of success π is calculated as follows:

$$\pi(m) = \sum_{i=\frac{m+1}{2}}^m \left(\frac{m!}{(m-i)! i!} \right) (q)^i (1-q)^{m-i}, \quad q = 0.6$$

Plugging in the parameters accordingly computes the expected probabilities of success, displayed in Table 1. While the probability of success of one informed player is equal to the probability of his signal, seven informed players improve the probability up to 71 percent. In pure strategies an individual plays an informed strategy if the additional expected payoff is higher than the information cost: $[\pi(m) - \pi(m-1)] * b \geq c$; $b = 25$, $c = \{0.1, 0.9, 1.7\}$.

Table 1 also depicts the individual expected, additional payoff of acquiring information for every number of informed group members. The aggregate probability improves only if an additional voter can break a tie with his information.¹⁶

¹⁶ For a detailed explanation see Mario Krapfenbauer’s master thesis.

TABLE 1. Additional expected payoff of getting informed and pure equilibria for each cost level

m	$\pi(m)$	add. payoff	$c = 0.10$	$c = 0.90$	$c = 1.70$
0	0.0%	-			
1	60.00%	2.5	*	*	*
2	60.00%	0			
3	64.80%	1.2	*	*	
4	64.80%	0			
5	68.26%	0.87	*		
6	68.26%	0			
7	71.02%	0.69	*		

Note: "*" marks pure Nash equilibria.

Since average success increases for any even number of informed participants and information acquisition is costly, only an odd number of informed participants can form a Nash equilibrium. Hence, subjects face a coordination game. It is not clear at which equilibrium the group will coordinate. It is also only possible to maintain a stable equilibrium after several rounds, due to coordination failures. However, the lower the costs are, the more pure equilibria exist. For example, given that 4 group members are already informed, the expected additional payoff of getting informed is 0.87 Euro. Therefore, it is individually rational to acquire information for any costs smaller than 0.87, within the experimental parameters that is only low costs. Figure 2 depicts individual payoffs, where the costs of getting informed are already subtracted from the additional expected payoff. Positive values mark pure equilibria for each cost level. To put it in a nutshell, m should decrease if c increases.

Hypothesis 2: *Higher information costs reduce the number of informed voters.*

Results will also clarify whether participants are able to figure out the equilibria and how they are related regarding their beliefs β about informed voters.

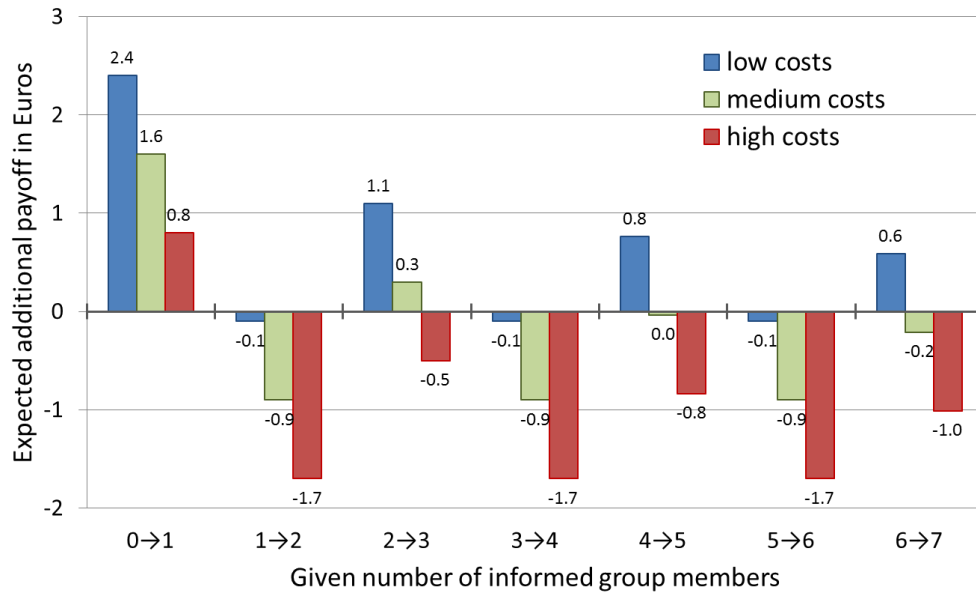


FIGURE 2
Additional, individual, expected payoff per cost level

Note: bars at “0→1” are to be interpreted as the additional expected utility of an individual who will acquire information, given there are no other informed group members for each cost level. For example, if no other group member is informed, the individual, additional, expected payoff is 2.4 for low costs. The other bars can be interpreted correspondingly. Note also that reported payoffs in the figure are rounded to the first decimal place. For example, given four informed group members the individual, additional, expected payoff is equal to -0.03 with medium costs, which is rounded to 0.0.

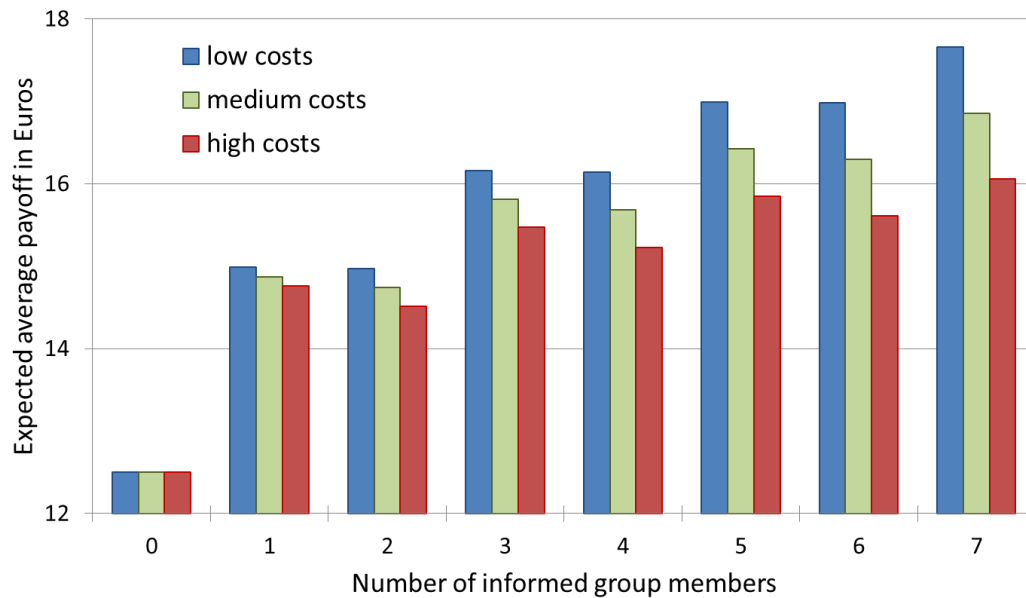


FIGURE 3
Expected average payoff per person

Pure strategies determine the individual rational behavior, given a belief about the informed participants. More information can be provided by looking at the game from a public good perspective. In fact, total utility of the group tends to increase for any odd quantity of informed voters, independent of the implemented cost level, as shown in Figure 3.¹⁷ Figure 3 furthermore shows that an optimal result is achieved for the entire group if all seven group members are informed. This means that an individual who is solely socially concerned should always acquire information, irrespective of the number of informed voters.

4.2. Symmetric Mixed Equilibria

The previous section gives predictions of rational behavior for a given number of informed participants. In mixed strategies, rational agents are able to randomize their strategies such that they are indifferent between acquiring information and abstaining from voting. The underlying principle is the same as in pure strategies: a rational agent is willing to purchase information if the expected utility of becoming informed is higher than the expected utility of being uninformed. When every agent is assumed to optimize the individual payoff equally, actions are symmetric. The indifference condition¹⁸ is given by:

$$\begin{aligned}
 EU_i^{NI} - EU_i^I &= 0 \\
 EU_i^{NI} &= \sum_{k=0}^{n-1} \left(\frac{(n-1)!}{((n-1)-k)! k!} \right) r^k (1-r)^{(n-1)-k} \pi(k) b \\
 EU_i^I &= \sum_{k=0}^{n-1} \left(\frac{(n-1)!}{((n-1)-k)! k!} \right) r^k (1-r)^{(n-1)-k} \pi(k+1) b - c \\
 n &= 7, b = 25, c = \{0.10, 0.90, 1.70\}
 \end{aligned}$$

k is the number of informed voters not counting the subject itself. r is the variable of interest and states the probability of acquiring information according to the randomization of strategies.

¹⁷ In the appendix Figure 13 additionally shows the average additional payoff per person.

¹⁸ Index NI refers to "Not Informed", Index I to "Informed".

After simplification I obtain¹⁹:

$$(1.37r^6 - 4.52r^5 + 6.34r^4 - 4.88r^3 + 2.22r^2 - 0.60r + 0.10)b - c = 0$$

Now the real solutions for $0 < r < 1$ for every cost level can be calculated: $r_l > 1$, $r_m \approx 0.22$, $r_h \approx 0.07$.

Hypothesis 3: *If subjects play mixed strategies, the share of informed subjects is 100 percent for low costs.*

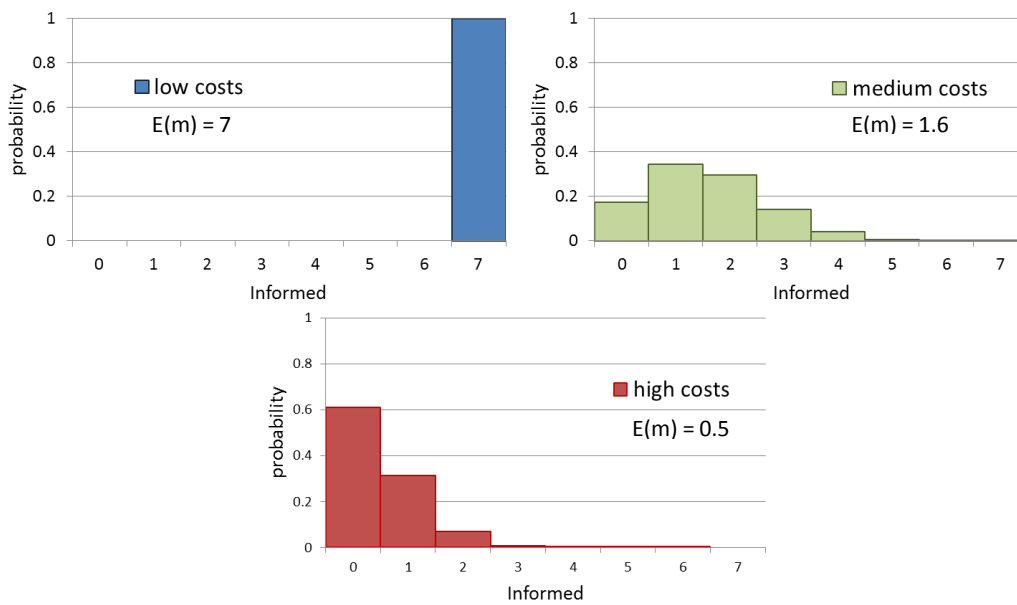


FIGURE 4

Binomial distribution of informed participants per cost level and per group in mixed strategies

Figure 4 provides the predicted binomial distributions within a group for each cost level. While agents randomize strategies such that they purchase information in 22 percent of the cases for medium costs and only in 7 percent of the cases for high costs, for low costs it is always optimal to acquire information. In fact, for low costs we face a degenerative equilibrium which shows that it is always optimal to play the informed strategy. Therefore, the expected number of informed participants is equal to seven. This means that, unlike in pure equilibria, we have one clear prediction for low costs.

Furthermore, for medium costs it is most likely that one person is informed. However, the binominal distribution is relatively flat and standard theory gives no clear prediction.

¹⁹ Real numbers are rounded on the second decimal place.

Similarly for high costs, in more than 60 percent of cases, all subjects play the uninformed strategy, but we have no clear prediction. In a majority of cases of randomized strategies both cost levels realize inefficient outcomes. This fact already hints towards the decision between group vote and the computerized expert in the earlier stage.

4.3. Delegation of Decision-Making

In the endogenous treatment, the subjects choose whether to implement a majority vote or to delegate the decision to the computerized expert. For the sake of simplicity, I will call them *path V* and *path C* in this section. According to the principle of backwards induction, participants are in favor of the path which provides them with the higher expected utility. The expected utility of *path C* is easily calculated:

$$EU_t^M = p * b, b = 25, p = \{0.6, 0.9\}$$

As 90 percent is a much higher percentage than any success percentage a group is able to achieve, the clear prediction is that in this case *path C* is always preferred. The expected payoff is 22.50.

Hypothesis 4: *If the computerized expert finds the correct state of the world with a probability of 90 percent, groups will always select into path C.*

The more interesting case is when the computerized expert decides the correct state of the world with a 60 percent chance. The expected payoff of *path C* is 15. In pure equilibria *path V* is only preferred if strictly more than 2 subjects acquire information. If just one subject gets informed, players are only indifferent if they do not have to bear the costs of acquiring information. Since there exists no equilibrium in the high cost case with more than one informed participant we can exclude *path V* for high costs.

Hypothesis 5: *If subjects play pure strategies, then for high costs the committee selects into path C.*

There are no further predictions for the other cost levels in pure strategies because it is not clear at which pure equilibrium the group will coordinate. Indeed, the individual belief β about k and the principle of forward induction could give hints on which equilibrium the group would coordinate, but things are not clear. I assume that in the very first round β partly depends on the cost level, but is partly exogenously given. Afterwards, belief β likely also depends on the number of informed players m of the previous round(s), as subjects

update β every round. It is difficult to compare β across groups as the parameter combinations are in random order. That leaves me with the insight that it is necessary to test for ordering effects.

With the randomized strategies I am also able to calculate the expected payoff of the mixed equilibrium and determine the path groups are predicted to choose.

$$EU_i^V(r) = \sum_{m=0}^n \left(\frac{n!}{(n-m)!m!} \right) r^m (1-r)^{n-m} \pi(m)b - c * r$$

$$(1.36608r^7 - 5.26963r^6 + 8.87376r^5 - 8.54r^4 + 5.18r^3 - 2.1r^2 + 0.7r + 0.5)b - c * r = 0$$

$$n = 7, b = 25, c = \{0.10, 0.90, 1.70\}, r = \{1, \approx 0.22, \approx 0.07\}$$

The expected individual utility for low costs is $17.66 + 0.1\alpha_i$, which is higher than the expected utility of *path C*. Note, that $\alpha_i \in [0, 1]$ is the individually, expected probability to guess the correct number of informed participants and 0.1 is equal to the belief premium. The belief premium does not drive the results, for any α_i . The expected utility for medium and high costs is $14.80 + 0.1\alpha_i$ and $12.57 + 0.1\alpha_i$ respectively, which is lower than 15, the expected utility of *path C*. Therefore in mixed strategies I obtain clear predictions for all three cost levels and only one of them supports *path V*.

Hypothesis 6: *If subjects play mixed strategies, then for high and medium costs the committee selects into path C. For low costs the committee selects into path V.*

4.4. Treatment Effect

On the one hand, analysis addresses the question of whether predictions of standard theory are in line with observed behavior and how well the collective decision-making works in groups. On the other hand, I am interested in whether a democratic institution improves the efficiency of the majority vote. As shown in previous research, a democratically chosen institution increases cooperation. This may happen for two reasons: Firstly, subjects feel committed to acquiring information if they actively voted for the majority vote. Secondly, participants perceive it as an informal commitment by the group members, which in turn triggers conditional cooperation. In contrast to the endogenous treatment, subjects in the exogenous treatment do not achieve the same effects and are therefore assumed to purchase information less often.

Hypothesis 7: *In the endogenous treatment participants acquire information more often compared to the exogenous treatment.*

The study of Dal Bo *et al* (2010) does not stop at this point. They distinguish between a pure endogenous effect of democracy, which they do not precisely specify, the selection effect and the *institution's informational effect*, which affects conditional cooperation as well.²⁰ They make the proper claim that the democratic institution does not only influence individual behavior per se but the exchange of information and related expectations about the other's action also effect individual behavior. In other words, the individual does not cooperate more because the institution was democratically chosen by herself and the group, but because the other group members chose the democratic institution, which in turn shapes expectations and conditional cooperation. However in my view, there is no harm in also interpreting the vote on the institution as a signaling device. Clearly the democratic choice concerning the decision-making process forms expectations about the partners' future behavior, but a highlighted distinction between endogenous and informational effects is not necessary, as information provided by democratic institutions actually is a key feature of the endogenous treatment.

Finally, as shown above, the social output increases *overall* with the quantity of informed players, independent of the cost level. It is therefore a matter of fact that a higher share of people playing the informed strategy implies increased efficiency.

Hypothesis 8: *As consequence of hypothesis 7, groups in the endogenous treatment receive a higher payoff on average than groups in the exogenous treatment.*

The following section of the master's thesis provides the results of the data analysis and relates them to the hypotheses.

²⁰ They have difficulties to assign causality solely to an endogenous effect first, but argue that in a second trial of the experiment they are able to account for the informational channel, which does not explain differences in behavior.

5. Results

I ran 8 sessions with 21 subjects each, between October and November 2014 at the VCEE (Vienna Center of Experimental Economics). The sessions lasted up to 2 hours and a total of 168 students earned an average of €32.47 each, including the payment from the public goods game and €3 for answering the questionnaire.²¹ I will continue in this section by examining hypotheses 1-3 first, which focus on predictions within path V. The following paragraph deals with the selection of paths and hypotheses 4 to 6. The final part reviews hypotheses 7 and 8 - the treatment effect and efficiency considerations.

5.1. Summary Statistics and Framing Effect

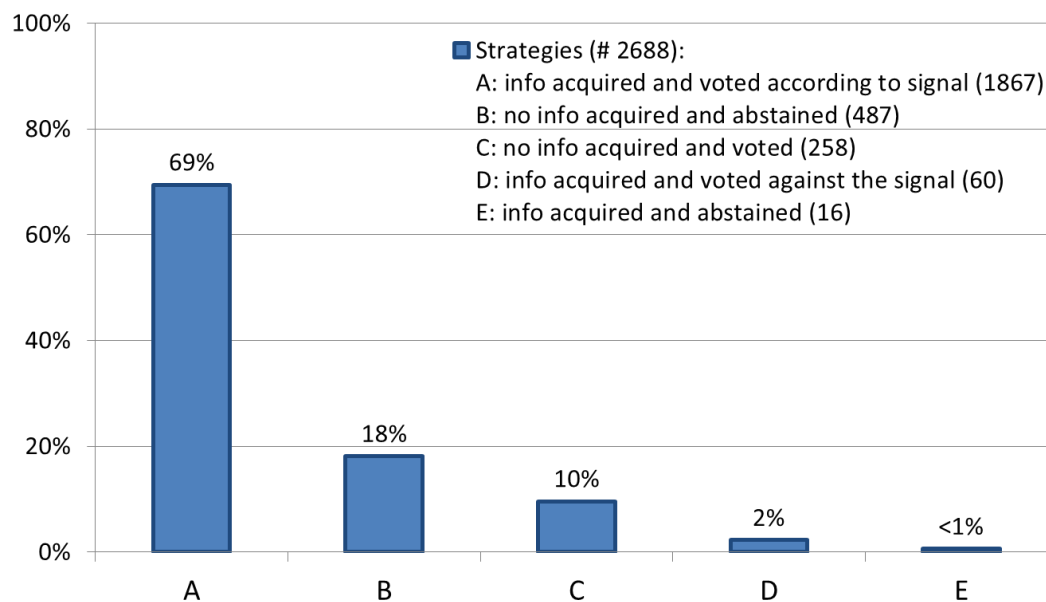


FIGURE 5
Summary statistics

I would clearly argue that the design and the framing procedure helped participants to understand the relatively complex design. Figure 5 shows the 2,688 decisions categorized in 5 strategies. It is a graphical representation of the summary statistics within the majority vote. In about 10 percent of the decisions subjects voted without buying information, in 2 percent of the cases subjects voted against their signal and in a few instances subjects refrained even though they had bought information. Overall, that

²¹ I used z-Tree (Fischbacher 2007) to program the experiment and ORSEE (Greiner 2004) to recruit participants.

makes the sum of irrational decisions approximately 12 percent. Obviously, in contrast to hypothesis 1, a share significantly greater than zero still played irrational strategies, but compared to similar designs, observed irrational behavior was rather small. The share of irrational strategies played in the experiments of Großer and Seebauer (2013) and Elbittar *et al* (2014) exceeded the share here by 2 to 3.5 times.²² Additionally, I can report that subjects seemed to understand instructions well, as people rarely made mistakes in the first try of the control questions before the actual experiment (subjective impression). Unfortunately, I cannot say in particular how much control is lost due to the framing procedure; or how much control would have been obtained by creating a situation which bears no relation for the participants. Cason and Plott (2014) have recently shown that even in “classic” experiments with completely abstracted situations, little details in the design can undermine known preferences. Thus, as an experimental researcher, one will always have to keep in mind how the presentation of the design influences behavior and can never be sure that the experiment is completely neutral.

On the one hand, even though we observe some irrational behavior, the design is quite strong compared to previous research. On the other hand, it is imaginable that some voting in real life is not based on information, even though one has to be cautious by comparing laboratory situations with real-life ones. Still, as I see it, and this point might be seen as trivial or naive, the result underlines that in politics it is also a necessary job of the government, whether in a direct or representative democracy, to provide simple and understandable explanations of complex matters to minimize uninformed voting.

Result 1: *In 87.6 percent of the cases, subjects played a rational strategy.*

²² However, it is difficult to compare the results appropriately as the designs are similar but not identical. Table 4 in the appendix provides a detailed overview and shows that differences are driven by information acquisition and differences between participation rates of uninformed voters are lower in magnitude.

5.2. Comparative Static, Non-equilibria, Learning, and the Flat Payoff Function

Figure 6 provides information about the share of cases in which subjects acquired information. Information acquisition of low costs (Mann-Whitney-U²³ test: $p=0.00$, two-sample-t test: $p=0.00$), and high costs (Mann-Whitney-U test $p=0.00$, two-sample-t test: $p=0.00$), are significantly different from the two other cost levels at the group level²⁴; which shows that the comparative static works, participants understood the game and reacted to incentives. In fact, as predicted by theory and as formulated in hypothesis 2, the number of informed voters is negatively correlated with the cost level.

Result 2: *Higher information costs reduce information acquisition.*

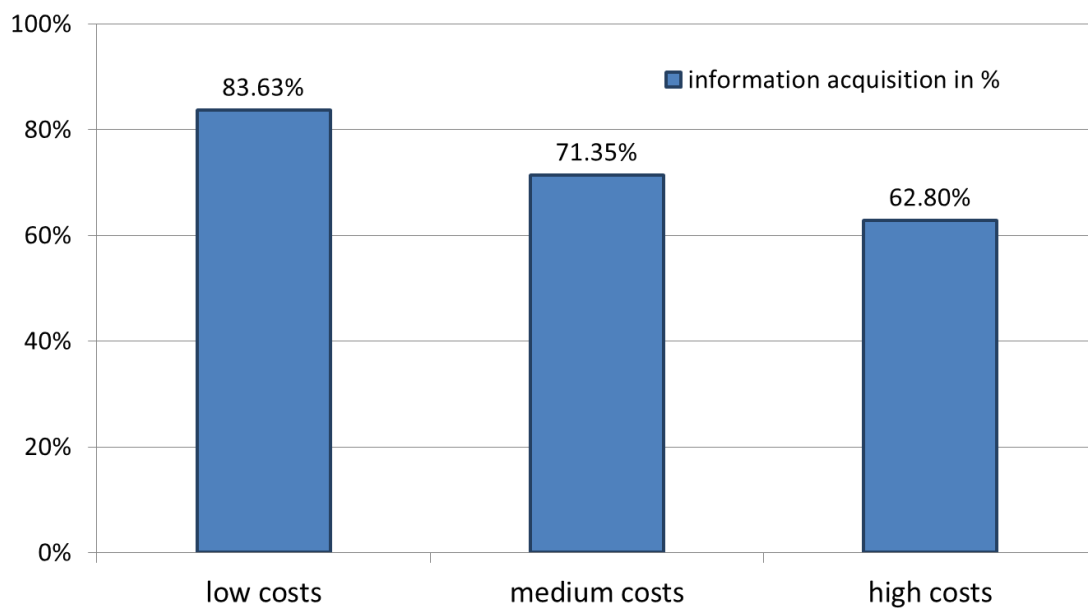


FIGURE 6
Information acquisition

²³ To be more precise, the Mann-Whitney-U test, also referred to as Wilcoxon-rank-sum test, is a commonly used, non-parametric test, which assumes under H_0 that the two samples belong to the same distributions. The two sample t-test compares the means directly, but assumes that samples are normally distributed.

²⁴ Also H_0 , positing that information acquisition for low and medium costs is equal, can be rejected in favor of H_a that more information was purchased when the information costs were low. (Mann-Whitney-U test: $p=0.01$). H_0 , claiming that medium and high cost are equal cannot be rejected at common significance levels (Mann-Whitney-U test: $p=0.17$). Note that tests are clustered on the group level with 12 observations per treatment.

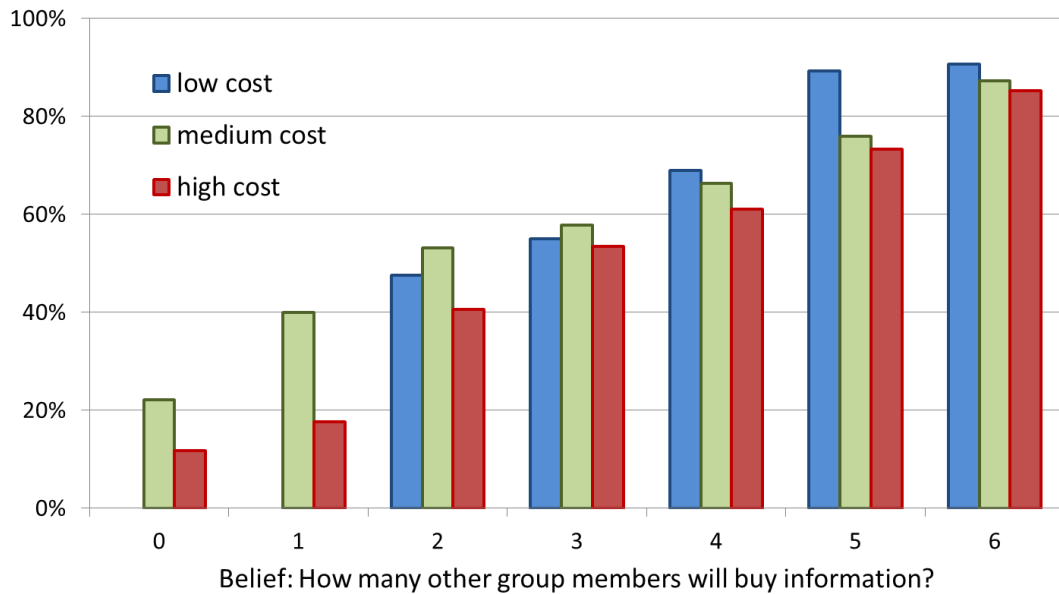


FIGURE 7
Relation between belief and information acquisition

In following step I want to verify whether subjects played pure or mixed strategies or neither of these. Figure 7 shows that it is unlikely that subjects played pure strategies. It plots the belief about the number of informed group members against the percentage of decisions in which subjects acquired information. If subjects play pure strategies one should be able to observe a spike for any even belief for low costs, a spike for a belief at 0 and 2 for medium costs, and one spike at 0 for high costs.²⁵ Descriptive analysis is sufficient to show that bars at the claimed levels are not larger than bars of the same cost level next to them.

In fact, the Figure describes a different pattern, that is, the higher the belief the more likely a subject is to purchase information. There are two explanations for this pattern. It could be either conditional cooperation or a false consensus bias. False consensus would imply that subjects state beliefs adjusted to their own behavior, because they assume that the other group members behave mostly as they themselves do. Conditional cooperation assumes the reverse causality. The participant cooperates (acquires information) conditional on the cooperation of the other group members (the

²⁵ It still makes sense to assume that spikes should be observed when the belief has a distribution. In that case the belief stated in the experiment is the first moment of the distribution. In the sample of decisions the subject still reacts according to the first moment of beliefs in a majority of the cases, although observed differences of the bars could then be smaller.

belief about the number of informed subjects). The question whether false consensus bias can be ruled out is not clear to answer, but false consensus would suggest that subjects make systematic mistakes in stating correct beliefs. In fact, beliefs match the actual number of informed players (correlation 0.55)²⁶ well. Additionally, the belief and the number of informed group members in the previous round are strongly correlated (0.70). This suggests that subjects update their belief according to experience, rather than their own behavior. Hence, conditional cooperation seems to be the better explanation. In fact, conditional cooperation is a common finding in the lab and in the field.²⁷

Result 3: *Beliefs about the number of informed group members and information acquisition are positively correlated.*

The tendency towards conditional cooperation also makes it unlikely that subjects play mixed strategies. Figure 8 compares the distribution of informed participants within a group in mixed strategies with the distribution of the last round groups played at the cost level. It is easy to see that predictions and empirics do not match. Furthermore, if subjects play the informative strategy with 22 percent then the accumulated probability of the observed average information acquisition lying between 19 and 25 percent is 99 percent.²⁸ As the average information acquisition for medium costs is 71 percent, it is unlikely that subjects randomize decisions according to a mixed equilibrium. Similarly, for high costs the accumulated probability is 99 percent that observed average information acquisition lies between 4 and 9 percent. An average of 63 percent is far above this range. For low costs the opposite case is true: information rates do not reach 100 percent as stated in hypothesis 1, but are in fact about 16 percent lower.

²⁶ See Figure 14 in the appendix for a graphical illustration.

²⁷ See for example Cialdini *et al* (1990), Fehr and Fischbacher (2004), Keizer *et al* (2008), or Thöni *et al* (2012).

²⁸ Poisson distribution is used to calculate a distribution of information acquisition over 1544 randomized decisions for medium costs and 772 randomized decisions for low costs.

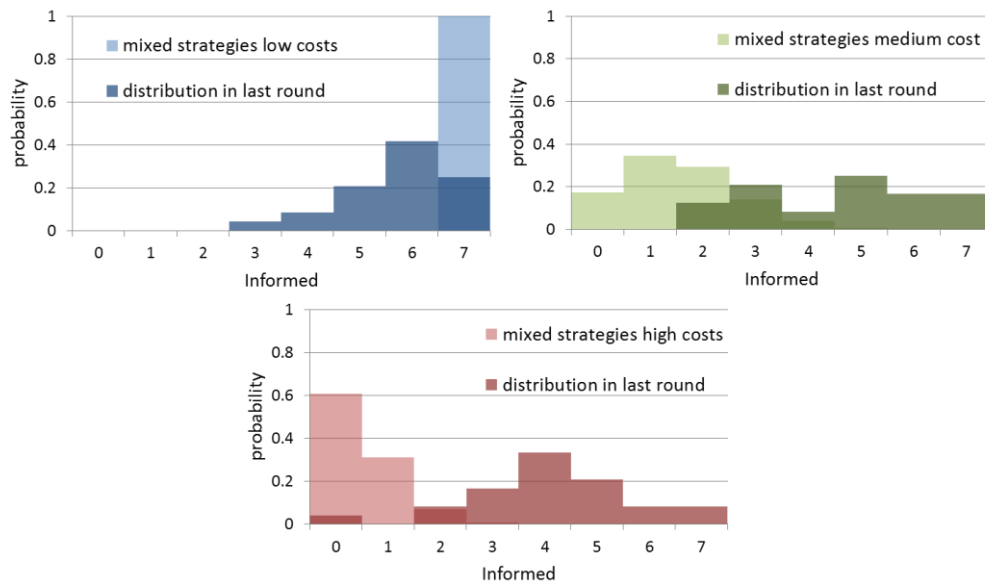


FIGURE 8
Distribution of informed players in mixed strategies vs. actual in the last round

Therefore, neither pure nor mixed strategies are able to explain the observed behavior. The question is why standard theory fails to predict behavior in the lab. One explanation is that conditional cooperation drives the results. But apart from reciprocity there are probably further reasons for the results. One would be that the equilibria within the experiment, whether in pure or mixed strategies, are quite artificial. Of course, it is a difficult task for the participants to calculate the equilibria. Additionally, the non-linear nature of the game is counter-intuitive. We are not “trained” to take note of whether the number of voters is even or odd. In real life situations, such as votes in large populations, the individual vote has almost no influence and people still participate in votes. The common impression might be that the more informed voters there are, the higher the probability of arriving at the correct decision. The heuristic, “the more voters, the better the decision”, challenges the concept of rational, solely self-concerned agents and overlaps with the discussion of the literature on the *paradox of voting*.^{29, 30}

If one is willing to accept that it is difficult for participants to find equilibria, the next immediate question arises: why is behavior not affected by experience and learning? One might assume that simply by observing the payoff over several rounds, participants

²⁹ See for example Downs (1957) as well as Ferejohn and Fiorina (1974).

³⁰ In this context, it would also be possible to make use of the quantal- response equilibrium (McKelvey and Palfrey, 1995) to account for the individual errors.

will manage to reach the equilibria after all and behave *as if* they were rational, as shown in many other experiments.³¹ As noted by Fudenberg (2006, p. 700): “Game theorists have long understood that equilibrium analysis is unlikely to be a good predictor of the outcome the first time people play an unfamiliar game”. Exactly for that reason Figure 8 compares predictions to information acquisition in the very last round, but not to average information acquisition. Figure 15 in the appendix compares the first and last rounds directly. There might be small learning effects detectable for medium and high costs. For medium costs the Figure shows small peaks at 3 and 5 informed group members after 8 rounds. For high costs there is an overall shift to less information acquisition after 4 rounds. However, for small costs the situation is reversed and while groups are initially quite close to equilibrium, they have moved away from it after 4 rounds. The reason for learning not operating effectively might be that the repetitions of rounds are too few, which gives too little time to learn or to coordinate.

From my point of view, the most likely explanation for why standard theory fails to predict the observed behavior is the difficulty of participants to actually observe the probability that the vote is beneficial. Therefore they have no chance to learn. At the end of the day, what participants observe is 1 or 0, success or failure. Participants do not know the likelihood arriving at 1 or 0 and the white noise of a random process makes it even more difficult to observe. For example, the difference between 3 and 5 informed group members is just 3.46 percent. That means even when participants observe 100 decisions with 3 and 5 informed group members each, the difference is very low. Simply put, out of 100 decisions, 5 informed members should reach the beneficial decision in expectation in just 3 to 4 instances more often than 3 informed members. It is obvious that this is not easy to assess. The difference between being off equilibrium with 4 informed group members and in equilibrium with 5 informed group members is equal to €0.87 in expectation, which in 2015 is hardly worth a single loaf of bread in Austria. If information is costly and it is difficult to observe differences, free riding behavior is motivated in addition to conditional cooperation, since nobody wants to be the “sucker”. Ultimately, equilibria are off the table. It is a problem for the theory’s predictions that differences between expected outcomes are low and that the payoff function is rather flat.

³¹ See for example Friedman (1998) or Slembeck and Tyran (2004).

Nevertheless, there are different angles to approach the issue. On the group level the individual additional payoff of €0.87 is more than €6. The power of information aggregation gets more salient when differences of group size increase. For example, whether 1 or 7 group members are informed makes a difference of more than 10 percent, which might already be assessable. Finally, outside the laboratory, expected utility between voting and abstaining is mostly effectively zero. The design of the experiment resembles voters' influence on real votes, except that in the real world voters mostly do not even realize whether they arrive at a metaphorical 1 or 0.

Result 4: *Subjects do not coordinate on predicted equilibria.*

5.3. Delegation of Decision-Making, Selection, and Forward Induction

In all 12 groups the outcomes of the votes on the institution were consistent. When the expert's probability of arriving at the beneficial state of the world was 90 percent, the majority of all groups voted for the computerized expert, independent of the cost level. This result is in line with hypothesis 4 and shows that subjects had clear incentives and that there were no groups which systematically preferred a majority vote no matter what. Indeed, one sixth of the subjects voted at least once against the experienced mayor³², but this reveals another feature of democracy: the smoothing effect of a minority's irrationality. In fact, subjects who voted against the experienced mayor played irrational strategies significantly more often ($p=0.01$) and bought less information ($p=0.00$)³³.

Result 5: *If the computerized expert arrives at the correct state of the world with a probability of 90 percent, groups always choose the expert.*

When the expert's probability to arrive at the beneficial state of the world was 60 percent, then the majority of all groups voted for a majority decision, independent of the cost level. This result is not in line with hypotheses 5 and 6, which predicts selection into the computerized decision, for high costs even in mixed and pure strategies. Again the question is why the benchmark failed to predict behavior. My answer is based on the principle of forward induction. As subjects expected and anticipated high cooperation rates they rationally preferred the majority vote over the uninformed mayor. In the very

³² 11% voted once, 6% voted twice against the experienced mayor.

³³ For both tests I use clustered two sample t-test on subject level.

first round the average belief about the number of informed participants was 5³⁴, which is equivalent to a probability of 68.26 percent of arriving at the beneficial state of the world. In contrast, the computerized expert reached the correct decision with a chance of 60 percent. Unfortunately, causality is ambiguous since the petition may affect the stated belief. In about 10 percent of cases, subjects decided against the majority vote. Only two subjects were always against a majority decision. Subjects who preferred the majority decision acquired significantly more information ($p=0.00$), and made less irrational decisions ($p=0.07$).

Result 6: *If the computerized expert arrives at the correct state of the world with a probability of 60 percent, groups always choose the majority decision.*

To link back to the problem of selection which I discussed above, I cannot be entirely sure whether groups in the exogenous treatment would not have selected into other treatments, but I still think, following the arguments earlier, that the design minimizes the probability of selection effects. According to forward induction, I can rationalize all group decisions. Since all endogenous groups always selected into identical paths, it is fair to assume that differences to the exogenous group can be attributed to the treatment effect rather than the selection effect. The difference between the treatments is discussed in detail in the next paragraph.

5.4. Treatment Effect

Figure 9 shows the average information acquisition per cost level in the exogenous and endogenous treatment. The Figure reveals one of the main results of the experiment: In the endogenous treatment, subjects acquire significantly more information at all cost levels. Taking all cost levels together, I can reject H_0 that subjects in the exogenous treatment purchase as much information as subjects in the endogenous treatment, against H_a that there was more information acquisition in the endogenous treatment, on a 1 percent significance level ($p=0.00$) using the clustered two-sample t-test (clustered on

³⁴ Also, in those sessions where high costs were implemented in the very first round, the average belief was 4.9.

group level) and on a 5 percent significance level ($p=0.01$) using the Mann-Whitney-U test for groups averages.

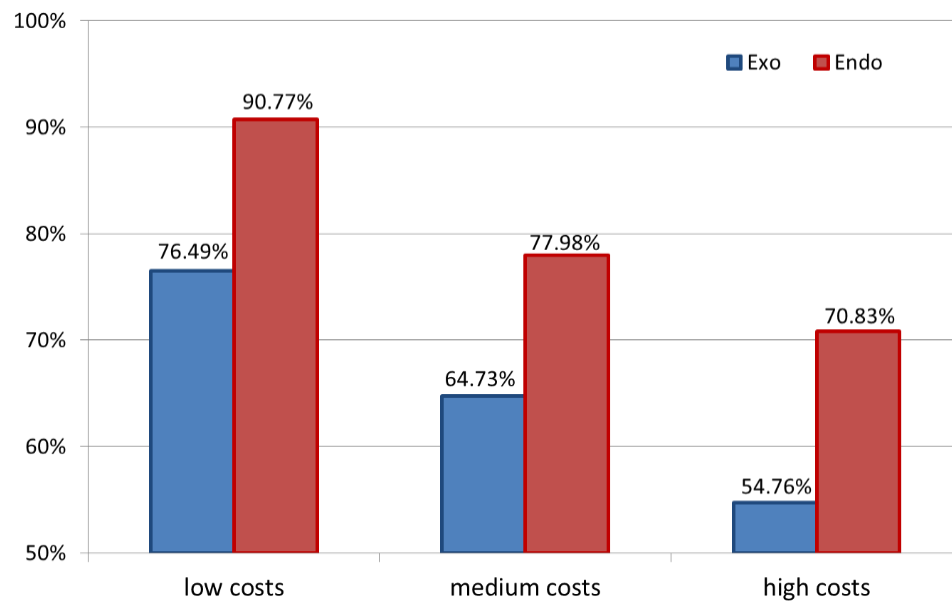


FIGURE 9
Average information acquisition, endogenous vs. exogenous treatment

While information acquisition is significantly different, the treatments show no difference in the share of subjects who voted without purchasing information (on average 9% and 10%, $p=0.39$), therefore uninformed voting cannot explain the differences.³⁵ It can be assumed that the ordering of parameters also had no influence on information acquisition, as the correlation between the identical groups $G_{i,endo}$ and $G_{i,exo}$ is negative and one would assume a positive relation if ordering of parameters had an effect. Mann-Whitney-U and two-sample t-test also reject that average information acquisition at the group level is equal within the same cost levels on common significance levels. Overall, this result is very robust and there is no doubt that a dividend of democracy is found in the data.

³⁵ Also, when I focus on the share of uninformed subjects only, the amount of participation of uninformed subjects is not different from zero in the endogenous treatment on common significance levels. I tested parameterized, i.e. in a logit regression clustered on group level. The instances when subjects were uninformed are the dependent variable. The dependent variable is equal to one if the subject participated in the vote and equal to zero if the subject abstained. As explanatory variables I used are a treatment dummy and information costs.

Result 7: *Information acquisition is significantly higher in the endogenous treatment than in the exogenous treatment on all cost levels.*

The relative increase of information acquisition in the endogenous treatment was 19 percent for low costs, 20 percent for medium costs and for high costs the increase was strongest with more than 29 percent.³⁶ This implies that efficiency gains by democratic institutions might increase with the costs of voting and could be then even more meaningful. However, the results also show that the democratic decision already works quite effectively when there is no endogenous choice. In the exogenous treatment average information rates were higher under medium and high costs than predicted by standard theory. A share of informed voters higher than 50 percent is very promising, even though I cannot extrapolate this result one on one to reality. I proceed by conducting further robustness checks by regressing information acquisition on the treatment and other controls.

Table 2 shows nine logistics regressions, with information acquisition as the dependent variable, stating the coefficients of the explanatory variables as odds ratios and standard errors clustered on a group level.³⁷ The dummy *information acquisition* is a variable equal to one if the subject purchased information in this very round and equal to zero when the subject did not. The first explanatory variable is the *treatment dummy*, which is equal to one if the subject participated in the endogenous treatment and equal to zero in the exogenous treatment. The treatment effect is significant in all regressions and roughly doubles the probability of purchasing information, holding everything else constant. The effect slightly decreases when I include the lagged variables. The next explanatory variable I control for is the *cost level*. Costs are equal to 0.10, 0.90 or 1.70 and the coefficient tells us that an increase of 1 Euro halves the probability that the subject acquired information. The cost level is significant and the magnitude of the coefficient is stable over all regressions I conducted.

³⁶ See Figure 16 in the appendix.

³⁷ The same regressions are provided in the appendix in table 5, but as robustness checks clustered on the subject level. Modern state of the art also uses multilevel regression models to account for group and subject levels simultaneously.

TABLE 2. Information acquisition regression, group level

Information acquisition	I	II	III	IV	V	VI	VII	VIII	IX
Endo dummy	2.058** (0.577)	2.102*** (0.602)	2.217*** (0.663)	2.305*** (0.722)	1.991** (0.614)	1.744** (0.408)	1.739** (0.406)	1.764** (0.413)	1.603** (0.359)
Information cost		0.505*** (0.057)	0.499*** (0.058)	0.494*** (0.058)	0.486*** (0.058)	0.533*** (0.057)	0.534*** (0.056)	0.531*** (0.055)	0.519*** (0.053)
PG game dummy			2.192** (0.798)	2.085** (0.734)	2.120** (0.705)	1.544* (0.404)	1.545* (0.403)	1.540 (0.414)	1.595* (0.386)
Reciprocity dummy				1.750** (0.379)	1.612* (0.401)	1.525** (0.222)	1.527** (0.263)	1.540** (0.273)	1.452* (0.278)
Information acquisition _{T-1}						10.619*** (2.717)	10.622*** (2.715)	5.476*** (1.350)	5.273*** (1.333)
Success _{T-1}							1.079 (0.112)	0.583** (0.123)	0.592** (0.127)
Info. acq. _{T-1} x success _{T-1}								2.850*** (0.769)	2.788*** (0.750)
Controls	No	No	No	No	Yes	No	No	No	Yes
Constant	1.872*** (0.365)	3.540*** (0.846)	3.049*** (0.772)	2.352*** (0.649)	4.670*** (2.464)	0.606** (0.135)	0.576*** (0.123)	0.852 (0.156)	1.576 (0.586)
Wald chi ² (2)	6.63	56.66	50.51	50.63	136.50	149.91	150.07	162.84	324.48
Prob > chi ²	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R ²	0.0215	0.0454	0.0588	0.0709	0.0897	0.2475	0.2477	0.2551	0.2629
N	2688	2688	2688	2688	2688	2520	2520	2520	2520

Note: Logit regression clustered on group level. Odds ratios reported. Dependent variable is information acquisition. Explanatory variables: Endo dummy refers to the treatment, information cost to the cost level of that very round. PG game dummy is equal to one if the contribution to the public good in the second part of the experiment is larger than the belief about the average contribution of the other group members; otherwise it is equal to zero. Success_{T-1} is equal to one when the last round's majority vote was beneficial for the group. Info. acq. _{T-1} x success_{T-1} is an interaction term between information acquisition and success of the last round of a majority vote. Controls, including the reciprocity dummy, contain answers retrieved from to the questionnaire. The dummy referring to question 1 is equal to one if the answer was correct, e.g. 16, otherwise zero. Answers to questions 2-10 are turned into median dummies, answers in the upper share are equal to one, zero otherwise. *Significant at 10%, **Significant at 5%, ***Significant at 1% (refer to the test of the hypothesis that the coefficient is zero).

The next variable is a variable constructed from the public goods game.³⁸ It is equal to one if the contribution to the public good in the second part of the experiment was larger than the belief about the average contribution of the other group members; otherwise it is equal to zero. Therefore I account for conditional cooperation and measure pro-social or

³⁸ Average contribution to the public good was 3.18 (out of 8) and average belief was 3.83. Almost 50% contributed as much as there stated belief. See Figure 17 in the appendix for visualization of the contributions.

altruistic behavior directly.³⁹ The share of pro-social subjects was relatively large, with about 20 percent of the participants. Being pro-social in the public goods game doubles the probability of purchasing information. When the lagged variables are used, significance is a little weaker⁴⁰ and the effect is lower in magnitude. Furthermore, I used the questionnaire to control for the strong conditional cooperation patterns implied by the results. The *reciprocity dummy* corresponds to the question: “How would you assess your willingness to do a favor for someone whom you have just met and who is doing you a favor?” I use it as a proxy for reciprocity. Participants answered the question on a scale from zero to ten. When the individual answer was above the median I constructed the dummy equal to one, otherwise it was equal to zero. Reciprocity increases the probability of acquiring information by 40-60 percent, which is in line with the findings of conditional cooperation. Regression V shows that all variables presented so far are significant and stay equal in magnitude when I control for further median dummies⁴¹. All coefficients of the explanatory variables are straightforward to interpret and go in the direction assumed. I will call the model which controls for the treatment, information costs, prosocial behavior and reciprocity the restricted model. The controls are insignificant, except the answer to the question whether the majority or the government should decide in a country. Surprisingly information acquisition is reduced when participants are in favor of majority ruling.

The next step to explain information acquisition is to include lagged variables of period $T-1$ in an extended model. For instance, the probability of purchasing information in the present round increases dramatically when a subject bought information in the previous round. One has to be cautious when interpreting the results, as autocorrelation tends to be high. In fact, all explanatory variables of the restricted model would also be able to explain information acquisition of the previous round with almost the same significance levels. Being aware of the problem, it is still clear that the *persistence* of decisions is extremely strong. The coefficient off the odds ratio states that the probability

³⁹ Another approach to classify patterns provides Fischbacher, *et al* (2001): conditional cooperation, free riding, “hump-shaped” contribution and others. As complete strategy method is not used in this experiment and I am more interested in pro-social behavior, I refrained from using the same approach.

⁴⁰ In regression VIII, $p=0.11$ and the variable is almost significant.

⁴¹ See appendix, questionnaire questions 2-10 are median dummies, question 1, is equal to 1 if the participant stated the correct number of rounds in which the group held a majority vote.

of acquiring information is 10 times as much when a subject bought information in round $T-1$. I also use a dummy to capture whether the last period was a success and the interaction term between success and information acquisition of the previous round. The interaction term takes some of the magnitude of *persistence* away and underlines *reinforcement* effects. That means that when someone bought information and had success with it, he or she was almost 3 times more likely to purchase information again. Lagged success has no effect on information acquisition per se, but when interaction with lagged information acquisition is accounted for, it reduces the probability of purchasing information. The intuition is that the success of the last period motivates free riding. Again, controls I use in the extended model are insignificant, except the answer to the question whether the majority or the government should decide in a country.

To conclude, the most important finding here is that the treatment dummy always stays significant and similar in magnitude independent of all controls I use. This makes the dividend of democracy an extremely robust finding. Furthermore, all explanatory variables reported in the regressions are straightforward to interpret, as the direction of the effects make sense and all important variables have a significant influence. I am even able to underline the importance of reciprocity for the acquisition of information. Since it might seem like the results are too good, the next robustness check concerns causality and dependence problems.

Statisticians would argue that the models I used in the previous paragraphs are invalid, since observations are not independent, which is assumed by the logit regression. Also, the causality of the public good data I use is not clear to interpret, because the first game might influence the decisions of the public good game.⁴² Consequently, there might be *spillover effects*. Therefore, I try to kill two birds with one stone: Instead of using all rounds, I restrict my model to the very first round. What I receive are 168 independent observations and I get rid of the causality problem, as the first round alone does not drive the public goods game. Table 6 shows these results. The treatment dummy is still significant and similar in magnitude, as are information costs. Results show that in the first round pro-social people are more likely to purchase information, which makes sense. I

⁴² Even though it is not possible to explain contributions of the public good in the second game through information acquisition, success rate and/or informed group members in the first game.

used the same controls as before, which are all insignificant except the answer related to the question about pivotality. The question asks how often people think that they were pivotal and is significant at a 10% level. Reciprocity is insignificant, which is what is assumed, as conditional cooperation cannot work in the very first round before the behavior of group members has been observed. Obviously lagged variables cannot be used here. I conclude that the results are robust even without hurting statistical assumptions (apart from normally distributed residuals).

TABLE 3. Information acquisition regression, first round

Information acquisition	I	II	III	IV
Endo dummy	2.314** (0.890)	2.372** (0.926)	2.630** (1.053)	2.786** (1.240)
Information cost		0.496** (0.162)	0.483** (0.164)	0.383** (0.151)
PG game dummy			6.544** (5.025)	6.828** (5.396)
Controls	No	No	No	Yes
Constant	2.36*** (0.563)	2.054*** (2.054)	3.724*** (1.652)	2.060 (1.712)
LR chi ² (2)	4.96	9.82	18.94	30.25
Prob > chi ²	0.0259	0.0074	0.0003	0.0043
Pseudo R ²	0.0276	0.0547	0.1054	0.1684
Subjects	168	168	168	168

Note: Logit regression. Odds ratios reported. Dependent variable is information acquisition. Explanatory variables: Endo dummy refers to the treatment, information cost to the cost level of that very round. PG game dummy is equal to one if the contribution to the public good in the second part of the experiment is larger than the belief about the average contribution of the other group members; otherwise it is equal to zero. Controls contain answers retrieved from to the questionnaire. The dummy referring to question 1 is equal to one if the answer was correct, e.g. 16, otherwise zero. Answers to questions 2-10 are turned into median dummies, answers in the upper share are equal to one, zero otherwise. *Significant at 10%, **Significant at 5%, ***Significant at 1% (refer to the test of the hypothesis that the coefficient is zero).

5.5. Efficiency

Lastly, I am interested in efficiency considerations.⁴³ It was shown that endogenous implementation of an institution triggers more information acquisition than exogenous implementation. According to the process of information aggregation this should ultimately lead to higher outcomes on average in the endogenous treatment. Unfortunately, uninformed voting and voting against the signal messes with that clear prediction. Figure 18 in the appendix shows the average success of the groups divided in cost level and treatment. The average success of one group consists of the average of 16 outcomes after majority decisions. A Mann-Whitney-U test finds a significant difference ($p=0.09$) between group averages of endogenous and exogenous treatments.

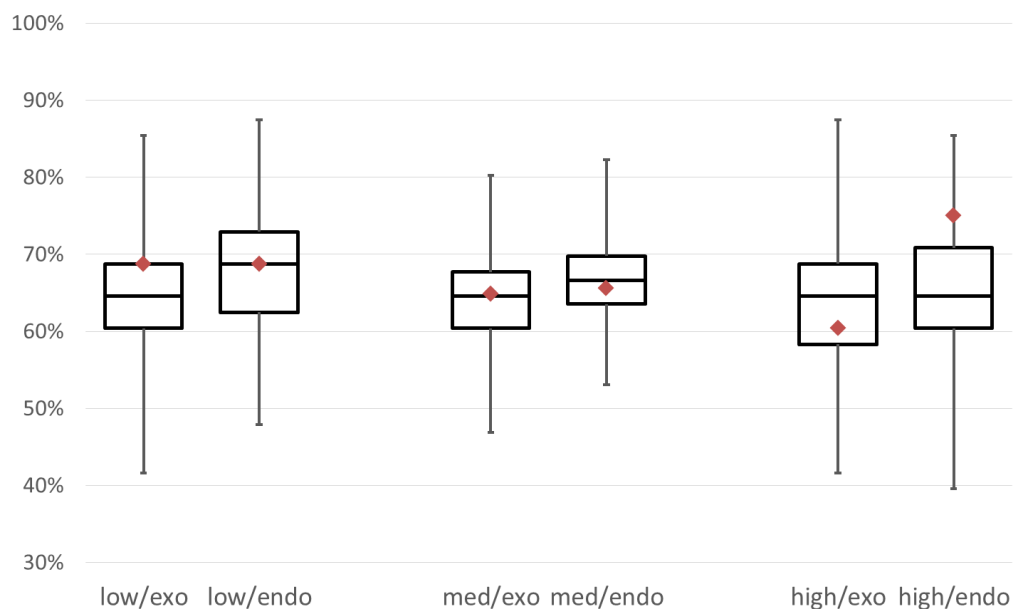


FIGURE 10
Simulation – box plot of average success per cost level and treatment

However, on first sight, the result do not seem to be what is predicted by theory, because the success rate was highest in the high cost scenario and participants acquired less information than in the other cost levels. The information quality (60.16%) empirically matches the programmed chance of 60 percent. For further investigation of this result, I simulate the experiment 1000 times given the empirical decisions and am able to observe distributions of outcomes. Figure 10 shows box plots of the average outcomes. The red

⁴³ The computer decision led to success in 89.58% of all cases.

diamonds correspond to the success rate of this experiment. The figure shows that apart from the endogenous high cost result all average outcomes are within the 50 percent of simulated observations, which are closer to the median.

I conclude that by chance I received one unlikely outcome in the data which had a relatively high success rate. For further considerations the expected average probability of success is calculated according to the empirical decisions of the subject, which are shown in Figure 11.⁴⁴ Here I find exactly the pattern which was assumed due to information aggregation. The less information acquired, the lower the chance of having successful outcomes on average. Since participants acquire more information in the endogenous treatment, success probability is higher than of the groups in the exogenous treatment. The Mann-Whitney-U test ($p=0.03$) confirms that the distribution of outcomes between treatments is significantly different. Figure 19 in the appendix shows that efficiency increases by 5.2-13.5 percent in contrast to the computerized decision.

Result 8: *In the endogenous treatment groups arrive at the beneficial outcome more often than in the exogenous treatment.*

It follows that information aggregation works in this setting, which leads to improved efficiency. Finally, I consider efficiency, taking into account the costs for information acquisition. In each cost level, groups make more money in the endogenous than in the exogenous treatment, on average. Groups' expected earnings are €4.40 more in each round in the endogenous treatment. The difference to the exogenous treatment decreases with the cost level. Consequently, the dividend of democracy is present even when I account for costs.

I have shown in this last section that efficiency is higher in the endogenous than in the exogenous treatment. There is not only a significant difference in the data, but the predicted patterns are also found in the data when the expected probabilities of success are calculated. Including the costs confirms the results.

⁴⁴ Expected calculated means and simulated means are similar: low/exo 64.70% vs. 65.11%, low/endo 68.00 vs. 68.07%, med/exo 64.12% vs. 64.02%, med/endo 66.41% vs. 66.54%, high/exo 63.75% vs. 63.13% and high/endo 65.35 vs. 65.21%.

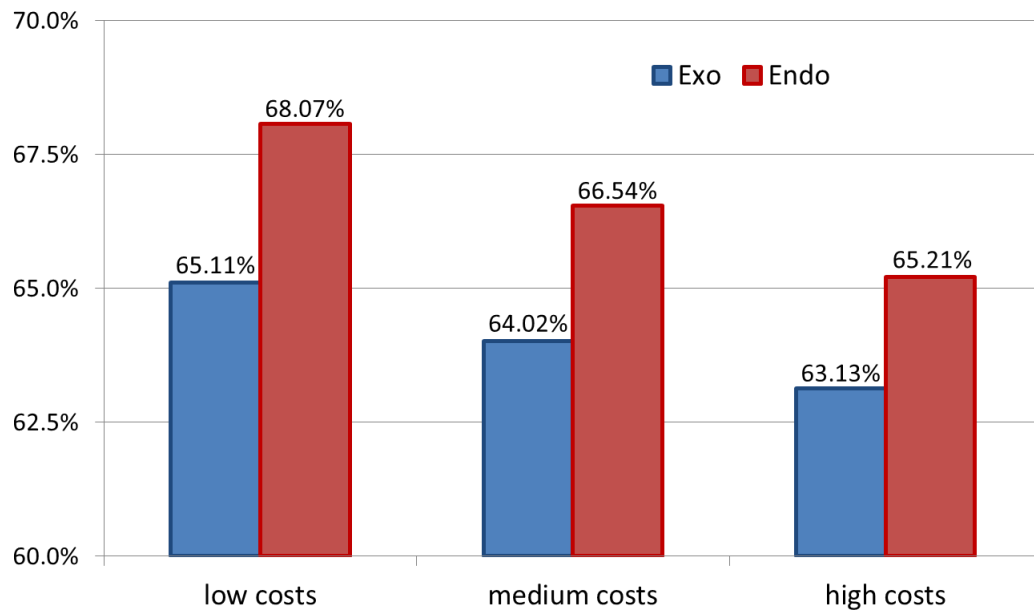


FIGURE 11
Expected average probability of success per cost level

6. Conclusions, Further Research, and Generalizability of the Results

Recent research on committee voting has found large shares of uninformed voters preventing groups from profiting from information aggregation (which improves the outcome of votes). Acquiring costly information is similar to contributing to a public good. Thus, free riding and irrational behavior can undermine all efforts. But, previous research on public goods games showed that approximately 50 percent of laboratory participants are conditional cooperators. This latent potential can be exploited by choosing the decision-making process through a majority. The literature refers to this as the “dividend of democracy”. The results presented in this thesis show that, by using a novel framing procedure, this dividend can also be found in a more complex game. As collective decision-making already works reasonably well in an exogenously imposed design, the efficiency of the majority vote can be further improved if implemented endogenously. In fact, in an endogenous setting subjects purchase significantly more information and have better average outcomes than in the exogenous treatment. This result is robust and present within all cost levels.

While we should see a result in an experimental study as just the starting point, it is conspicuous that no other empirical/methodological approach has more suitable tools to detect causalities. The strength of experimental research is revealed when several clever designs *together* replicate findings, thus preparing the ground for clear and strong implications. When research is extended to online and field experiments, findings become even more robust. Potentially, they become part of a theory, and ultimately, they can help to predict the systematic behavior of agents. In this spirit, I conduct another treatment for this experiment, allowing communication between the participants. Preliminary results suggest that *communication* reinforces information acquisition further. Another thought that emerged in the course of this research is that while “group identity” has strong normative implications in the groups, greater group size makes free riding a more attractive option. This could challenge the results and would be an interesting area for further research.

In experimental research it is difficult to extrapolate results to practical environments.⁴⁵ As a matter of fact, I consider experimental studies basic research, which need not necessarily be immediately applied. Nevertheless, fundamental research need not be viewed as completely insulated from current political issues. In fact, the concept of direct democracy has been the subject of much debate in Austrian politics in recent years. In particular, the topic received widespread media attention during the 2013 referendum on ending conscription. It seems that Austrian political parties as well have increasingly discovered the potential of direct democratic tools. In September 2014, the Austrian parliament decided unanimously to convene an enquiry commission dealing with a proposed piece of legislation. A change in the law would provide Austrian politics with more elements of direct democracy at all levels of government – federal, state and local. The commission was appointed in December 2014, and is already working. In the course of seven sessions to be held in early 2015, the future direction of Austrian politics regarding direct democracy will be discussed and take shape. However, even though there is some political support for direct democracy, the concept is still in an early stage and has many adversaries in Austria.⁴⁶

⁴⁵ See for example Al-Ubaydli and List (2013) for an intensive discussion.

⁴⁶ For more information see: <http://www.parlament.gv.at/PERK/NRBRBV/NR/PARLENQU/PEKDEMO/>

In reality, the pros and cons of direct democracy are more multilayered than they appear in the stylized and simplified setting of the laboratory. Yet, it is a valid claim that direct democracy works only when people are willing to make an effort, take interest in the topics at hand, educate themselves, and participate in the votes. This is what the artificial laboratory experiment and reality have in common. The results of this experiment show that majority voting is more beneficial for a whole group when group members choose and consciously commit themselves to direct democracy. Conditional cooperation latent in a society can become salient through a signaling device. In fact, conditional cooperation depends on expectations. As in other economic fields, different equilibria are possible depending on expectations. Through the decision to hold a group vote, individual preferences are exchanged, conditional cooperation enforced, and ultimately the efficiency of direct democracy enhanced.

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8. Appendix

Additional Figures and Tables

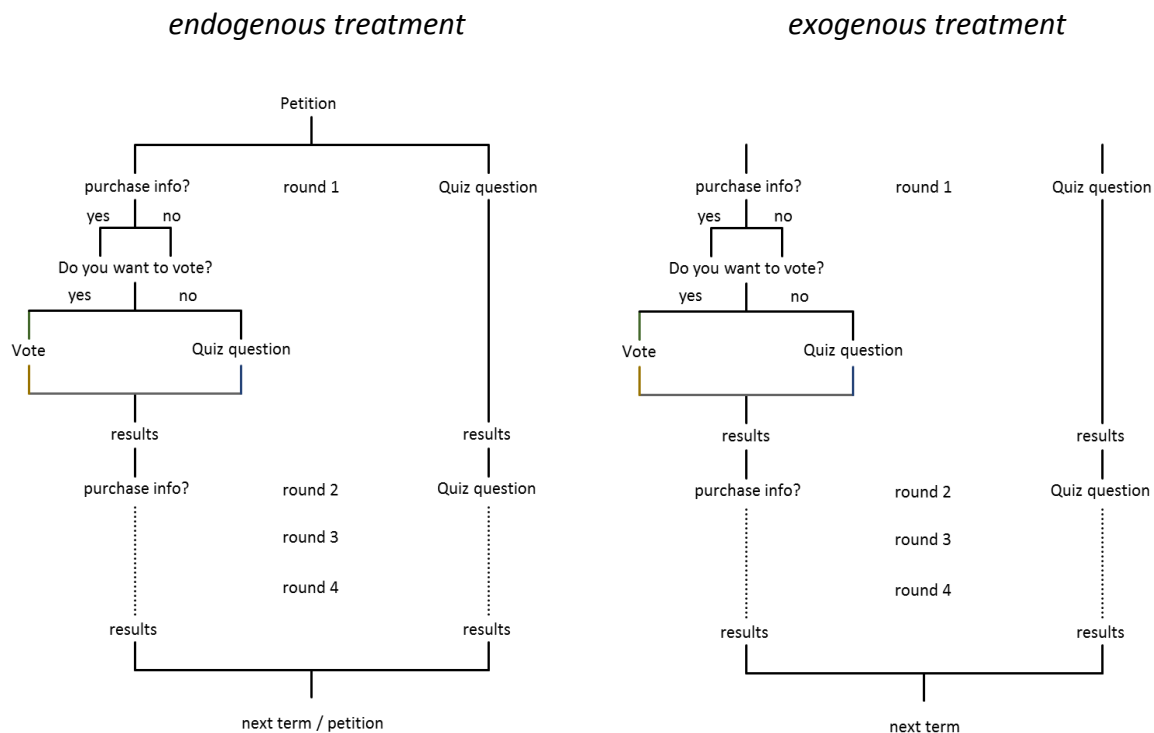


FIGURE 12
Decision tree

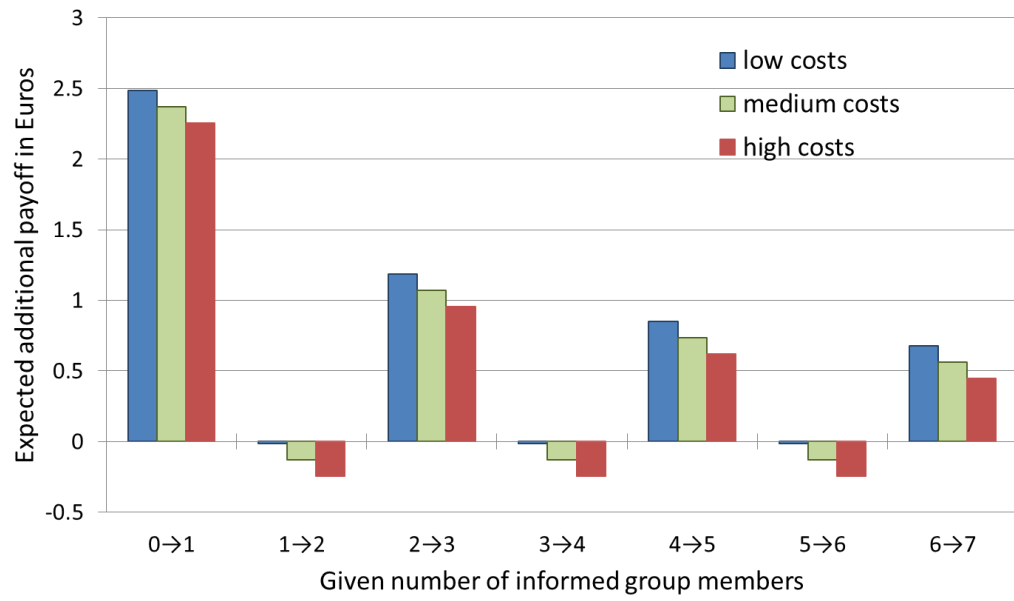


FIGURE 13
Additional total utility per person

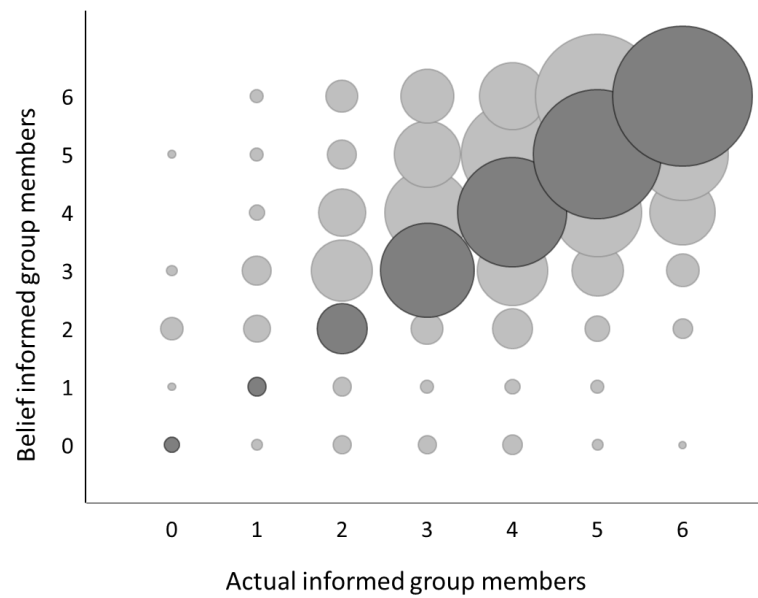


FIGURE 14
Correlation between belief and actual number of informed group members

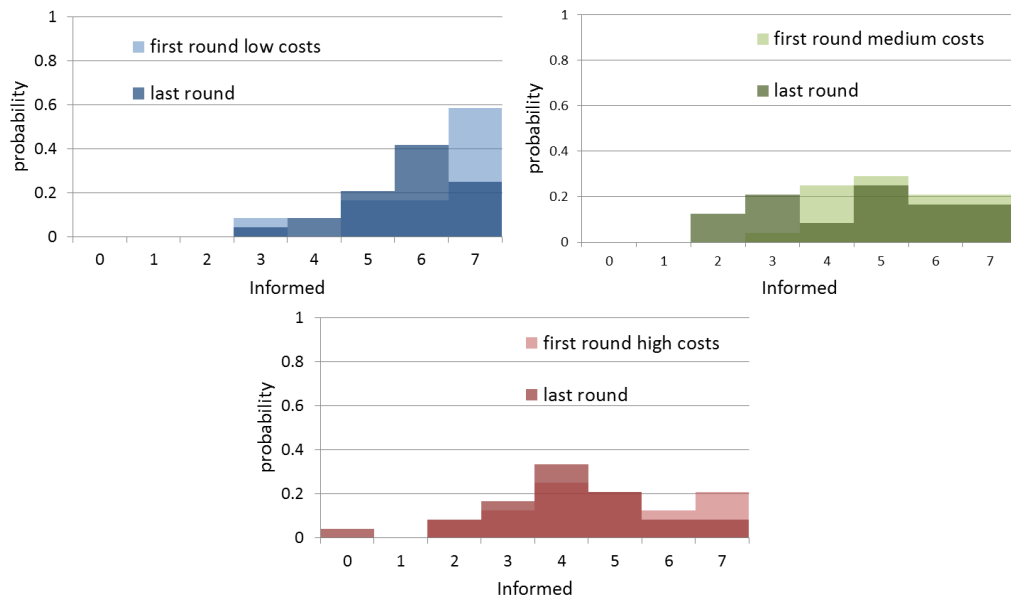


FIGURE 15
Learning effects: first round vs. last round

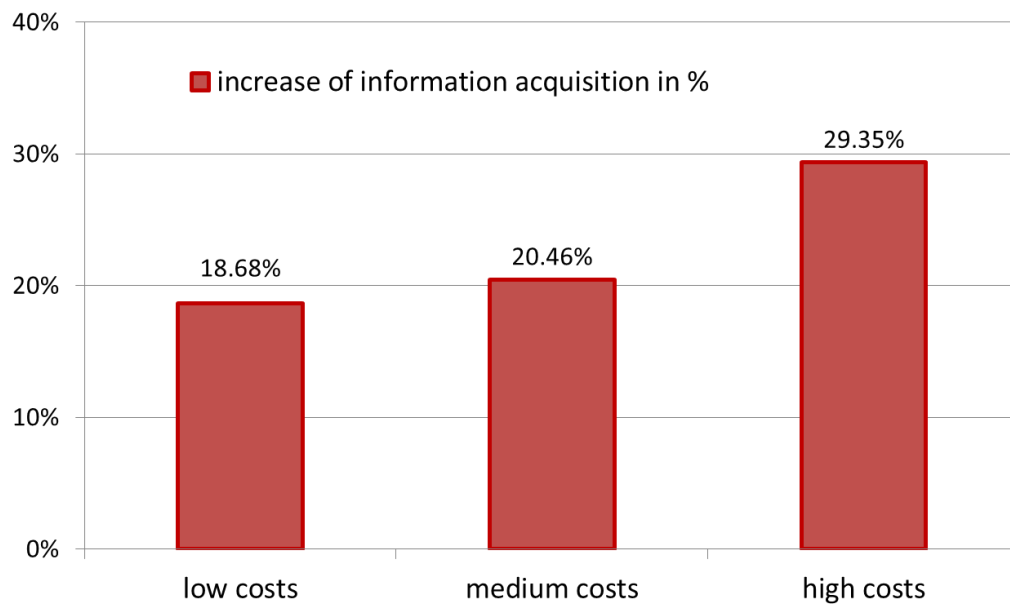


FIGURE 16
Endo vs. Exo: percentage increase of information acquisition per cost level

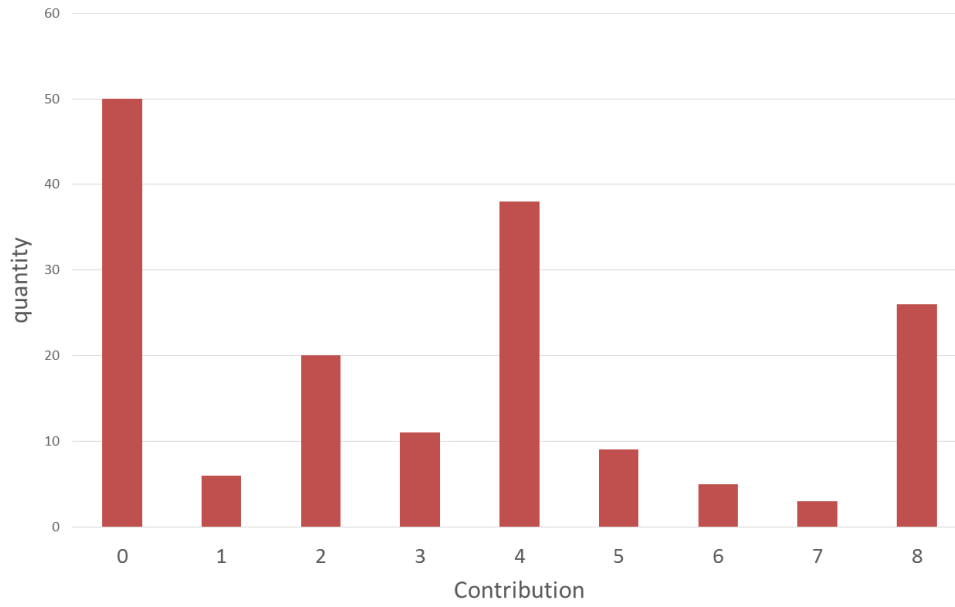


FIGURE 17
Contributions to PG game

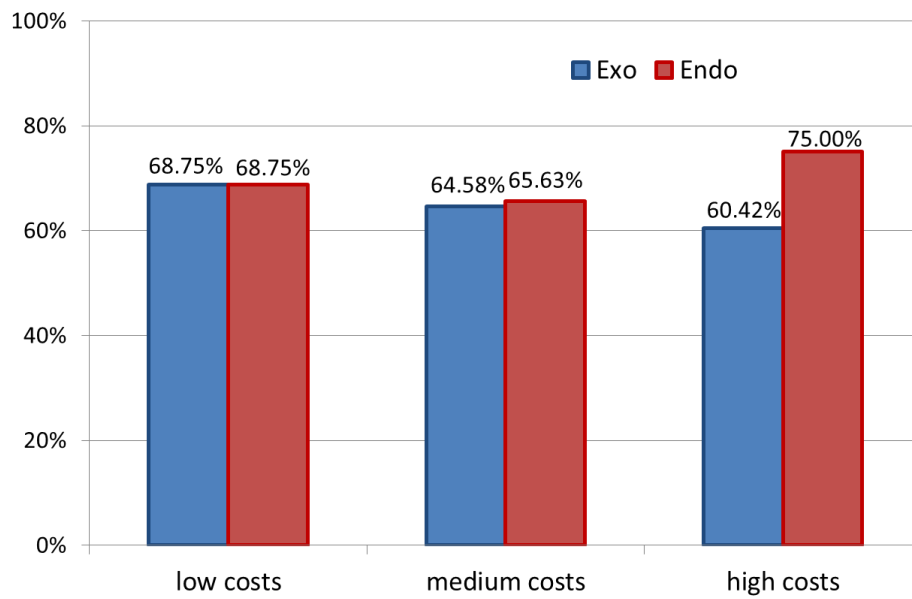


FIGURE 18
Average success per cost level and treatment

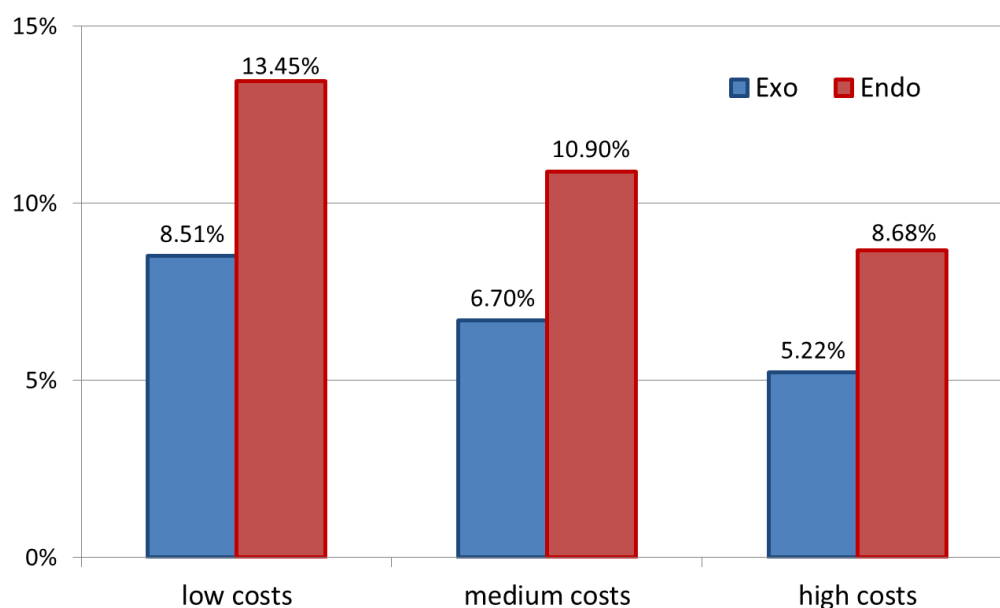


FIGURE 19
Expected efficiency gain in percent relative to an inexperienced mayor

TABLE 4. Comparison of the results to other studies on committee voting

	Großer and Seebauer (2013)	Elbittar, <i>et al</i> (2014)	Treatments of this study	
			Exogenous	Endogenous
Rounds	30	25	24	24
Payoff	accumulated over all rounds	accumulated over all rounds	one round picked at random	one round picked at random
Information costs as % share of earnable payoff	12.5%	0.1% - 10% ¹	0.4% – 6.8% ²	0.4% – 6.8% ²
Signal quality	75%	67%	60%	60%
Information acquisition	27%	32%	62%	77%
Sum of irrational behavior	30%	45%	14%	11%
Uninformed voting ³	29%	41%	10%	9%
Uninformed voting ⁴	40%	61%	29%	44%

Note: For the comparison I only consider treatments with groups of seven and voluntary voting with simple majority rule, percentages are rounded. 1: information costs are randomly drawn from a uniform distribution for each individual, each round, payoff is constant. 2: Three distinct cost levels. 3: Uninformed voting as percentage of all instances. 4: Uninformed voting as percentage of these who did not acquire information.

TABLE 5. Information acquisition regression, subject level

Information acquisition	I	II	III	IV	V	VI	VII	VIII	IX
Endo dummy	2.058*** (0.489)	2.102*** (0.512)	2.217*** (0.562)	2.305*** (0.587)	1.991*** (0.520)	1.744*** (0.331)	1.739*** (0.331)	1.764*** (0.341)	1.603** (0.308)
Information cost		0.505*** (0.042)	0.499*** (0.043)	0.494*** (0.043)	0.486*** (0.043)	0.533*** (0.044)	0.534*** (0.056)	0.531*** (0.044)	0.519*** (0.043)
PG game dummy			2.192** (0.787)	2.085** (0.737)	2.120** (0.727)	1.544* (0.407)	1.545* (0.406)	1.540 (0.412)	1.595* (0.396)
Reciprocity dummy				1.750** (0.424)	1.612* (0.430)	1.525** (0.276)	1.527** (0.276)	1.540** (0.280)	1.452* (0.286)
Information acquisition _{T-1}						10.619*** (2.065)	10.622*** (2.066)	5.476*** (1.314)	5.273*** (1.271)
Success _{T-1}							1.079 (0.141)	0.583*** (0.116)	0.592** (0.120)
Info. acq. _{T-1} x success _{T-1}								2.850*** (0.706)	2.788*** (0.693)
Controls	No	No	No	No	Yes	No	No	No	Yes
Constant	1.872*** (0.279)	3.540*** (0.635)	3.049*** (0.579)	2.352*** (0.515)	4.670*** (2.172)	0.606** (0.109)	0.576*** (0.123)	0.852 (0.177)	1.576 (0.541)
Wald chi ² (2)	9.23	81.11	76.21	82.69	95.96	281.00	280.47	282.02	300.52
Prob > chi ²	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R ²	0.0215	0.0454	0.0588	0.0709	0.0897	0.2475	0.2477	0.2551	0.2629
N	2688	2688	2688	2688	2688	2520	2520	2520	2520

Note: Logit regression clustered on group level. Odds ratios reported. Dependent variable is information acquisition. Explanatory variables: Endo dummy refers to the treatment, information cost to the cost level of that very round. PG game dummy is equal to one if the contribution to the public good in the second part of the experiment is larger than the belief about the average contribution of the other group members; otherwise it is equal to zero. Success_{T-1} is equal to one when the last round's majority vote was beneficial for the group. Info. acq. _{T-1} x success_{T-1} is an interaction term between information acquisition and success of the last round of a majority vote. Controls, including the reciprocity dummy, contain answers retrieved from the questionnaire. The dummy referring to question 1 is equal to one if the answer was correct, e.g. 16, otherwise zero. Answers to questions 2-10 are turned into median dummies, answers in the upper share are equal to one, zero otherwise. *Significant at 10%, **Significant at 5%, ***Significant at 1% (refer to the test of the hypothesis that the coefficient is zero).

Instructions: Endogenous Treatment

Instruktionen

Herzlich willkommen! Sie und die anderen Experimententeilnehmer werden an einer Entscheidungssituation teilnehmen. In dieser Situation können Sie Geld verdienen, das Ihnen am Ende des Experiments in bar ausgezahlt werden wird. Wie viel Sie verdienen werden, hängt davon ab, welche Entscheidungen Sie und die anderen Experimententeilnehmer fällen werden.

Diese Instruktionen beschreiben die Entscheidungssituation und sind für alle Experimententeilnehmer identisch. Es ist wichtig, dass Sie die Instruktionen sorgfältig durchlesen, damit Sie die Entscheidungssituation gut verstehen. Falls Ihnen beim Lesen etwas unklar erscheint oder falls Sie sonstige Fragen haben, so zeigen Sie das bitte per Handzeichen an. Wir werden Ihre Fragen dann einzeln beantworten.

Bitte stellen Sie Ihre Frage(n) auf keinen Fall laut. Es ist Ihnen nicht erlaubt, irgendwelche Informationen an andere Teilnehmer weiterzugeben.

Ebenso ist es während des gesamten Experiments nicht gestattet, mit anderen Teilnehmern zu sprechen. Wann immer Sie eine Frage haben, heben Sie bitte Ihre Hand; und wir werden zu Ihnen kommen und Ihre Frage beantworten. Die Einhaltung dieser Regeln ist für den wissenschaftlichen Wert des Experiments sehr wichtig.

Wenn alle die Instruktionen durchgelesen und keine Fragen mehr haben, werden wir noch ein kurzes Quiz mit Ihnen durchführen. Sie werden dann jeder für sich einige kurze Aufgaben bearbeiten. Das Quiz dient dem Zweck, die wichtigen Details der Entscheidungssituation gut zu verstehen und um zu erfahren, ob die Instruktionen verständlich sind.

Selbstverständlich bleibt Ihre Anonymität gegenüber anderen Teilnehmern während des gesamten Experiments gewahrt. Weder werden Sie die wahre Identität der anderen Teilnehmer erfahren, noch werden die anderen Teilnehmer Ihre Identität herausfinden können.

Allgemeines

Das Experiment besteht aus drei Teilen, wobei der erste Teil mehrere Runden hat. In den ersten zwei Teilen müssen Entscheidungen getroffen und Informationen aufgenommen werden. Durch Ihre Entscheidungen können Sie Geld verdienen. Am Ende des gesamten Experiments wird vom Computer zufällig eine Runde aus dem ersten Teil gezogen, wobei jede Runde gleich wahrscheinlich gezogen werden kann. Den Betrag, den Sie in dieser am Schluss gezogenen Runde verdienen, und die Beträge, welchen Sie in den übrigen Teilen verdienen, stellen in der Summe Ihr Einkommen dar und werden am Ende des Experiments bar ausbezahlt.

Unten finden Sie die Instruktionen zum 1. Teil des Experiments. Ist der 1. Teil abgeschlossen, bekommen Sie Instruktionen für den 2. Teil. Nach Abschluss des 2. Teils beantworten Sie in einem kurzen 3. Teil einige Fragen. Anschließend bekommen Sie Ihre Auszahlung und das Experiment endet.

Der Ablauf des 1. Teils des Experiments, die verschiedenen Entscheidungen und die Auszahlungsmodalitäten werden nun genau erklärt.

Erster Teil

In diesem Experiment sind Sie in der Rolle eines Stadtbewohners und fällen Entscheidungen über die **Vergabe von Bauprojekten**. Für jedes Bauprojekt kommen zwei Firmen in Frage, von denen eine geeignet und eine ungeeignet ist. Es gilt die jeweils **geeignete Firma** zu **ermitteln**.

Dies kann auf zwei Arten geschehen. Wenn genug Stadtbewohner dies in einer **Unterschriftensammlung** verlangen, dann recherchieren **die Stadtbewohner selbst** und stimmen über die Vergabe des Bauprojekts ab. Recherchieren ist aber kostspielig. Wenn nicht genug Stadtbewohner die Abstimmung verlangen, dann fällt der Bürgermeister die Entscheidung selbständig. Die Kompetenz des Bürgermeisters, die geeignete Firma zu finden, ist allen bekannt.

Die Entscheidung, ob man die Abstimmung verlangen soll, hängt von verschiedenen Faktoren ab. Grundsätzlich gilt, dass manchmal eher die Stadtbewohner die richtige Entscheidung fällen, manchmal der Bürgermeister eher die richtige Entscheidung fällt. Je mehr Stadtbewohner recherchieren, desto eher wird durch die Abstimmung die geeignete Firma gewählt. Je kompetenter der Bürgermeister ist, desto eher wird er im Alleingang die richtige Entscheidung fällen.

Im Folgenden wird der genaue Ablauf dieses Entscheidungsprozesses beschrieben.

1 Auszahlungsrelevante Runden

Zu Beginn des Experiments werden alle Teilnehmer zufällig in Gruppen zu 7 Leuten eingeteilt. Diese Gruppenzuteilung bleibt während des gesamten 1. Teils konstant. Als Mitglied Ihrer Gruppe sind Sie einer von 7 wahlberechtigten Stadtbewohnern einer fiktiven Stadt.

1.1 Zwei Firmen zur Auswahl

Die Stadt möchte Bau- und Modernisierungsprojekte in Auftrag geben, welche allen Bewohnern im gleichen Maße zu Gute kommen.

Für jedes Projekt bewerben sich immer 2 Firmen. Nur jeweils eine Firma hat die notwendigen Spezialisten, um das Projekt erfolgreich zu errichten. Die andere Firma macht konzeptionelle Fehler und das Projekt wird im Nachhinein von der Bauaufsicht als „nicht nutzbar“ eingestuft.

Somit ist immer eine Firma „geeignet“ und eine „ungeeignet“. Welche Firma die geeignete ist, ist unabhängig von vorangegangenen Projekten und exakt gleich wahrscheinlich. Wird ein Projekt erfolgreich errichtet, können alle Stadtbewohner der Stadt die neu gewonnenen Vorteile genießen. D.h. bei einem **erfolgreich errichteten Bauprojekt** verdient jeder Stadtbewohner **25 Euro**, bei einem **nicht nutzbaren Bauprojekt** hingegen **0 Euro**.

1.2 Wer hat Informationen über die Firmen und wie können sie gesammelt werden?

Niemand kann einfach beobachten, welche der beiden Firmen in einer gegebenen Runde die geeignete ist. Um herauszufinden, welche die geeignete Firma ist, muss man recherchieren. Es gibt zwei Möglichkeiten: Entweder der Bürgermeister recherchiert diese Information so gut er kann und entscheidet dann im Alleingang, welche Firma den Zuschlag erhält. Oder es wird eine Abstimmung unter den Stadtbewohnern durchgeführt, die dann selbst Information über die Firmen recherchieren können; und diejenige Firma, für die die Mehrheit gestimmt hat, bekommt den Zuschlag.

Bürgermeister sind es gewohnt, sich mit den zwei Firmen auseinanderzusetzen. Es gibt **erfahrene** Bürgermeister (welche durchschnittlich in **90 von 100 Fällen** die geeignete Firma auswählen) und **unerfahrene** Bürgermeister (welche durchschnittlich in nur **60 von 100 Fällen** die geeignete Firma auswählen). Die Rolle des Bürgermeisters wird vom Computer übernommen.

Stadtbewohner sind zwar als Einzelne unerfahren, aber wenn **alle oder zumindest genug** Stadtbewohner recherchieren, sind sie in ihrer Gesamtheit **besser** informiert als der unerfahrene Bürgermeister (wenn auch schlechter als der erfahrene Bürgermeister). Die **Information**, die Sie als einzelner Stadtbewohner erlangen, hilft Ihnen in durchschnittlich **60 von 100 Fällen**, die geeignete Firma zu identifizieren. Wenn alle Stadtbewohner recherchieren, dann wählen sie per

Abstimmung im Schnitt in 71 von 100 Fällen die geeignete Firma aus. Bereits drei informierte Stadtbewohner treffen in einer Abstimmung im Schnitt gemeinsam eine bessere Entscheidung als der unerfahrene Bürgermeister.

Allgemein gilt: Je mehr Stadtbewohner Ihrer Stadt sich informieren und per Mehrheitsabstimmung die Firma auswählen, desto besser wird die Entscheidung. Allerdings hat das Sich-Informieren Kosten für Sie. Die Kosten können **0.10** Euro, **0.90** Euro oder **1.70** Euro betragen.

Diese Informationskosten, wie auch die Erfahrung des Bürgermeisters, können sich jede Legislaturperiode unterscheiden, bleiben aber innerhalb einer gegebenen Legislaturperiode konstant. Insgesamt gibt es 6 Legislaturperioden zu je 4 Runden, was in der Summe 24 Runden und 24 Bauprojekte macht.

1.3 Unterschriftensammlung: Wer soll zwischen den Firmen entscheiden?

Zu Beginn jeder Legislaturperiode werden Sie darüber informiert, wie hoch die Informationskosten und der Grad der Erfahrung des Bürgermeisters in den kommenden 4 Runden sind. Es gibt eine **Unterschriftensammlung** für eine Mehrheitsabstimmung. Wenn genügend Unterschriften gesammelt werden, also **mindestens 4 von den 7** Stadtbewohnern unterschreiben, dann wird die Entscheidung darüber, welche Firma den Zuschlag bekommt, per **Abstimmung** von den Stadtbewohnern selbst getroffen. Ansonsten entscheidet der **Bürgermeister**, welche Firma den Zuschlag bekommt.

Wenn Sie dafür sind, die kommenden 4 Projekte per Mehrheitsabstimmung zu vergeben, dann „unterschreiben“ Sie mit Ihrem Pseudonym (Ihnen wird am Anfang des Experiments ein Pseudonym zugewiesen, welches das ganze Experiment über gleich bleibt. Immer wenn Sie es brauchen könnten, wird es angezeigt). Sind Sie für einen Bürgermeisterentscheid, dann geben Sie „Nein, danke“ in das Feld ein. Sie können mit dem Button „Bestätigen“ rechts unten fortfahren (siehe Abbildung).

Je nach Legislaturperiode kann es sich für alle Stadtbewohner lohnen, für die Mehrheitsabstimmung zu unterschreiben, wenn im Anschluss hinreichend viele Stadtbewohner Informationen zu den Firmen recherchieren.

Periode 2 von 25	Verbleibende Zeit [sec]: 40
Bürgermeisterentscheid oder Mehrheitsbeschluss?	
Die Stadt hat vier neue Bauprojekte, welche allen Mitbewohnern der Stadt zu Gute kommen sollen. Es werden Unterschriften gesammelt. Soll die Entscheidung darüber, welche Firmen den Zuschlag von der Stadt erhalten, vom Bürgermeister oder durch Mehrheitsabstimmung bestimmt werden? Sind Sie für einen Mehrheitsabstimmung, geben Sie Ihr Pseudonym in das Feld rechts unten ein. Sind Sie für einen Bürgermeisterentscheid geben Sie "Nein, danke" in das Feld ein. Haben Sie sich entschieden und Ihre Eingabe gemacht, klicken Sie auf "Bestätigen", damit das Experiment weiter geht.	
Selbst Informationen darüber zu recherchieren, welche der beiden Firmen geeignet ist, kostet: 0.90 Euro Der Bürgermeister ist: unerfahren Ihr Pseudonym ist: Hintzer	Ihre Entscheidung "Unterschreiben" Sie hier mit Ihrem Pseudonym, wenn Sie für eine Mehrheitsabstimmung sind, sonst geben Sie bitte "Nein, danke" ein.
Bestätigen	

1.4 Die Entscheidung durch den Bürgermeister

Wenn zu wenige Unterschriften gesammelt wurden und daher der Bürgermeister im Alleingang zwischen den Firmen entscheidet, müssen Sie kurz warten, bis eine Entscheidung getroffen wurde. In dieser Wartezeit können Sie eine Quizfrage lösen. (Diese Frage hat keinen Einfluss auf Ihre Auszahlung. Sie erhalten alle Lösungen der Fragen am Ende des Experiments.)

Danach werden Sie darüber informiert, welche Firma vom Bürgermeister gewählt wurde, welche die geeignete Firma war und wie viel Sie in der laufenden Runde verdient haben.

Dieser Ablauf wiederholt sich 4-mal, für jedes Bauprojekt in der Legislaturperiode.

1.5 Die Mehrheitsabstimmung und die Möglichkeit, sich vorher zu informieren

Wenn genügend Unterschriften gesammelt wurden, haben Sie zunächst die Möglichkeit, gegen Zahlung der Informationskosten zu recherchieren und erhalten eine Information darüber, welche Firma geeignet ist. Diese Information ist in 60 von 100 Fällen richtig. Deshalb können verschiedene Stadtbewohner im Zuge ihrer Recherchen zu unterschiedlichen Ergebnissen gelangen. Dies wiederum macht eine Mehrheitsabstimmung sinnvoll: Wenn alle Stadtbewohner recherchiert haben und sich an der Abstimmung beteiligen, dann ist es ziemlich wahrscheinlich, dass die Mehrheit zum richtigen Ergebnis gekommen ist und daher auch für die geeignete Firma stimmt. Je mehr Stadtbewohner sich informieren und dann auch abstimmen, desto eher wählt die Stadt die geeignete Firma. Unabhängig davon, ob sie selbst eine Information recherchiert haben oder nicht,

müssen Sie eine Schätzung darüber abgeben, wie viele andere Stadtbewohner sich vor der Abstimmung informieren. Wenn Sie richtig raten, bekommen Sie 0.10 Euro.

Im Anschluss entscheidet jeder Stadtbewohner, ob er sich an der Abstimmung beteiligt oder nicht. Wenn Sie eine Information recherchiert haben und gemäß Ihrer Information mit abstimmen, dann **erhöhen** Sie dadurch die Chance, dass die geeignete Firma den Zuschlag erhält und das Bauprojekt gelingt. Wenn Sie jedoch nicht recherchiert haben und trotzdem mit abstimmen, dann **verringern** Sie dadurch die Chance, dass die geeignete Firma den Zuschlag erhält und das Bauprojekt gelingt. Wenn Sie nicht an der Abstimmung teilnehmen, dann können Sie in der Zwischenzeit eine Quizfrage beantworten. (Diese Frage hat keinen Einfluss auf Ihre Auszahlung und Sie erhalten alle Lösungen der Fragen am Ende des Experiments.)

Die Firma, für die in der Abstimmung die Mehrheit gestimmt hat, erhält den Zuschlag. Bei Gleichstand der Stimmen für die beiden Firmen oder wenn sich niemand an der Abstimmung beteiligt, wird vom Computer zufällig eine der beiden Firmen ausgewählt, wobei dann beide gleich wahrscheinlich sind.

Im Anschluss an die Abstimmung erfahren Sie, wie viele Stadtbewohner sich informiert haben, für welche Firma die Mehrheit gestimmt hat, welche die geeignete Firma ist und wie viel Sie verdient haben.

Dieser Ablauf wiederholt sich 4-mal, für jedes Bauprojekt in der Legislaturperiode.

2 Ihre Auszahlung

Zum Schluss des Experiments wählt der Computer zufällig eine Runde aus dem 1. Teil des Experiments aus, die für Ihre Auszahlung relevant ist. Wenn das Bauprojekt in dieser Runde erfolgreich errichtet wurde, erhalten Sie 25 Euro, sonst 0 Euro. Zusätzlich erhalten Sie 0.10 Euro, wenn Sie in der gezogenen Runde die Anzahl der informierten Stadtbewohner richtig geschätzt haben. Etwaige Informationskosten dieser Runden werden abgezogen.

3 Simulation

Am Anfang des 1. Teils haben Sie 2 Minuten lang die Möglichkeit, beliebig viele Entscheidungshistorien von erfahrenen und unerfahrenen Bürgermeistern anderer fiktiver Städte anzusehen, in denen es – im Gegensatz zu Ihrer Stadt – keine Unterschriftensammlung gibt und immer nur der Bürgermeister entschieden hat. Dies dient dem besseren Verständnis und hat keine Auswirkungen auf Ihre Auszahlung.

Zusammenfassung

- Sie werden informiert, wie erfahren der Bürgermeister ist und wie hoch die Informationskosten sind. Diese Information gilt für die nächsten 4 Runden.
- Es wird eine Unterschriftensammlung für Mehrheitsabstimmungen in den nächsten 4 Runden durchgeführt. Sie unterschreiben, wenn Sie dafür sind, dass Sie und die anderen Stadtbewohner selbst über die zu beauftragende Firma abstimmen. Sie unterschreiben nicht, wenn Sie dagegen sind und es bevorzugen, dass der Bürgermeister im Alleingang entscheiden soll, welche Firma beauftragt wird. Die Unterschriftensammlung ist erfolgreich, wenn mindestens 4 der 7 Stadtbewohner unterschreiben.
- Wenn die Unterschriftensammlung erfolglos ist, entscheidet der Bürgermeister 4 Runden lang, welche Firma den Zuschlag erhält. Ein unerfahrener Bürgermeister beauftragt in 60 von 100 Fällen die geeignete Firma, ein erfahrener Bürgermeister hingegen in 90 von 100 Fällen. Wenn die geeignete Firma den Zuschlag erhält, verdient jeder Stadtbewohner in der laufenden Runde 25 Euro. Wird die ungeeignete Firma beauftragt, verdient jeder Stadtbewohner in der laufenden Runde 0 Euro.
- Wenn die Unterschriftensammlung erfolgreich ist, dann stimmen Sie und die anderen Stadtbewohner selbst über die zu beauftragende Firma 4 Runden lang ab. Vor der Abstimmung können Sie und alle anderen Stadtbewohner Information kaufen, die in 60 von 100 Fällen richtig ist. Außerdem schätzen Sie ab, wie viele der anderen Gruppenmitglieder sich informieren.
 - Die Stadtbewohner nehmen entweder an der Abstimmung teil und stimmen für eine der beiden Firmen oder nehmen nicht an der Abstimmung teil und lösen stattdessen eine Quizfrage, die nicht auszahlungsrelevant ist.
 - Die Stadtbewohner beauftragen diejenige Firma, die mehr Stimmen erhalten hat. Bei Gleichstand, oder wenn sich niemand informiert hat, wird eine der beiden Firmen zufällig ausgewählt, wobei beide gleich wahrscheinlich sind. Hat die Stadt die geeignete Firma beauftragt, erhält jeder Stadtbewohner 25 Euro, abzüglich etwaiger Informationskosten. Ihnen wird mitgeteilt, welche Firma die Stadt beauftragt hat und welche das geeignete Angebot gemacht hat. Für eine richtige Schätzung der Zahl der informierten Stadtbewohner erhalten Sie zusätzlich 0.10 Euro.
- Am Ende wird 1 Runde aus dem 1. Teil zufällig zur Bezahlung ausgewählt.

Im Anschluss an die 24 Runden des 1. Teils beginnt der 2. Teil des Experiments, in dem Sie weitere Beträge verdienen können.

Control Questions: Endogenous Treatment

Welche zwei der folgenden Aussagen sind korrekt?

- **Die Wahrscheinlichkeit, dass ein unerfahrener Bürgermeister die geeignete Firma wählt, beträgt 60 Prozent.**
- **Der unerfahrene Bürgermeister ist weder besser noch schlechter als ein informierter Stadtbewohner, wenn es darum geht, die geeignete Firma zu wählen.**
- Der unerfahrene Bürgermeister ist besser als ein informierter Stadtbewohner, wenn es darum geht, die geeignete Firma zu wählen.

Welche zwei der folgenden Aussagen sind korrekt?

- Wenn sich genau ein Stadtbewohner informiert, dann hat die Stadt bereits eine größere Chance als ein unerfahrener Bürgermeister, die geeignete Firma zu wählen.
- **Wenn sich mehr als zwei Stadtbewohner informieren, dann haben die Stadtbewohner bereits eine größere Chance als ein unerfahrener Bürgermeister, die geeignete Firma zu wählen.**
- **Ist der Bürgermeister unerfahren, ist die Chance am größten, die geeignete Firma zu wählen, wenn sich alle sieben Stadtbewohner informieren und abstimmen.**

Welche zwei der folgenden Aussagen sind korrekt?

- **Die Wahrscheinlichkeit, dass ein erfahrener Bürgermeister die geeignete Firma wählt, beträgt 90 Prozent.**
- **Der erfahrene Bürgermeister ist besser als sieben informierte Stadtbewohner, wenn es darum geht, die geeignete Firma zu wählen.**
- Beantwortet man eine Quizfrage richtig, erhält man eine zusätzliche Auszahlung

Welche zwei der folgenden Aussagen sind korrekt?

- **Außer der Information die Sie kaufen können, gibt es für die Stadtbewohner absolut keine Möglichkeit Ihr Wissen darüber, welche die geeignete Firma ist, zu verbessern.**
- Kauft man keine Information und stimmt trotzdem mit ab, hat man eine größere Chance als der Zufall, für die geeignete Firma zu stimmen.
- **Kauft man keine Information und stimmt trotzdem mit ab, dann ist die Wahrscheinlichkeit, dass die geeignete Firma gewählt wird, kleiner, als wenn man nicht mit abgestimmt hätte.**

Welche der folgenden Aussagen ist korrekt?

- Es gibt jede Runde eine Unterschriftensammlung.
- Die Unterschriftensammlung ist nur erfolgreich, wenn alle Stadtbewohner unterschreiben.
- **Ist die Unterschriftensammlung erfolgreich, folgt in den nächsten 4 Runden eine Mehrheitsabstimmung.**

Welche der folgenden Aussagen ist korrekt?

- Es gibt pro Stadt drei Stadtbewohner, die jede Runde neu zusammengewürfelt werden.
- **Es gibt pro Stadt sieben konstante Stadtbewohner.** Es gibt pro Stadt zehn konstante Stadtbewohner.

Instructions Public Goods Game

Zweiter Teil

Der zweite Teil besteht aus einer einzigen Runde. Alle Teilnehmer werden zufällig in **Gruppen zu je 3 Personen** eingeteilt. Alle erhalten dieselbe Fragestellung und müssen eine Entscheidung treffen. Ihre Auszahlung in diesem Teil hängt von Ihrer und der Entscheidung Ihrer Gruppenmitglieder ab.

Sie und die anderen Gruppenmitglieder werden mit jeweils **8 Euro** ausgestattet.

Sie haben die Möglichkeit, diese 8 Euro auf sich selbst und einen gemeinschaftlichen Topf aufzuteilen. Jeder Euro im **Topf wird mit 1.5 multipliziert** und gleichmäßig auf die ganze Gruppe aufgeteilt. Ihr Anteil aus dem Topf, zusammen mit jenem Teil den Sie behalten haben, wird Ihnen ausgezahlt.

Beispiel 1:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	0	8
Gruppenmitglied 1	0	8
Gruppenmitglied 2	0	8

Beispiel 2:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	8	12
Gruppenmitglied 1	8	12
Gruppenmitglied 2	8	12

Beispiel 3:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	8	4
Gruppenmitglied 1	0	12
Gruppenmitglied 2	0	12

Beispiel 4:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	0	16
Gruppenmitglied 1	8	8
Gruppenmitglied 2	8	8

Beispiel 5:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	4	10
Gruppenmitglied 1	4	10
Gruppenmitglied 2	4	10

Beispiel 6:	<i>Beitrag in den Topf</i>	<i>Auszahlung</i>
Sie	5	10
Gruppenmitglied 1	2	13
Gruppenmitglied 2	6	8

Beispiel 5: Angenommen, alle in der Gruppe geben 4 Euro in den gemeinschaftlichen Topf. Im Topf befinden sich nun insgesamt 12 Euro. Dies wird mit 1.5 multipliziert, was 18 Euro ergibt. In Summe erhält jedes Gruppenmitglied 10 Euro. 6 Euro aus dem Topf, plus 4 Euro, welche behalten wurden.

Zusätzlich müssen Sie angeben, wie viel Ihrer Ansicht nach die anderen Gruppenmitglieder im Durchschnitt zu dem gemeinschaftlichen Topf beisteuern. Dies kann wieder zwischen 0 und 8 Euro liegen.

Im Anschluss erfahren Sie, wie viel Sie und die anderen Gruppenmitglieder in den gemeinschaftlichen Topf getan haben und was Ihre Auszahlung in diesem Teil des Experiments ist. Diese Auszahlung geht in Ihre Gesamtauszahlung ein.

Falls Ihnen beim Lesen etwas unklar erscheint oder falls Sie sonstige Fragen haben, so zeigen Sie das bitte per Handzeichen an. Wir werden Ihre Fragen dann einzeln beantworten.

Im Anschluss beantworten Sie im 3. Teil einige Fragen.

Questionnaire

- Erinnern Sie sich bitte (ungefähr), in wie vielen der insgesamt 24 Runden des 1. Teils es eine Mehrheitsabstimmung gab. Ihre Antwort: In _____ von insgesamt 24 Runden gab es eine Mehrheitsabstimmung.
- Was glauben Sie, in wie vielen Mehrheitsabstimmungen war Ihre Entscheidung zwischen den Firmen und Enthaltung entscheidend für den Ausgang der Mehrheitsabstimmung, d.h. wie oft wäre das Ergebnis der Mehrheitsabstimmung anders ausgefallen, wenn Sie sich anders entschieden hätten? Ihre Antwort: In _____ Abstimmungen wäre das Ergebnis der Mehrheitsabstimmung anders ausgefallen, wenn ich mich anders entschieden hätte.
- Wie sehr stimmen Sie folgender Aussage zu: In einer Demokratie hat man die Pflicht, sich zu den relevanten politischen Fragen zu informieren, bevor man zur Wahl geht. *Scale 1-4*
- Wie sehr stimmen Sie folgender Aussage zu: In einer Demokratie hat man die Pflicht, zur Wahl zu gehen. *Scale 1-4*
- Wie sehr stimmen Sie folgender Aussage zu: Experten und nicht Regierungen sollten darüber entscheiden, was für das Land das Beste ist. *Scale 1-4*
- Wie sehr stimmen Sie folgender Aussage zu: Experten und nicht die Mehrheit der Wähler sollte darüber entscheiden, was für das Land das Beste ist. *Scale 1-4*
- Wie sehr stimmen Sie folgender Aussage zu: Die Mehrheit der Wähler sollte in einem Referendum darüber entscheiden, was für das Land das Beste ist, anstatt dass die Regierungen entscheiden. *Scale 1-4*
- Einige Leute meinen, dass sie völlig freie Wahl bei der Gestaltung Ihres Lebens haben; andere meinen, dass sie keine Wahl dabei haben, wie ihr Leben verläuft. *Scale 1-4*
- Wie sehr vertrauen Sie Menschen, denen Sie zum ersten Mal begegnen? *Scale 0-10*
- Wie würden Sie Ihre Bereitschaft einschätzen, einem Menschen, dem Sie zum ersten Mal begegnet sind und der Ihnen einen Gefallen tut, auch einen Gefallen zu tun? Antworten Sie anhand dieser Skala. 1 bedeutet, dass Sie nicht dazu bereit sind, dem Fremden auch einen Gefallen zu tun, und 10 bedeutet, dass Sie vollkommen dazu bereit sind, dem Fremden auch einen Gefallen zu tun. *Scale 0-10*

Curriculum Vitae

Manuel Schwaninger has studied Economics at the University of Vienna since 2010. He completed the Bachelor's programme in 2013. During his studies in the Master's programme he focused on behavioral economics and experimental science. Since January 2014, he has worked as a freelancer at the VCEE (Vienna Center of Experimental Economics). Since March 2015, Manuel Schwaninger has been employed as junior researcher at the Department of Economic Sociology at the University of Vienna.

Manuel Schwaninger studiert seit 2010 Volkswirtschaftslehre an der Universität Wien. 2013 schloss er das Bakkalaureatsstudium ab. Während seinem Magisterstudium setzte er Schwerpunkte in Bereichen der Verhaltensökonomie und der experimentellen Forschung. Seit Januar 2014 ist er zudem freier Mitarbeiter am VCEE (Vienna Center of Experimental Economics). Seit März 2015 ist Manuel Schwaninger am Institut für Wirtschaftssoziologie an der Universität Wien als Projektassistent beschäftigt.