Buying Supermajorities in the Lab*

Sebastian Fehrler
Department of Economics
University of Konstanz
Box 131
78457 Konstanz
Germany
sebastian.fehrler@uni-konstanz.de

Maik T. Schneider
Economics Department
University of Bath
Claverton Down
Bath BA2 7AY
United Kingdom
m.t.schneider@bath.ac.uk

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Abstract

Many decisions taken in legislatures or committees are subject to lobbying efforts. A seminal contribution to the literature on vote-buying is the legislative-lobbying model pioneered by Groseclose and Snyder (1996, "Buying Supermajorities", *American Political Science Review*, Vol. 90, No. 2), which predicts that lobbies will optimally form supermajorities in many cases. Providing the first empirical assessment of this prominent model, we test its central predictions in the laboratory. While the model assumes sequential moves, we relax this assumption in additional treatments with simultaneous moves. We find that lobbies buy supermajorities as predicted by the theory. Our results also provide supporting evidence for most comparative statics predictions of the legislative lobbying model with respect to legislators' preferences and the lobbies' willingness-to-pay. Many of these results carry over to the simultaneous-move set-up but the predictive power of the model declines.

Keywords: legislative lobbying, vote-buying, Colonel Blotto, multi-battlefield contests, experimental political economy.

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1 Introduction

Special-interest groups frequently try to influence political decisions. The Center for Responsive Politics documented that in just the first three quarters of 2017, lobbyists working on tax-related issues donated USD 9.6 million to members of the U.S. Congress.[1] A prominent theoretical approach to analyze how such payments are made to influence political decisions is the legislative lobbying model pioneered by Groseclose and Snyder (1996), henceforth GS. However, the context of political decision making is just one where the model has been used. More generally, it can represent many collective action problems in which two opposing actors compete for support of a decision-making body by investing resources, such as money or effort, to influence its members. Examples of such decision-making bodies include executive boards in companies and committees in charge of monetary policy, hiring or common land-ownership decisions, and many more. In the model, two opposed lobbies move once and sequentially. A central prediction is that the first-moving lobby will often find it cheaper to win over a supermajority of legislators rather than a simple majority. Further, the model predicts that the first-moving lobby should leave no soft spots for the opposed second-moving lobby by making bribes in such a way that all lobbied legislators are equally expensive to buy out of the coalition.

In this paper, we aim to shed some light on the predictive power of this prominent workhorse model by testing its key predictions in the laboratory. Based on examples given in the original GS paper, we design several scenarios with seven legislators predicting different sizes of lobbied supermajorities and varying distributions of bribe offers. While the GS model provides clear predictions and can represent many collective decisions with lobby influence well, it has also been criticised for the assumption of lobbies moving sequentially.[2] For example, Grossman and Helpman (2001) argue for simultaneous moves as they see no compelling reason for why lobbies would be bound to a sequential protocol.[3] In fact, there is also a large literature on lobbying where lobbies move simultaneously.[4] Therefore in a next step, we relax the assumption of

[1]We note that the Republican tax reform passed Congress in the fourth quarter. See https://www.opensecrets.org/news/2017/12/tax-lobbyists-contributions for more details. Details on many more cases, almost exclusively based on data provided by the U.S. government, are presented on OpenSecrets.org, the Center for Responsive Politics' website.

[2]Groseclose and Snyder (1996, p. 304) argue that sequential moves accord well with coalition building for example when the status quo is a favored alternative. Then any proposed bill must beat the status quo and the lobby in favor of policy change needs to move first while the defender of the status quo can react and effectively move last. Another example given by GS is when coalitions need to be maintained over several sessions of the legislature, where groups that oppose the bill may have opportunities to counterattack.

[3]Grossman and Helpman (2001, p. 302) argue that "to impose a sequence of moves seems artificial here. Why should one special interest group have the ability to preempt the other in making offers to the legislators? What is to stop the other group from approaching the legislators at the same time? " and that "the sequencing of offers in a model of legislative influence introduces unjustifiable restrictions on the groups' political efforts.".

[4]For example, there are large literatures on the Common Agency lobbying model based on the approach advanced by Bernheim and Whinston (1986) and Grossman and Helpman (1994), on lobbying contests with simultaneous moves and on the Colonel Blotto game. We discuss these strands of the literature in more detail in the section where we relate our paper to the literate.

sequential moves and run treatments in which lobbies move simultaneously. Our study thus combines tests of game-theoretical model predictions with a "stress test".[5]

At first sight, it seems that moving from sequential to simultaneous moves could drastically alter the logic of the game, as no lobby enjoys a second-mover advantage anymore. However, despite the fact that no analytical predictions are available for the simultaneous case with seven legislators, we argue that the underlying economic logic suggests that we should observe similar comparative statics results with respect to the majority sizes as in the sequential case. To be able to make more precise predictions for the simultaneous scenarios, we reduce the number of legislators to three in additional treatments. While the computation of all equilibria is unfeasible with normal computing power for the case with seven legislators, we are able to determine all equilibria of the simplified set-up with three legislators. In fact, for one scenario we obtain 56 different (mixed-strategy) equilibria. However, they share some common properties, which allows for comparative statics predictions regarding the number of bribes and the sum of bribes offered between scenarios and, as conjectured, these predictions go in the same direction as those for the sequential case. While it seems unlikely that these equilibria in the simultaneous-move game will be identified by the subjects of the experiment, the comparative statics predictions might, nevertheless, capture the economic intuition of the game. We compare the predictive performance of these equilibria with the GS predictions for the sequential-move set-up.

In the experiment, we focus on the behavior of the lobbies and hard-wire the behavior of the legislators. Our experimental results confirm most comparative statics predictions of the GS model for the sequential-moves scenarios, but point predictions regarding the number and level of bribes are not very accurate. The explanatory power of the predictions derived in the sequential-move set-up declines for the simultaneous-moves treatments but many comparative statics predictions are, nevertheless, robust to the relaxation of this central model assumption. The simplified scenarios with three legislators confirm this pattern.

Relation to the literature There are several different approaches to theoretically capturing lobbying in the form of vote-buying.[6] In the common-agency approach, several principals (lobbies) make offer schedules to an agent (politician) specifying for any possible policy choice how many resources they would pay if it was implemented. This model was introduced by Bernheim and Whinston (1986) and it has often been applied since, for example, famously for analyzing the role of special-interest groups in the shaping of trade policies (Grossman and Helpman, 1994, 2001). Kirchsteiger and Prat (2001) test some of the model's key predictions

[5]Morton and Williams (2010, p. 204) define a stress test as an investigation that tests "*the predictions of a formal model while explicitly allowing for one or more assumptions underlying the empirical study to be at variance with the theoretical assumptions.*" This approach is not very common in the experimental economics literature. A notable exception is the work on legislative bargaining by Tremewan and Vanberg (2016).

[6]For brevity we omit a discussion of other forms of lobbying, such as informational lobbying (Crawford and Sobel, 1982) and lobbying in the form of legislative subsidies (Hall and Deardorff, 2006; Ellis and Groll, 2017).

in the laboratory.

While the common agency approach offers explanations of the lobbying of a single policy-maker, our interest in this paper is in the lobbying of legislatures or committees. We focus on the seminal legislative lobbying model of Groseclose and Snyder (1996). In the original set-up, lobbies move sequentially in making offers to the legislators in favor of their preferred policy choice, which is either an exogenously given policy change or the status quo. As one of the landmarks in the lobbying literature the GS model has triggered interesting variations and extensions (e.g., Diermeier and Myerson, 1999; Banks, 2000; Dekel et al., 2008, 2009; Hummel, 2009; Le Breton and Zaporozhets, 2010; Schneider, 2014, 2017) but surprisingly has not been tested empirically in the laboratory. This is the focus of the present paper. In addition to testing the model's key predictions, we conduct a stress test by relaxing the central assumption of sequential and publicly visible moves of the two lobbies. These somewhat arbitrary assumptions have been a point for criticism of the sequential legislative lobbing model (e.g., in Grossman and Helpman, 2001; see Footnote 3). Assuming simultaneous moves instead – an equally arbitrary assumption, proponents of the legislative lobbying model might argue – transforms the game into a Colonel Blotto type of game. This class of games has been studied in another strand of the literature.

The models proposed in this strand of the literature assume simultaneous moves. A contest success function determines who wins the vote of a legislator in a legislature that is deciding on an exogenously given policy proposal. Variations of this approach range from assuming Tullock success functions to different types of auctions (e.g., Szentes and Rosenthal, 2003a,b; Konrad and Kovenock, 2009; Kovenock and Roberson, 2012). The use of all-pay auctions has been very prevalent in the theoretical literature. Various versions of all-pay auction lobbying games have been studied in the laboratory (e.g., Arad and Rubinstein, 2012; Chowdhury and Kovenock, 2013; Dechenaux et al., 2015; Hortala-Vallve and Llorente-Saguer, 2015; Montero et al., 2016; Mago and Sheremeta, 2017). Of particular interest is the classical "Colonel Blotto game", first analyzed by Borel (1921), where the lobby making the highest payment wins the legislator's vote. The theoretical solutions to this game are notoriously complicated (Roberson, 2006; Roberson and Kvasov, 2012; Kvasov, 2007). Typically, no pure-strategy equilibria exist in this class of games with the exception of some special cases, for example, with asymmetric battlefield valuations (Hortala-Vallve and Llorente-Saguer, 2012). Casella et al. (2017) show how decision-making with storable votes can be understood as a decentralized Blotto game – decentralized, as voters with majority and minority preferences make their voting decisions in a decentralized rather than in a coordinated way. The authors show that the economic logic underpinning this game is very similar to that in Blotto games, where players have to mix between the strategies of concentrating their votes on one issue or spreading them out over several or even over all issues.

The simultaneous version of the model in our paper differs from Blotto games in that it is not an all-pay auction. Lobbies make bribe offers that have to be paid only if the legislator votes accordingly; that is, if the battlefield is won. However, our model shares the described economic logic according to which the weaker lobby tends to concentrate their bids on only a few legislators while the stronger lobby is more likely to spread its bids over a large number of legislators. While there is no general theoretical solution of this particular game, we are able to present results for some specific settings that we implement in the laboratory, and the experiment provides a first idea of how different the results between the simultaneous and sequential variants are.

The paper is organized as follows. In Section 2, we introduce the sequential legislative lobbying game and the theoretical reasoning behind its central equilibrium predictions. We then discuss the game with simultaneous moves and explain why some comparative statics in the simultaneous-move game may be similar to those in the set-up with sequential moves. We go on to design the scenarios that we implement in the laboratory and describe the procedural details of the experiment. We present and discuss our results in Section 3 and we conclude in Section 4. Experimental instructions and additional results are relegated to the Appendix.

2 Theoretical Background and Experimental Design

In this section, we first introduce the legislative lobbying model and its main theoretical predictions. We start with the sequential-move game and then discuss the differences for the simultaneous-move game. Our focus will be on the intuition behind the theoretical results that are important for our experiment.[7] In the second part of this section, we explain the design of the scenarios that we implement in the laboratory.

2.1 Theoretical Mechanism

The model set-up considers a legislature of size N that is to decide between the status quo s and a new policy x by majority rule. We assume N to be an odd number for simplicity. Legislators have preferences regarding the two policy options expressed by a bias v_i in favor of voting for the policy change and against the status quo. Legislators are referred to by subscript $i, i = 1, .., N$.[8] Two lobbies, A and B, compete by making payment offers to legislators for votes to win a majority in the legislature. Lobby A prefers policy change x over status quo s while

[7] A more general theoretical analysis can be found in for example, Groseclose and Snyder (1996); Le Breton and Zaporozhets (2010); Schneider (2014).

[8] The legislators' biases v_i can be micro-founded via sincere voting and utility functions $u_i(\cdot)$ over $\Re$, a one-dimensional policy space, where $x, s \in \Re$ and $v_i = u_i(x) - u_i(s)$.

Lobby B supports the status quo s over x.[9] We denote Lobby A's and Lobby B's maximal willingness-to-pay for their preferred alternative by $W_A \geq 0$ and $W_B \geq 0$, respectively.[10] We will also refer to W_A and W_B as Lobby A's and Lobby B's prize for winning a majority for their preferred policy.

In the *s*equential game, Lobby A moves first, offering a schedule of bribes $\{b_i^A\}_{i=1}^N$ to the legislators for a vote in favor of policy change. Lobby B moves second with schedule $\{b_i^B\}_{i=1}^N$ for a vote for the status quo. Offers cannot be negative $b_i^A, b_i^B \geq 0$. Lobbies only pay what they offered if the legislator votes for their preferred alternative. After observing the lobbies' offers, the legislators vote in favor of policy change if $v_i + b_i^A > b_i^B$ and otherwise they vote for the status quo. The policy alternative that wins a majority will then be implemented. Note that legislators obtain utility from voting for their preferred policy, irrespective of the legislature's decision to implement either of the two policy options.

Predictions in the sequential legislative lobbying game and economic intuition

For a given prize for Lobby B, W_B, and given preference biases of the legislators, v_i, there exists an amount C_A which is the smallest amount Lobby A will have to spend in payments to legislators to form a majority coalition that cannot be broken by the opposed Lobby B when moving second. Groseclose and Snyder (1996) show that there is a unique subgame-perfect equilibrium for this sequential game with the following property: If the first mover's willingness-to-pay for policy change x is larger than the amount necessary to form a winning majority coalition, i.e. if $W_A \geq C_A$, Lobby A will spend C_A in the optimal way to form a coalition that preempts the second mover from winning the vote and the second mover will not make any payments. However, if $W_A < C_A$, the first mover Lobby A has no possibility of keeping the second mover from securing a majority for the status quo and, hence, refrains from offering any payments at all. The second mover will then only compensate the pro-change biases of a sufficient number of legislators to form a simple majority for the status quo.

In fact, in all scenarios that we implement in the laboratory, a majority of legislators have a (slight) preference bias for the status quo. Consequently, the second mover will never make any payments in equilibrium and only the first mover will form winning coalitions through payments if feasible. The following theoretical predictions and economic intuition for the sequential lobbying game concern the optimal offer strategies of the first mover Lobby A to form a winning coalition in the least expensive way. While we focus on the economic intuition behind the equilibrium properties in the main text, in Appendix A we provide a formal discussion that we also relate to the specific scenarios we test in the laboratory.

[9] Hence, a positive value of a legislator's bias v_i expresses a preference in line with that of Lobby A, while a negative value v_i shows alignment with the preferences of Lobby B.

[10] The lobbies' willingness-to-pay can be micro-founded similarly to the legislators' biases in Footnote 8 by defining the lobbies' utility functions $U_j(\cdot)$, $j = A, B$, over $\Re$, with $W_A = U_A(x) - U_A(s)$ and $W_B = U_B(s) - U_B(x)$.

The equilibrium properties provide four key predictions that we will test in the laboratory. First, **there are no scenarios in which both lobbies make payments**. Second, when making payments, the **first-mover lobby will use a leveling strategy**, where every bribed legislator will be equally expensive to buy back for the second mover. The intuition for the optimality of a leveling strategy is that it leaves no "soft spots". To understand this, suppose that some legislators can be bought back by the second mover at a lower expense than others. Requiring only a simple majority for the status quo to destroy the coalition for a policy change, the most expensive legislators will not be offered any payments – the second mover will instead concentrate their offers on the cheapest set of legislators. Then, however, it is optimal for the first mover to reduce their offers to the most expensive legislators to increase their offers to the least expensive ones. This logic applies as long as the legislators differ regarding the cost of securing their vote in the second mover's favor.

The third central prediction is that the **optimal sizes of the majorities are (weakly) lower the lower the legislators' biases in favor of policy change, v_i, and (weakly) increase with the prize for B, W_B**. The central insight advanced by Groseclose and Snyder (1996) is that it is often cheaper to form a supermajority than a simple majority. The key intuition behind this insight is that the amount necessary for the second mover to destroy a majority formed by the first mover must exceed the second mover's willingness-to-pay, W_B. In the case of a simple majority, the second mover needs to buy back only one legislator. That is, for each legislator in the first-mover's coalition, the first mover's offer b_i^A plus the legislator's initial bias for policy change v_i must be larger than the second mover's willingness-to-pay, W_B. If the first mover increased the majority by another legislator, the second mover needs to buy back two legislators to break the coalition for policy change. Consequently, for any two legislators the cost must exceed the second mover's willingness-to-pay. This allows the first mover to reduce the offers made to each single legislator, thereby saving resources as long as the initial status quo bias of the additional legislator in the coalition is sufficiently small. The trade-off when including another legislator in the coalition is between the resources that can be saved by being able to reduce the bribe offers to all other legislators in the coalition and the extra amount to be paid to neutralize this legislator's initial bias in favor of the status quo. Accordingly, if the legislators do not have any preferential bias towards the status quo, it will be optimal to form a coalition including all legislators.[11]

Further, for given preference biases of the legislators, the larger the willingness-to-pay for B, W_B, is, the larger will be the reduction in the offers to the legislators in the coalition, when the majority is increased by an additional legislator. Hence, ceteris paribus, the larger B's willingness-to-pay is the (weakly) larger the size of Lobby A's majority will be. It follows from this intuition that, ceteris paribus, if the legislators' biases in favor of the status quo are smaller

[11] Formal arguments and examples are provided in Appendix A.

or the second mover's willingness-to-pay is larger, the size of the supermajority formed by the first-mover will be larger.

The fourth prediction is that, **either Lobby A will win the vote for sure (if $W_A \geq C_A$) or Lobby B will win for sure (if $W_A < C_A$).** In the unique pure-strategy equilibrium there is no uncertainty as to which lobby will win the vote.

We test these predictions in the laboratory in several scenarios varying the degrees of the status-quo biases of the legislators and the second mover's prize which reflects their maximal willingness-to-pay to break a pro-change majority by the first-mover lobby. We describe the specific scenarios, with their particular predictions, in the next section.

Predictions in the simultaneous-move game and economic intuition

As discussed in the Introduction, one of the specific criticisms of the sequential legislative lobbying model is the sequential timing of the lobbies' moves. The direct method of assessing how important the sequential moves are in this set-up is to compare the outcomes with those in the exact same game but with simultaneous moves. Models of this type are often referred to as "Colonel Blotto games", which are notoriously difficult to solve analytically.[12]

Consequently, the only way to obtain theoretical predictions for our experiment is to compute the equilibria for the particular scenarios and parameters that we bring into the laboratory. For the standard legislative lobbying game, as described earlier, this is possible for the simple set-up with three legislators and very low willingness-to-pay, $W_B = 2$, on the part of Lobby B defending the status quo. The two scenarios we bring to the laboratory and for which we can compute the equilibria differ in the legisators' preferences. In the first scenario, legislators have a very weak bias against policy change towards x, $v_i = -0.5$, while in the second scenario they have stronger opposition to policy change with $v_i = -4.5$. Even in this simplest set-up, we obtain a large number of equilibria for the two scenarios that can be summarized in several equilibrium types. We provide a discussion of all the equilibrium types in Appendix B and we summarize some central characteristics of these equilibrium types in Table 2 in Section 2.2.

From the results, we observe that, first, in contrast to the case with sequential moves, we expect that **both lobbies will make positive payment offers in all scenarios**, although in most equilibrium types the probability placed by Lobby B on the pure strategy of not offering

[12]Except for trivial cases, for example when one lobby's willingness-to-pay is zero, there cannot be any pure-strategy equilibria. The reason for this is the following: in any combination of two pure strategies by Lobbies A and B, if one of the lobbies wins there will be a possibility to deviate to win at lower costs given the strategy of the other lobby, or there is a possibility for the other lobby to win the majority given its opponent's offer schedule. While several variants of these "Colonel Blotto games" have been solved, resulting in very complicated mixed-strategy equilibria, there is no general solution in the literature that could be easily adapted to our simultaneous-move set-up because of two particular properties: (1) it is not an all-pay auction: offers do not have to be paid if the legislator does not vote accordingly; and (2) the lobbies' objectives are to win the majority of votes, while the Colonel Blotto game has been solved for lobbies which try to maximize the number of voters voting for their cause (not caring about whether they will win a majority).

any payments is very high. Second, in the simultaneous-move game the degree of persuing leveling strategies varies between equilibrium types. Consequently we expect to observe a **lower frequency of leveling strategies in the simultaneous relative to the sequential game set-up**. Our greatest interest is in whether supermajorities will be observed in the simultaneous game as well and how the optimal coalition size will change with the legislators' preferences and Lobby B's willingness-to-pay. In our set-up with three legislators we predict supermajorities in the case with very low intensities of preferences of the legislators. Moreover, as in the game with sequential moves, the expected size of the majority declines with the legislators' biases in favor of the status quo. Unfortunately, it is not possible to derive equilibrium predictions for more complicated set-ups, with more than three legislators or higher willingness-to-pay for the status quo with normal computing power.[13] However, the following intuition suggests that a similar logic regarding supermajorities as in the sequential game holds in the simultaneous-move game as well.

In principle, there are two strategy types for winning a majority: (a) offering a large number of legislators a small amount on top of neutralizing the legislators' preference biases and (b) offering a smaller number of legislators a substantial amount on top of preference bias neutralization. Strategy (a) tries to win a majority by winning over those legislators to which the opposed Lobby B did not make any offers or offered very little. Overall, the probability of winning the vote of any particular legislator might not be very high but the probability of winning enough legislators for a majority is substantial. Strategy (b) seeks to achieve a high probability of winning the vote of almost all of the legislators in a small coalition. The mixed strategies of the lobbies in the simultaneous game are probability distributions over the support comprising strategies of type (a) and type (b) as well as hybrid versions of the two. If the preference of the legislators is biased more strongly against the policy change, Lobby A needs to pay more to neutralize the preference bias for all legislators in its coalition. This makes strategies of type (a) more costly and we expect that this will reduce the probability weight on such pure strategies in the mixed strategy played in equilibrium. Consequently, as in the sequential game, we predict that the expected size of the majorities formed by Lobby A will be smaller if the legislators' preference biases against the policy change are larger. By contrast, if the prize of winning the vote for Lobby B increases, securing almost all legislators' votes in a small coalition will become substantially more expensive for A, leading to a reduction in the probability weight on strategies of type (b). Hence, we expect larger expected majority sizes for A if B's willingness-to-pay is higher.

The depicted intuition suggests that the **optimal sizes of the majorities are (weakly) lower the lower the legislators' biases in favor of the policy change, v_i, and (weakly)**

[13] For example, with seven legislators and a willingness-to-pay of Lobby A of 9, there are roughly 10^7 (not weakly dominated) pure strategies for Lobby A. The payoff matrix would be extremely large (many terabytes).

increase with the prize for B, W_B. Consequently, we expect the comparative statics of the coalition sizes with respect to preference biases and the prize for B to be qualitatively the same as in the sequential game.

Finally, while in the sequential game lobbies either win or lose the vote for sure, the simultaneous game allows Lobby A to slightly reduce the probability of winning in order to reduce the expected amount of bribes to be paid. This is what we can observe for the three legislator case in Table 2. Hence, we expect that the **winning probability of A will be lower in the simultaneous game than in the sequential legislative lobbying game and that Lobby B's winning probability is positive.**

While the scenarios with the three legislator set-up allows to derive theoretical predictions for both the sequential and simultaneous-move game, this is not possible for the scenarios with more legislators. However, it is still interesting to see if the intuition and predictions outlined above for the three legislator case can also be observed in scenarios with more than three legislators. For this reason, we bring two different set-ups, each with sequential and simultaneous moves, into the laboratory: one with seven legislators and one with three. The scenarios with seven legislators allow us to directly connect to the examples for the sequential move games given in Groseclose and Snyder (1996) and to test how different the outcomes will be if the game is played with simultaneous moves.

2.2 Laboratory Scenarios

In the experiment, we implement seven scenarios for the game with seven legislators and two scenarios for the game with three legislators.

In the first five scenarios with seven legislators, all legislators are identical and between scenarios we vary their preference bias towards the status quo as well as Lobby B's willingness-to-pay. In the last two scenarios with seven legislators, we slightly increase the complexity by considering heterogeneous preferences of the legislators and by varying the willingness-to-pay of the status-quo-defending lobby between the two scenarios.

For the set-up with three legislators, we consider two scenarios with homogeneous legislators with different status-quo biases between the two specifications. As indicated previously, our focus here is on testing our theoretical predictions for both the simultaneous and the sequential games.

2.2.1 Legislature with Seven Legislators

In all scenarios, Lobby A possesses a maximal willingness-to-pay of $W_A = 300$ in order to win the vote in favor of a policy change. Lobby B's willingness-to-pay to win the vote for preserving the status quo, W_B, varies between a relatively weak 12, a strong preference of 60, and a very strong preference of 180. Moreover, the scenarios show different preference biases of the legislators. In the sequential-move games, Lobby A always moves first, and the defender of the status quo, Lobby B, moves second. The budgets are 400 for Lobby A and 200 for Lobby B.

Scenarios with homogeneous legislator preferences We consider legislators to be either unbiased (more precisely, they have a minimal bias in favor of the status quo of $v_i = -0.5$ as a tie breaker if no payments are made), or to have a strong preference for the status quo of $v_i = -19.5$. The particular scenarios with their equilibrium predictions in the sequential-move game are summarized in Table 1.

Table 1: Theoretical Predictions for Scenarios with Seven Legislators

	Sc1	**Sc2**	**Sc3**	**Sc4**	**Sc5**	**Sc6**	**Sc7**
Prize B, W_B	12	12	60	60	180	12	60
Legislator valuation							
Legislators 1–3	- 0.5	-19.5	-0.5	-19.5	-19.5	12.5	12.5
Legislators 4–7	- 0.5	-19.5	-0.5	-19.5	-19.5	-19.5	-19.5
Equilibrium predictions							
Coalition size A	7	4	7	6	0	4	6
Leveling [%]	100	100	100	100	0	100	100
Total bribes A, C_A	25	128	109	238	0	32	142
Total bribes B	0	0	0	0	0	0	0

The idea behind Scenarios 1–4 is to test our hypotheses regarding the predictions on changes in the prize for Lobby B and in the legislators' evaluations. In particular, comparing the results between Scenarios 1 and 2, and between Scenarios 3 and 4, indicates the effects of differences in the legislators' preference biases towards the status quo. With stronger biases towards the status quo the majority is predicted to decline. The majority size declines less if the value of the status quo for Lobby B is higher as the latter makes a larger majority more beneficial as explained in Section 2.1.

Comparing the results between Scenarios 1 and 3, and between Scenarios 2 and 4, reveals whether the hypothesis holds that majority sizes (weakly) increase with higher willingness-to-pay of the status-quo defender. As pointed out previously, with neutral bias of the legislators it is always optimal to form a maximal coalition including the entire legislature. However, there are substantial costs of large majorities when the legislators have strong status-quo biases. In this case, a large coalition is only optimal for the pro-change lobby if the defender of the status quo has a high willingness-to-pay, thereby increasing the benefits of a large supermajority.

In Scenario 5, we test the case where the willingness-to-pay by Lobby B is so high that there is no profitable way for Lobby A to preempt Lobby B buying back a sufficient number of legislators to preserve the status quo.

The theory predicts leveling in all cases (except Scenario 5), which theoretically implies that all legislators in the coalition obtain the same payment offers in the scenarios with homogeneous legislator valuations. We only allow offers in integers in the experimental scenarios and impose valuations of a half to break ties. Therefore, the least expensive way to form a majority coalition for Lobby A is to pay one unit less to $m-1$ of the legislators in the coalition, where m represents the number of legislators that the second mover needs to buy back to destroy the majority in favor of policy change. As a consequence of the indivisibility implied by integer offers, leveling in the scenarios we implement in the laboratory can thus include differences of one between the offers.

Heterogeneous valuations by legislators We also test the situation where the legislators have heterogeneous valuations. Three legislators have valuation 12.5 in favor of policy change and four legislators have valuations of -19.5, hence strongly favoring the status quo. The prize of winning for B is again either 12 or 60. In the case where Lobby B's willingness-to-pay is only 12, Lobby A does not have to worry about Lobby B offering bribes to any of the three legislators with 12.5 valuation for policy change when it forms a winning coalition. Consequently, Lobby A will concentrate their offers on the legislators that are biased towards the status quo to form a pro-policy-change coalition that includes legislators with and without bribe offers. This is referred to as a *non-flooded coalition*, following GS's terminology. In the second case, where B's willingness-to-pay for the status quo is 60, it is necessary to make an offer to a legislator with initial preference bias of 12.5 in favor of policy change. As a consequence of the "leaving no soft spots" logic, Lobby A will have to make additional offers to the pro-policy-change legislators as well as to a number of legislators initially leaning towards the status quo. All legislators in the formed coalition will receive payments: a *flooded coalition*.

Scenarios 6 and 7 have been set-up to test whether participants form a non-flooded and a flooded coalition, respectively. In Scenario 6, it is optimal for Lobby A to form a non-flooded coalition of four where only one pro-status-quo legislator with valuation -19.5 receives a bribe of 32. In Scenario 7, it is optimal for A to form a flooded coalition with six legislators. To make all legislators in the coalition equally costly to buy back, Lobby A offers all pro-change legislators a payment of 8 and among the other three status-quo leaning legislators it offers 39 to two of them and 40 to one. Recall that the latter is due to our design, which allows only integers as payment offers. The minimal total cost for this flooded coalition will be 142.

2.2.2 Legislature with Three Legislators

In the scenarios with three legislators, both lobbies possess a budget of 30. The maximal willingness-to-pay for policy change by Lobby A is 25 and the maximal willingness-to-pay to defend the status quo by Lobby B is 2. Legislators are homogeneous and we again implement a scenario (Scenario 1) where legislators are unbiased (valuation of -0.5 for breaking ties without payments) and one where they relatively strongly lean towards the status quo with valuation -4.5 (Scenario 2).

In the sequential game, where Lobby A moves first, it is least expensive to buy a supermajority comprising all three voters and to spend 2 on two legislators and offer 1 to the third, summing up to a total cost of 5. In Scenario 2, the costs of a vote in favor of policy change is more expensive, leading to an optimal majority of two legislators formed by paying both 7. This adds up to a minimum total cost of 14. In Table 2, we contrast the predictions of the sequential-move game with those in the corresponding simultaneous-move game.[14]

While we obtain 16 equilibria for Scenario 1 and 56 equilibria for Scenario 2, they can be subsumed under a much smaller set of equilibrium types. Equilibrium types comprise all equilibria where strategies only differ with respect to the permutations of payments between different legislators.

For Scenario 1, there are four equilibrium types which show the following common properties. In all four equilibrium types, the pro-change Lobby A randomizes between a grand coalition with payments of 1 for each legislator, and forming simple majorities by offering a payment of 1 to any two legislators. Each of the four possibilities carries an equal probability weight of 0.25. Consequently, we expect a supermajority in a fourth of cases and in three-quarters of cases a simple majority. This implies that, on average, coalition sizes formed by A should be 2.25 and the expected costs amount to 2.25 as well. Compared to the sequential set-up, where Lobby A is predicted to form a coaltion of 3 with a total sum of bribes of 5, policy change can be achieved at substantially lower expected costs in the simultaneous game. This reflects the second-mover advantage of the defender of the status quo in the sequential set-up, as well as the fact that it is optimal for the pro-change lobby to give up a 100% probability of winning the vote. The different strategies by Lobby B define the four equilibrium types. Nevertheless, they look very similar: all place a large probability of around 95% on not making any offers, while the six strategies where either one or two legislators are offered an amount of 1 carry almost equal shares of the remaining 5% probability. Consequently, we expect, on average, close to zero payments by Lobby B.

In Scenario 2, we find twelve equilibrium types. All equilibria have in common that the

[14] We used the software GAMBIT 14 to solve the simultaneous games. Documentation can be found in McKelvey et al. (2016) and at http://www.gambit-project.org/. We provide the details of the different equilibria in Appendix B.

Table 2: Theoretical Predictions for Scenarios with Three Legislators

	Sc1	**Sc2**
Legislator valuation	- 0.5	-4.5
Equilibrium types:		
sequential	1	1
simultaneous	4	12
Coalition size A:		
Equilibrium: sequential	3	2
Equilibrium: simultaneous	2.25	2
Leveling by A:		
Equilibrium: sequential	100	100
Equilibrium: simultaneous	100	0 – 100 (dep. on eq. type)
Exp. total bribes proposed (paid) by A:		
Equilibrium: sequential	5 (5)	14 (14)
Equilibrium: simultaneous	2.25 (2.19 - 2.23) (dep. on eq. type)	11 (10.98)
Exp. total bribes proposed (paid) by B:		
Equilibrium: sequential	0 (0)	0 (0)
Equilibrium: simultaneous	0.03 - 0.07 (0.02 - 0.06) (dep. on eq. type)	0.067 - 1.044 (0.044) (dep. on eq. type)
Winning Probability by A:		
Equilibrium: sequential	1	1
Equilibrium: simultaneous	0.96 - 0.99 (dep. on eq. type)	0.978

pro-change Lobby A will form a minimal coalition of two legislators and all involve expected total costs of 11. As documented in Tables B2 and B3 in Appendix B, this is a result of Lobby A using only three types of pure strategies as a support for their mixed strategies played in equilibrium: (1) offer one legislator a payment of 6, offer another 5 and pay no bribe to the remaining one; (2) use leveling strategy offering two legislators a bribe of 5 and nothing to the remaining one; (3) use a leveling strategy offering two legislators a bribe of 6 and nothing to the remaining one. Either the mixed strategy equilibria use only type (1) pure strategies as support, obviously involving total payment offers of 11 and implying no leveling, or they use all three pure strategy types as their support, where the two leveling strategy types always receive the same probability weight. By this, we again observe expected total bribe offers of 11, but now have a positive probability to observe leveling. As a consequence of these mixed strategies, we expect to observe a lower degree of leveling than in the sequential-moves setting in the experimental data. Lobby B again shows very high probability weights on the pure strategy of not offering any bribes at all and then mixes in pure strategies offering a payment to only one of the legislators or sometimes to two of the legislators. Interestingly, there are also three equilibrium types where Lobby B puts the highest probability weight on the pure strategy of offering only one legislator a payment of one rather than on the strategy of making no bribe offers at all. However, in these equilibria the offer of one by Lobby B is made to a legislator whose vote Lobby B cannot win as this legislator is offered a bribe of 6 with probability 1 by Lobby A. Therefore the use of this pure strategy of making a bribe offer of one to only this particular legislator is equivalent to making no bribe offers at all.

These theoretical considerations provide us with the following predictions that we will test in the experiment. Comparing the two scenarios in the simultaneous game, the average coalition size should be larger in Scenario 1 compared to Scenario 2 and the amount spent to win the majority should be higher in Scenario 2 relative to Scenario 1. Compared to the sequential game, we expect to find smaller coalition sizes, less payments offered in total, and a lower probability of winning the vote for Lobby A in the simultaneous game.

2.3 Procedural Details

To test the accuracy of our theoretical predictions with respect to the lobbies' behavior, we implemented the scenarios described above in four different treatments (sequential and simultaneous moves with three and seven legislators). A total of 162 students from ETH Zurich and the University of Zurich (58% female, average age 23 years) participated in 10 experimental sessions in the DeScil laboratory at ETH Zurich.[15]

In the sessions with seven legislators, participants played one round of each of the seven scenarios. Before that, they played three practice rounds. The sequence of scenarios was varied randomly between the sessions with sequential moves. For each session with a specific sequence in the sequential-moves treatment, we also ran one with the same sequence in the simultaneous-moves treatment. In the three-legislators sessions, subjects played five rounds of each of the two scenarios in a row after two practice rounds. One of the two sessions in the two subtreatments (sequential and simultaneous) started with Scenario 1, the other one with Scenario 2. In all treatments, subjects were randomly re-matched after every round, and the roles of Lobby A and Lobby B were also randomly assigned within each pair of matched subjects in every round. As our focus is on the behavior of the lobbies, we chose to hardwire the behavior of the legislators in the following way: each computerized legislator is programmed to vote for the alternative that gives it the highest payoff.

In the beginning of each round, subjects were informed about their role as Lobby A or

[15]Following the suggestion of an anonymous Advisory Editor, we ran four more sessions as a robustness check, at a later point in time, to address some concerns of an anonymous referee. We discuss them in Section 3.1.4.

Table 3: Number of Sessions and Participants

	Seven legislators		Three legislators	
	Seq	Sim	Seq	Sim
Sessions	3	3	2	2
Subjects	82	80	56	56

Notes: A session lasted on average 110 minutes and average earnings were CHF 52.

Lobby B (called member A/B in the instructions), about their corresponding budget and the legislators' (committee members') valuations. On the second screen, they entered their payment offers. At the end of every round, they saw a feedback screen informing them about the legislators' decisions and their payoff. Subjects were paid a show-up fee of CHF 5 in addition to the points they earned in the experiment, which were converted into Swiss Francs at an exchange rate of CHF 0.02/point (CHF 0.13/point) in the sessions with seven (three) legislators.

Subjects were informed about all these details in the instructions and we checked their understanding with an on-screen quiz before the start of the experiment (see Appendix D for the instructions and the quiz).[16]

3 Experimental Results

3.1 Seven Legislators

Before analyzing the results in detail, we point to Table 5 for an overview of the descriptive statistics for all scenarios, and to Figures 1 and 2 for a graphical overview of the behavior of Lobbies A. The analogue Figures C1 and C2 give a first overview of the behavior of Lobbies B.[17]

3.1.1 Number and Level of Bribes

Sequential moves Starting with Scenarios 1–5, we observe that most of the comparative statics predictions with respect to the preference biases of the legislators hold in the data (Table 4 and Figure 1). In particular, the comparative statics regarding an increase in the legislators' preference bias towards the status quo are tested in the comparison between Scenarios 1 and

[16]The experiment was programmed in zTree (Fischbacher, 2007).

[17]Note that some of the material is presented in the Appendix to limit the length of the main text. This includes the figures for Lobby B. The letter C in the table and figure references indicates that they can be found in Appendix C.

2, as well as between Scenarios 3 and 4. As Table 4 indicates, both inequalities are in the direction predicted by the theory and the differences are statistically significant.[18]

Table 4: Comparative Statics with Seven Legislators in Sequential Scenarios: Number of Bribes of Lobby A

	Sc.2	Sc.3	Sc.4	Sc.5	Sc.6	Sc.7
Sc.1	$>$	$<$	$>$	$>$	$>$	$>$
p-value	.032†	.017†	.000†	.000	.000	.189
Sc.2		$<$	$>^{*}$	$>$	$>$	$<$
p-value		.000	.036†	.000	.000	.455
Sc.3			$>$	$>$	$>$	$>$
p-value			.000†	.000	.000	.000
Sc.4				$>$	$>$	$<$
p-value				.000	.037†	.014†
Sc.5					$<$	$<$
p-value					.000†	.000
Sc.6						$<$
p-value						.000

Notes:: $>$ ($<$): average number of bribes in row scenario greater (smaller) than column scenario; all comparisons are between sequential-moves scenarios; p-value are for two-sided tests. $*$: direction is opposite to theoretical prediction; †: significant at 5% with clustering at subject level but not with clustering at session level.

The comparative statics results with respect to the willingness-to-pay by Lobby B are more mixed. They are tested by comparing Scenarios 1 and 3, Scenarios 2 and 4 as well as by the comparative statics relating to Scenario 5. First, the theoretical predictions regarding Scenario 5, where the prize for Lobby B is so large that it is optimal for Lobby A to make no payments are confirmed. As shown in Figure 1, the mode indicates that overwhelmingly the Lobbies A make zero payments. This is also reflected in the significant and theoretically predicted direction of the comparative statics with the other Scenarios 1-4 in Table 4. However, the theory suggests that there is no difference in the number of bribes between Scenarios 1 and 3, while Table 4 indicates that the number of bribes is lower in Scenario 1 than in Scenario 3. Figure 1 reveals that in both scenarios the mode reflects the theoretical prediction of Lobby A optimally bribing all seven legislators. However, in Scenario 1 a substantial share of the

[18]When we speak of statistical significance throughout the text, we mean significance at the 5% level in two-sided t-tests or F-tests with standard errors clustered at the subject level. We checked for robustness of the treatment differences by clustering the standard errors at the session level. See Table 4 and Footnote 31.

subjects choose to bribe only four legislators, probably wrongly believing this would be a cheaper way to win than bribing seven legislators. This lowers the average bribe for Scenario 1 and leads to the difference in the average bribes relative to Scenario 3. We see a similar pattern in the comparison between Scenarios 2 and 4. In Scenario 4, there is both, a strong bias of the legislators towards the status quo, and a high willingness-to-pay by Lobby B. Both factors make it more expensive for Lobby A to win the vote and a non-negligible share of the participants apparently overestimate their impact, believing that Lobby A could not win and therefore making no bribes. This share of zero bribes reduces the average number of bribes in Scenario 4 to the extent that the comparison with Scenario 2 leads to an inequality in the opposite direction to the theoretical prediction. However, as we document in Section 3.1.4, this deviation from our theoretical prediction is not robust.[19]

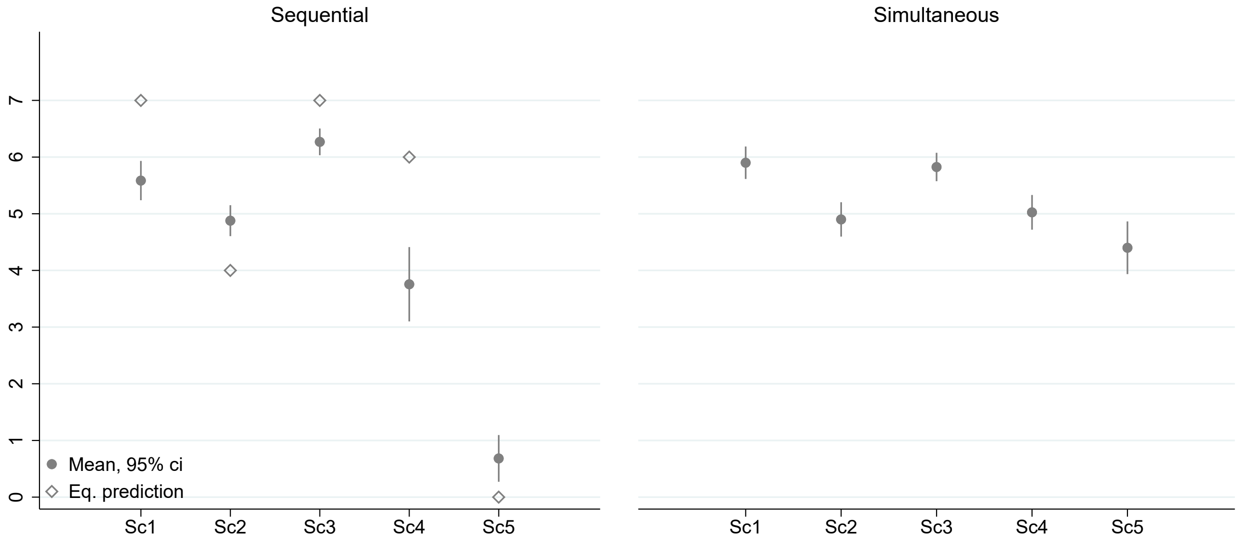
Figure 1 indicates that the point predictions with respect to the number of bribes by Lobby A are not very accurate and the observed means differ significantly from the predictions in all five scenarios. However, regarding the distribution of the number of bribes, the mode corresponds to the theoretical prediction in all scenarios except Scenario 4, in which it is most expensive but still profitable for A to win. Regressing the actual number of bribes offered on the theoretically predicted number reveals that the theoretically predicted values have a significantly positive coefficient and explain 42% of the variation across Scenarios 1–5 (Table C2). While the total sum of bribes offered differs significantly from the point predictions (Table 5), regressing the former on the latter indicates that the theoretically predicted values have a significantly positive coefficient and explain 21% of the variation in the bribe levels across Scenarios 1–5 (Table C3).[20]

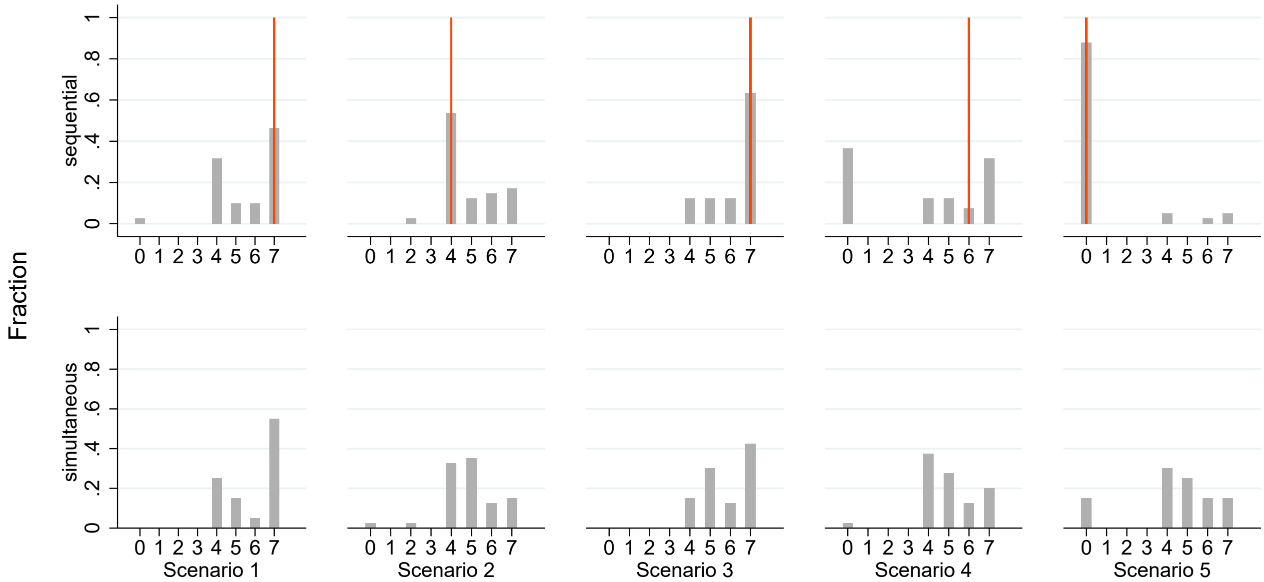
Turning to Scenarios 6 and 7 (Figure 1 and Table 5), which test whether non-flooded (Scenario 6) or flooded (Scenario 7) coalitions are formed, we find that the mode in Scenario 6 is at one, implying that a non-flooded coalition is formed as predicted by the theory. We also observe a large share of Lobbies A forming a flooded coalition in Scenario 7, albeit mostly with a coalition size of seven rather than the theoretically predicted six legislators. As we observe in Figure 1, a substantial share of Lobbies A bribe four legislators in both, Scenario 6 and Scenario 7. The box-plots in Figure C4 indicate that in Scenario 6 these typically reflect non-flooded coalitions of size seven where the four status-quo leaning legislators are offered some payments. From a theoretical perspective the non-flooded coalition is too large is this case. Regarding Scenario 7, Figure C4 suggests the situations where four legislators are bribed mostly reflect flooded coalitions where the three policy-change legislators are bribed and only one addional

[19]In the extra sessions that we conducted for robustness (reported in Section 3.1.4), the results are more closely aligned with the theory: The comparison between Scenarios 1 and 3 shows no significant difference, as theoretically predicted, and the comparison between Scenarios 2 and 4 indicates the theoretically predicted inequality; however, it is not statistically significant.

[20]In Scenarios 6–7, legislators' valuations are not homogeneous and predictions are qualitatively different. We therefore analyze these scenarios separately. However, we also present the regression results of all scenarios combined in Appendix C.

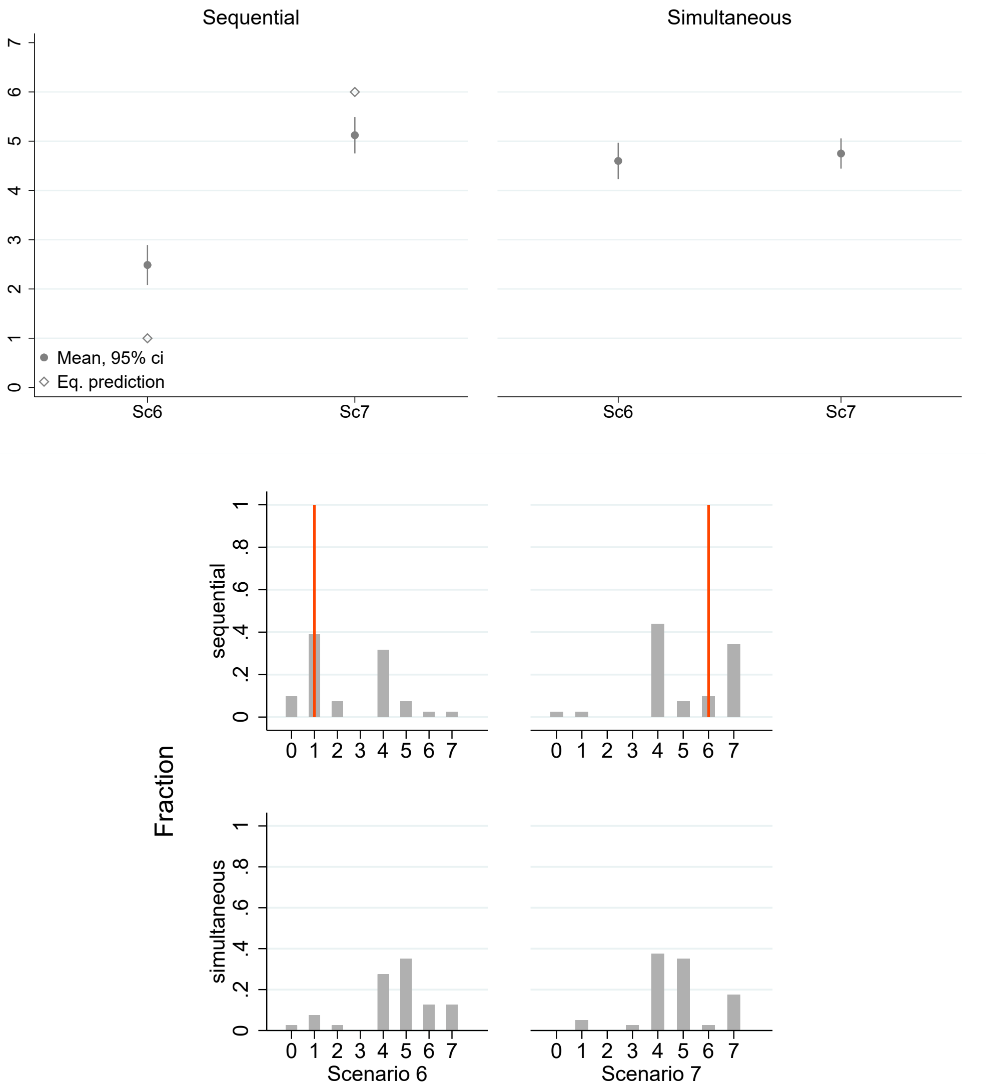
Figure 1: Number of Bribes by Lobby A in Scenarios 1–5 with Seven Legislators





Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure 2: Number of Bribes by Lobby A in Scenarios 6 and 7 with Seven Legislators



Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Table 5: Results for Scenarios with Seven Legislators

	Sc1	se	Sc2	se	Sc3	se	Sc4	se	Sc5	se	Sc6	se	Sc7	se
# Bribes proposed by A:														
Equilibrium: sequential	7		4		7		6		0		1		6	
Observed: sequential	5.59	(0.18)	4.88	(0.14)	6.27	(0.12)	3.76	(0.33)	0.68	(0.21)	2.49	(0.21)	5.12	(0.19)
Observed: simultaneous	5.9	(0.15)	4.9	(0.15)	5.83	(0.13)	5.03	(0.16)	4.4	(0.24)	4.6	(0.19)	4.75	(0.16)
# Bribes proposed by B:														
Equilibrium: sequential	0		0		0		0		0		0		0	
Observed: sequential	0.56	(0.14)	0.44	(0.1)	0.98	(0.17)	0.32	(0.1)	0.44	(0.13)	0.27	(0.08)	1.22	(0.17)
Observed: simultaneous	2.85	(0.31)	2.53	(0.29)	3.45	(0.28)	4.33	(0.23)	5.18	(0.18)	2.23	(0.24)	3.33	(0.23)
Votes won by A:														
Equilibrium: sequential	7		4		7		6		0		4		6	
Observed: sequential	5.2	(0.2)	4.54	(0.16)	5.34	(0.2)	3.44	(0.33)	0.37	(0.11)	4.32	(0.15)	4.49	(0.2)
Observed: simultaneous	5.38	(0.2)	4.23	(0.2)	5.1	(0.18)	4.25	(0.19)	2.88	(0.24)	4.68	(0.16)	4.6	(0.16)
A wins (%):														
Equilibrium: sequential	100		100		100		100		0		100		100	
Observed: sequential	80.49	(4.4)	73.17	(4.92)	65.85	(5.27)	48.78	(5.55)	0	(0)	75.61	(4.77)	48.78	(5.55)
Observed: simultaneous	92.5	(2.96)	75	(4.87)	90	(3.38)	77.5	(4.7)	47.5	(5.62)	85	(4.02)	77.5	(4.7)
Total bribes proposed by A:														
Equilibrium: sequential	25		128		109		238		0		32		142	
Observed: sequential	69.27	(6.03)	148.68	(6.65)	126.46	(6.21)	141.41	(13.51)	17.8	(5.43)	69.98	(8.12)	137.76	(8.82)
Observed: simultaneous	98.8	(9.59)	137.68	(8.17)	118.58	(8.21)	162.05	(7.97)	122.08	(10.56)	111.3	(8.17)	117.23	(9.43)
Total bribes proposed by B:														
Equilibrium: sequential	0		0		0		0		0		0		0	
Observed: sequential	6.54	(3.43)	3.12	(0.66)	19	(3.21)	4.37	(1.45)	8.02	(2.65)	6.17	(3.43)	20.78	(2.83)
Observed: simultaneous	16.2	(5.61)	15.98	(4.1)	21.28	(4.61)	33.3	(5.78)	78.33	(6.26)	22.53	(5.61)	28	(4.62)
Winning coalition size if A wins:														
Equilibrium: sequential	7		4		7		6				4		6	
Observed: sequential	5.82	(0.16)	5.13	(0.16)	6.56	(0.12)	6.15	(0.18)	X	X	4.77	(0.16)	6.05	(0.2)
Observed: simultaneous	5.76	(0.14)	5.07	(0.13)	5.47	(0.14)	4.94	(0.13)	4.79	(0.15)	5.06	(0.14)	5.1	(0.15)
Winning coalition size if B wins:														
Equilibrium: sequential									7					
Observed: sequential	4.38	(0.25)	4.09	(0.06)	4	(0)	6.14	(0.21)	6.63	(0.11)	4.1	(0.07)	4	(0)
Observed: simultaneous	6.33	(0.39)	5.3	(0.27)	5.25	(0.39)	5.11	(0.28)	5.86	(0.19)	4.5	(0.22)	4.11	(0.07)
Levelling by A (%):														
Equilibrium: sequential	100		100		100		100		0		100		100	
Observed: sequential	87.88	(5.72)	90	(5.51)	85.19	(6.88)	100	(0)	0	(0)	29.03	(8.21)	35	(10.74)
Observed: simultaneous	29.73	(7.56)	40	(9)	36.11	(8.06)	45.16	(9)	57.89	(11.4)	0	(0)	9.68	(5.34)
Quasi-levelling by A (%):														
Observed: sequential	93.94	(4.18)	93.33	(4.59)	88.89	(6.09)	100	(0)	0	(0)	39.13	(10.25)	70	(10.32)
Observed: simultaneous	48.65	(8.27)	73.33	(8.13)	50	(8.39)	51.61	(9.03)	63.16	(11.14)	18.75	(6.95)	32.26	(8.45)

Notes: Standard errors (ses) are clustered at the subject level. Lobby A never wins in the sequential set-up in Scenario 5. Therefore, we have no observations of winning coalition sizes for this scenario (as indicated by the "X"). Leveling and quasi-leveling refer to the strategy types as defined in 3.1.2.

status-quo leaning legislator. In this way, the coalition size of the flooded coalition is too small when viewed from the theoretical standpoint. Taken together, the point predictions for Scenarios 6 and 7 are not very accurate. However, the comparative statics prediction regarding the willingness-to-pay of Lobby B is confirmed. Regressing the actual number of bribes and the total sum of bribes offered on the theoretically predicted values, we find that the latter are significant predictors of the observed behavior in the laboratory and explain 35% of the variation in both regressions (Tables C2 and C3).

Lobby A does not always win when it theoretically should. In Scenarios 4 and 7, where winning is most costly, it wins in only 49% of the cases (see Table 5). In the other scenarios, Lobby A wins substantially more often. To a large extent the low winning rates are due to suboptimal behavior on the part of Lobby A. However, in some cases Lobby B wins by paying more than its willingness-to-pay. In Scenario 5, where A is predicted to lose, it does indeed always lose. Lobby B's bids are mostly close to zero in all seven scenarios, as predicted.[21] However, while the median number and level of bribes is zero in Scenarios 1-4 and 6-7, the means are significantly larger than zero in all scenarios.

Simultaneous moves Starting again with Scenarios 1–5, we observe a similar pattern regarding the comparative statics than for the sequential-move games (Figure 1). However, with simultaneous moves the differences between treatments with respect to the average number of bribes and the total bribe level are less pronounced (see Figure 1 and Table C1). Table 6 indicates that the average numbers of bribes are not significantly different between the sequential and simultaneous moves game in scenarios 1, 2, and 7, while they differ in the other scenarios.

When we regress the actual number of bribes offered on the theoretically predicted number for the sequential case, we see that these values again have a significantly positive coefficient but explain only 10% of the variation across Scenarios 1–5 (Table C2). Regressing the total sum of bribes offered on the predicted values for the sequential case reveals that the theoretically predicted values have a significantly positive coefficient again but explain only 3% of the variation across Scenarios 1–5 (Table C3). When we turn to Scenarios 6 and 7, we find no predictive power for the theoretically predicted values for the sequential case for either the number of bribes offered or the total sum of bribes. In neither of the two regressions the coefficients for the theoretically predicted values is significantly different from zero, and we get p-values larger than 0.6 (Tables C2 and C3).

Interestingly, Lobby A wins more often in all scenarios as compared to the sequential case.[22] This occurs despite higher average bribes by Lobby B, and does not reflect the theoretical prediction of winning rates of 100% for all scenarios (except Scenario 5, where it is 0%) in the sequential-move game, while there are no equilibria with a winning rate of 100% in the

[21]See Figures C1, C2, C5, and C6.

[22]The difference is significant in Scenarios 3, 4, 5 and 7, and if all scenarios are pooled.

simultaneous case.[23] We provide a possible explanation for this observation in Section 3.1.3.

Table 6: Comparison of Sequential vs. Simultaneous Scenarios with Seven Legislators

Number of Bribes of Lobby A	Sc.1	Sc.2	Sc.3	Sc.4	Sc.5	Sc.6	Sc.7
Comparison sequ. vs sim. moves	$<$	$>$	$>$	$<$	$<$	$<$	$>$
p-value	.338	.941	.008	.018†	.000	.000	.290

Notes:: $>$ ($<$): average number of bribes in the scenario with sequential moves is higher (lower) than in the same scenario with simultaneous moves; *p*-values are for two-sided tests. †: significant at 5% with clustering at subject level but not with clustering at session level.

3.1.2 Leveling, Flooding and Mixing

We now turn to the predictions regarding leveling and flooding. In theory, all members of a coalition should be equally expensive to buy back for Lobby B. With our discretization of the bribes and initial valuations with half points, it is sufficient to bring them to almost the same level so that the legislators' valuations differ by maximally one point in scenarios with supermajorities because it costs Lobby B a full point to turn a valuation of 0.5 into -0.5. Therefore, we consider a bribe offer schedule as leveling if the valuation of all members of a coalition differ by at most one point. In Scenarios 1 to 5, we compute the relative frequency of bribe schedules in which more than one bribe is offered. For Scenarios 6 and 7, we also consider bribe schedules in which only one bribe is offered as the legislators with positive *ex ante* valuation are also coalition members whose valuations can be compared to those of the bribed. In addition to leveling as just described, we also report "quasi-leveling" bribe profiles, in which the valuations (after the bribe offers) of legislators must not be different by more than 5 points.

Sequential moves In Scenarios 1–4, where the model predicts 100% leveling, we also observe high percentages of leveling in the data (Table 5). However, while the theory also predicts full leveling in Scenarios 6 and 7, we observe leveling only in around 30% of all cases. This suggests that leveling may not entirely originate from subjects realizing that it is optimal to leave no soft spot but possibly also from the fact that it is very easy to offer the same amount to every legislator. When applying the more lenient criterion of quasi-leveling, the precentage almost doubles for Scenario 7, but only slightly increases for Scenario 6. Further and as discussed previously, we observe flooded coalitions in Scenario 7 albeit mostly not of the exact theoretically predicted size. This is different for Scenario 6 where the we do not

[23]See Table 5 and Figures C1, C2, and C5.

only observe the theoretically predicted non-flooded coalitions but also a large share of them reflecting the theoretical prediction of one addtional legislator beyond the pro-policy leaning ones receiving a bribe (see Figure 2).

Simultaneous moves Leveling occurs much less frequently in the simultaneous case. However, in Scenarios 1–5 it is still a popular strategy (see Table 5). As a consequence of the lower degree of leveling, the standard deviation in bribes is much (and significantly) higher in the setting with simultaneous moves (5 points, compared to 1.5 points). This indicates substantially different strategy choices than in the sequential-move game. The box plots in Figures C3, C4, C5 and C6 provide further evidence for different strategy choices between the two treatments.

3.1.3 Errors, Learning, and Heterogeneity

As we have no theoretical predictions regarding the total sum of offered bribes or the number of bribes offered for the simultaneous case, this section focuses on the sequential case. We will have more to say on the simultaneous scenarios with three legislators in Section 3.2.3.

The deviations from equilibrium that we observe give rise to a number of questions that we address in this section: (i) Are these deviations real errors in the sense that they are not best responses to the actual behavior of Lobbies B? (ii) Do they decline over time, that is: do subjects learn with experience? (iii) Are there systematic differences between subjects?

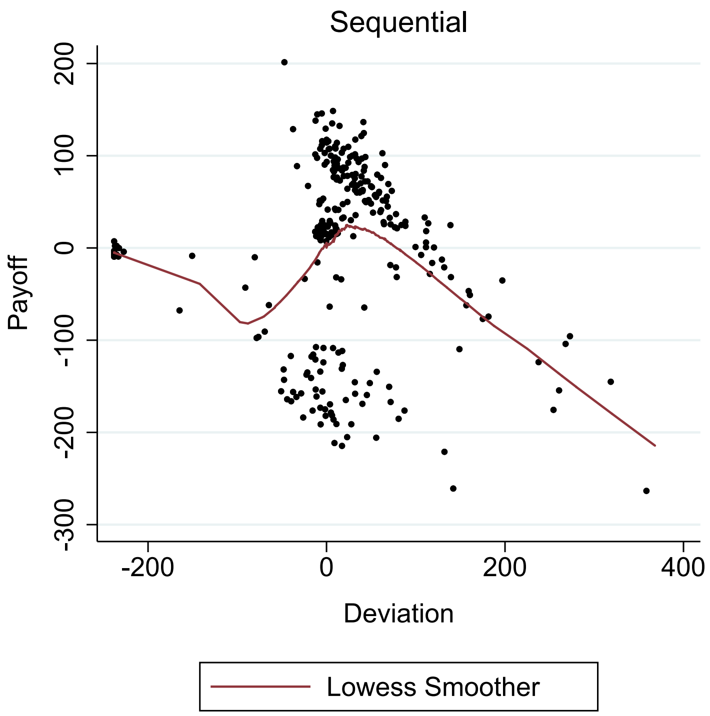
Figure 3 shows Lobbies A's payoffs and deviations from the theoretically predicted total sum of offered bribes. The lowess smoother peaks close to zero, suggesting that bidding the predicted optimal amount (or slightly more) is, indeed, optimal.[24] Regressions of Lobby A's payoffs on deviations from the theoretically predicted total sum of offered bribes, or the deviations from the theoretically predicted number of bribes, lend further evidence on the costs of deviating from equilibrium (Table C4). Both types of errors decline over time, suggesting that subjects learn and improve their bribe distributions (Table C5).

Lobby B sometimes wins in scenarios where it should not according to theory. In 36% of these cases this occurs because of Lobby B bidding more than its willingness-to-pay. Interestingly, in 14% of the cases, in which B wins, this happens when it costs B only one point, which makes it unlikely that this occurred by chance. This suggests that some subjects have a positive willingness-to-pay for winning *per se* and explains why Lobby A's payoffs do not peak exactly at the theoretical optimum but at slightly higher total bribe levels.

A related question is why Lobby B seems to win more often in the sequential-move game than in the game with simultaneous moves, even though theoretically we would expect the opposite. We believe a key reason is the possibility for Lobby B to observe Lobby A's payment

[24]Lowess (locally weighted scatterplot) smoothing is a non-parametric technique which allows finding the best fitting curve without any parametric assumptions. 80% of the data is used to smooth every point, which is done by running one regression per point and weighing data closer to the point more than data further away.

Figure 3: Lobby A's Deviations from Equilibrium and Payoffs – Seven Legislators



Note: Scatter plot and lowess smoother of Lobbies A's deviation from theoretically predicted total sum of bribes and Lobbies A's normalized payoffs. Payoffs are normalized by de-meaning them by scenario. To avoid overlay a random jitter was used.

offers and make targeted responses in the sequential-moves set-up. This allows Lobby B, first, to spot any non-optimal behavior by Lobby A and target their own offer to optimally take advantage of it and, second, to act on a possible willingness-to-pay for winning in a targeted and therefore cheap way. This explanation would be consistent with the observation that in the simultaneous-moves set-up Lobbies B spend, on average, more in bribes but win in a smaller share of cases compared to the sequential-move game. Lobbies B can use their resources more efficiently in the sequential-move game and therefore act on a possible willingness-to-pay for winning in a cheaper way with higher success rates. Moreover, there is no possibility for Lobbies B to spot potential errors by Lobbies A and directly respond to them in the simultaneous-move game.

Regarding the question of whether subjects show systematic differences, we focus on subjects who played in the role of Lobby A in at least three scenarios (84% of all subjects). We observe that none of these subjects plays exactly the theoretically predicted strategy in all scenarios. However, at least 9% play it in 50% or more of the scenarios. Moreover, 28% of the subjects always play a leveling strategy in all scenarios and 44% play a quasi-leveling strategy. When we look for subjects that frequently play strategies that are relatively far from the theoretical predictions, we find that 24% of the subjects are at or above the 75th percentile of the distributions of the deviations from the theoretically predicted total sum of offered bribes in more than half of the scenarios they played. Deviating at or above this percentile leads to a 26 points lower payoff, on average, than that of the other Lobbies A. Turning to subjects who frequently play strategies that are relatively close to the theoretical predictions, we find that 19% of the subjects are at or below the 25th percentile of the distributions of the deviations in more than half of the scenarios they played. Being in this group gives them a payoff that is, on average, 24 points higher than that of the other subjects.

3.1.4 Extra Sessions – Robustness Checks

Two observations motivate running a robustness check of some of our key findings. On the one hand, there are a few deviations from our key theoretical predictions for the sequential moves case. On the other hand, we observe that error rates decline over time. Hence, some of the deviations could be due to the fact that subjects do not have enough time for learning.[25] Therefore, we ran four additional sessions to do some robustness checks.[26] In these sessions, subjects play only three different scenarios: Scenarios 1, 3, and 6 in two sessions; and Scenarios 2, 4, 7 in two further sessions. They play each scenario three times, which allows for learning within the scenario.[27] In Figures C7 and C8 we show the number of bribes by Lobby A if we drop the first two rounds or only the first round of each scenario, respectively. Figures C9 and C10 show the analogue figures for Lobby B, while Table 7 displays the pairwise comparisons of the six scenarios.

Overall, the distributions look very similar to those reported for the main treatment before. However, we observe some notable differences in the pairwise comparisons of the scenarios especially regarding the comparative statics with respect to the willingness-to-pay by Lobby B.[28] In the comparison between Scenarios 1 and 3, the difference between the average numbers of payments is much smaller now and not statistically significant anymore. We recall that according to the theoretical prediction, the number of bribes should be the same in both scenarios.[29] Moreover, we find in the extra sessions results that the average number of bribes is lower in Scenario 2 compared with Scenario 4 as predicted by the theory. As we can observe

[25] This reasonable concern was raised by one of our anonymous referees.

[26] We ran these extra sessions in the LakeLab at the University of Konstanz. Average payments were around EUR 28 and the sessions lasted 90 minutes, on average. 28 subjects each participated in three of the four sessions and 24 in the fourth.

[27] We had to drop one of the seven scenarios for the extra sessions to have enough time for the repetitions. As the differences between all the other scenarios and Scenario 5 were the most clear-cut, we decided to leave this scenario out. The order in which subjects played the scenarios was 1-3-6-1-3-6-1-3-6 and 2-4-7-2-4-7-2-4-7

[28] As the figures also show, the number of bribes are very similar when we keep only the last round rather than the last two rounds from each scenario. Therefore we only present the comparative-statics results for the last two rounds in the main text.

[29] The same is true for the comparison between Scenarios 4 and 7, which is now insignificant, and where the theory also predicts no difference in the number of bribes.

Table 7: Comparative Statics with Seven Legislators in Sequential Scenarios: Number of Bribes of Lobby A in Extra Sessions – Last Two Rounds

	Sc.2	Sc.3	Sc.4	Sc.6	Sc.7
Sc.1	>	<	>	>	>
p-value	.034	.523	.218	.000	.065
Sc.2		<	<	>	<
p-value		.015	.493	.079	.955
Sc.3			>	>	>
p-value			.111	.000	.030
Sc.4				>	>
p-value				.048	.616
Sc.6					<
p-value					.095

Notes:: > (<): average number of bribes in row scenario greater (smaller) than column scenario; all comparisons are between sequential-moves scenarios; *p*-value are for two-sided tests with clustered standard-errors on the subject level. As we have only two sessions per scenario, we refrain from clustering at the session level. Results are very similar if we focus on the last round only (omitted here).

in the lower halves of Figures C7 and C8, the reason is the lower share of subjects offering no payment in the extra sessions as compared to the main treatment sessions (see lower half of Figure 1). However, the difference between the two scenarios is small and not statistically significant. This is also true for some of the other differences. It is reassuring, however, that the key inequalities testing the comparative statics with respect to legislators' biases towards the status quo and Lobby B's willingness-to-pay are in line with the theoretical predictions. Further, none of the differences is statistically significant where theory predicts the same number of payments. When the theory predicts large differences in the number of bribes (a difference of three bribed legislators), the extra sessions results show statistically significant differences as well. However, we also find in the extra sessions that Lobbies B, on average, bribe more than the predicted zero legislators and win some of the games.

The differences between the results of the extra sessions and the main treatment sessions do not appear to be a consequence of different opportunities for learning. They are similar in the first round of each scenario in the extra sessions. Thus, while these results show that some of the comparative statics results from the main treatment sessions are not robust (notably those that did not support the theoretical predictions), the reason does not seem to be that subjects did not have enough time for learning in the main treatment.[30]

[30]Recall that they played three practice rounds at the beginning of the main treatment sessions to give them

3.2 Three Legislators

We now turn to the experimental results for the games with three legislators. We summarize the descriptive statics in Table 8. Figures 4 and C11 provide a graphical overview of the behavior of the two lobbies, A and B.

3.2.1 Number and level of bribes

Recalling the differences in the theoretical predictions between the sequential and the simultaneous-move set-up, we note that the comparative statics predictions for both settings go in the same direction. However, the predicted differences in the number of bribes is smaller with simultaneous moves. The theoretical prediction is that Lobby A offers bribes to only two legislators in Scenario 2, both in the simultaneous and in the sequential-move game. However, in Scenario 1 Lobby A is predicted to make offers to two legislators with 75% probability and with 25% probability to all three legislators in the simultaneous-move game, whereas in the sequential-move game Lobby A is predicted to make offers to all three legislators.

The predicted pattern for the number of payments in the game with simultaneous moves is clearly reflected in the data (Figure 4 and Table C6). The mode is correct in all four situations and the comparative statics all hold.[31] However, the point predictions regarding the average number of bribes are again not accurate. The same holds for the total sum of bribes offered (Table 8 and Table C7). We also observe again that Lobby A wins more often in the simultaneous-move game, which goes against the theoretical predictions.[32] The same reason as provided in Section 3.1.3 likely applies here as well. While the number of offered bribes by most Lobbies B are close to zero in the sequential scenarios (Figures C11 and C13), their means are again significantly larger than zero.

3.2.2 Leveling

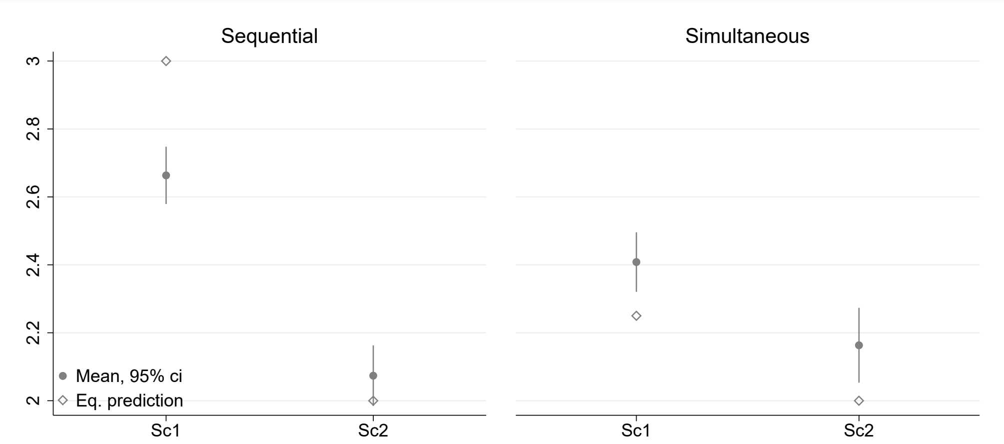
Leveling is very prevalent in both sub-treatments and both scenarios: at least 86% of the Lobbies A adopt a leveling strategy. This is not very surprising as the number of strategies that are not leveling and not weakly dominated is much lower as a result of the much lower willingness-to-pay compared to the scenarios with seven legislators. The differences in the distributions of bribes for each legislator again indicate different strategy choices in the sequential as compared to the simultaneous treatments (Figures C12 and C13).

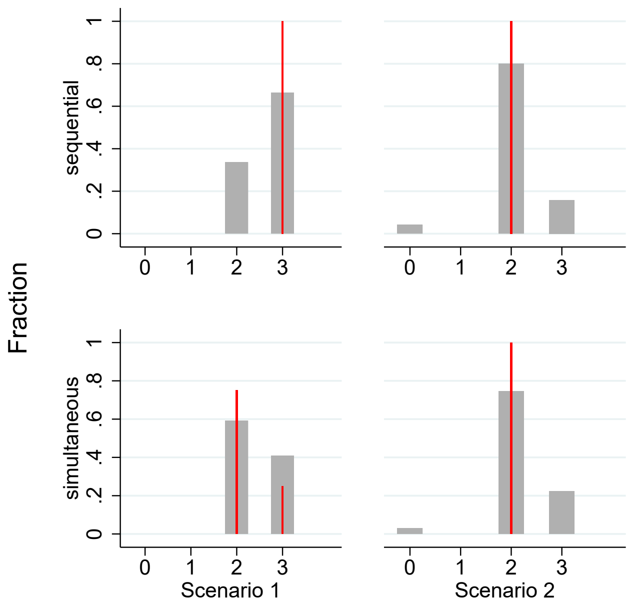
the opportunity to make themselves familiar with the type of situations and the interface.

[31] The p-value for the significance test of the difference between Scenarios 1 and 2 is $< .001$ (.013) for the sequential (simultaneous) cases. For the simultaneous scenarios, the treatment difference is not significant at the 5% level with clustering at the session level. Comparing sequential with simultaneous we get a p-value of $< .001$ (.466) for Scenario 1 (2).

[32] The difference is only significant when the two scenarios are pooled.

Figure 4: Number of Bribes by Lobby A for Scenarios with Three Legislators





Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

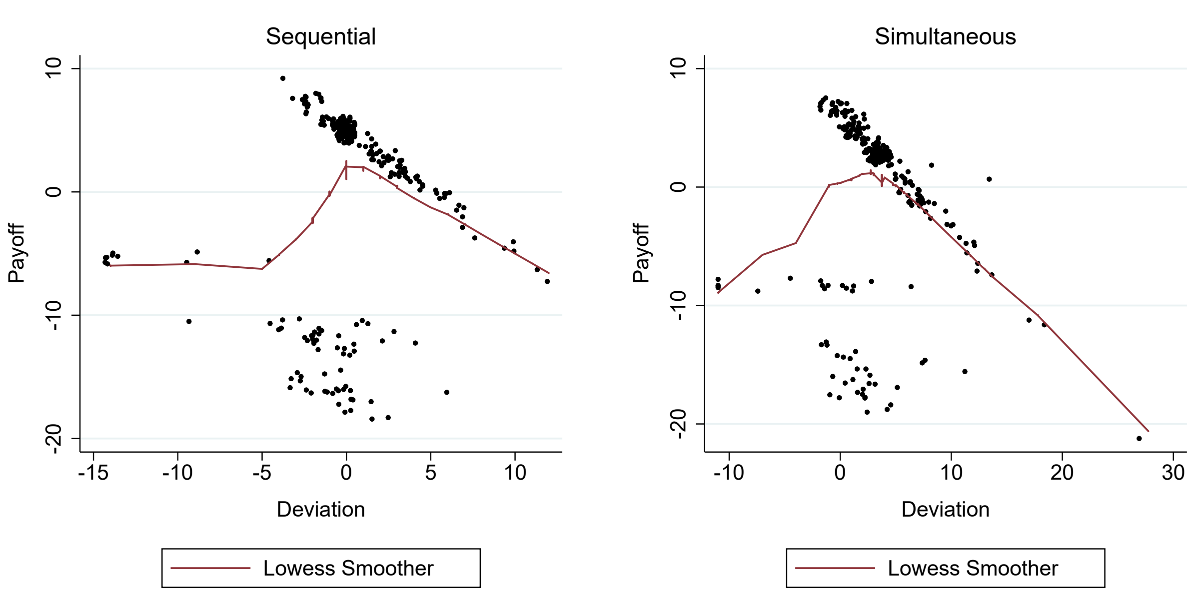
Table 8: Results for Scenarios with Three Legislators

	Sc1	se	Sc2	se
# Bribes proposed by A:				
Equilibrium: sequential	3		2	
Observed: sequential	2.66	(0.04)	2.07	(0.05)
Equilibrium: simultaneous	2.25		2	
Observed: simultaneous	2.41	(0.04)	2.16	(0.06)
# Bribes proposed by B:				
Equilibrium: sequential	0		0	
Observed: sequential	0.4	(0.06)	0.31	(0.05)
Observed: simultaneous	0.72	(0.1)	0.97	(0.09)
Votes won by A:				
Observed: sequential	2.35	(0.06)	1.77	(0.07)
Observed: simultaneous	2.27	(0.06)	1.84	(0.07)
A wins (%):				
Equilibrium: sequential	100		100	
Observed: sequential	83.17	(3.12)	73.68	(3.96)
Equilibrium: simultaneous	<100		<100	
Observed: simultaneous	92.86	(2.53)	79.59	(3.9)
Total bribes proposed by A:				
Equilibrium: sequential	5		14	
Observed: sequential	6.54	(0.25)	11.92	(0.44)
Equilibrium: simultaneous	2.25		11	
Observed: simultaneous	6.66	(0.33)	11.66	(0.44)
Total bribes proposed by B:				
Equilibrium: sequential	0		0	
Observed: sequential	0.7	(0.13)	0.46	(0.08)
Observed: simultaneous	0.83	(0.21)	1.26	(0.24)
Winning coalition size if A wins:				
Observed: sequential	2.64	(0.04)	2.14	(0.04)
Observed: simultaneous	2.38	(0.04)	2.18	(0.04)
Winning coalition size if B wins:				
Observed: sequential	2.12	(0.05)	2.28	(0.07)
Observed: simultaneous	2.29	(0.1)	2.5	(0.1)
Levelling by A (%):				
Equilibrium: sequential	100		100	
Observed: sequential	86.9	(4.56)	95.71	(3.12)
Equilibrium: simultaneous	100		0-100	
Observed: simultaneous	87.91	(4.66)	87.18	(4.82)

Notes: Standard errors (ses) are clustered at the subject level. The theoretical predictions for the simultaneous case are expected values.

3.2.3 Errors, Learning, and Heterogeneity

Figure 5: Lobby A's Deviations from Equilibrium and Payoffs



Note: Scatter plots and lowess smoothers of Lobbies A's deviations from theoretically predicted total sum of bribes and Lobbies A's normalized payoffs. Payoffs are normalized by de-meaning them by scenario. To avoid overlay a random jitter was used.

Figure 5 shows the payoffs for Lobbies A and deviations from the theoretically predicted total sum of offered bribes. As in the seven-legislator scenarios, the lowess smoother peaks close to zero both under sequential and simultaneous moves. This suggests that making payment offers the predicted optimal amount (or again slightly more) is optimal. Regressions of Lobby A's payoffs on deviations from the theoretically predicted total sum of offered bribes, or on the deviations from the theoretically predicted number of bribes, lend further evidence on the costs of deviating much from the equilibrium (Table C8). There seems to be less learning than in the scenarios with seven legislators and we only observe a significant decline in the errors over time for deviations from the theoretically predicted total sum of bribes with simultaneous moves (Table C9).

Regarding heterogeneity of subjects, we focus again on subjects who played in the role of Lobby A in at least three rounds (96% of all subjects). We observe that one subject plays the exact theoretically predicted strategy in all rounds with sequential scenarios, and 17% play it in 50% or more of the rounds. Moreover, 67% (67%) of the subjects always play a leveling strategy in both sequential (simultaneous) scenarios. Looking again for subjects playing strategies far from the theoretical predictions, we see that 35% (35%) of the subjects who played in the role of Lobby A in at least three rounds are at or above the 75th percentile of the distributions of the deviations from theoretically predicted total sum of offered bribes in more than half of the sequential (simultaneous) rounds they play.[33] Deviating at or above this percentile leads to a payoff that is, on average, 2.4 (1.8) points lower than that of the other Lobbies A in the sequential (simultaneous) rounds. Turning to subjects who frequently play strategies that are relatively close to the theoretical predictions, we see that 42% (34%) of the subjects are at or below the 25th percentile of the distributions of the deviations in more than half of the sequential (simultaneous) scenarios they played. Being in this group gives them a payoff that is, on average, 3.9 (1.6) points higher than that of the other subjects.

3.3 Summary of Key Results

Following the predictions as stated in Section 2, we summarize the main empirical findings for the sequential scenarios as follows:

1. **There are no scenarios in which both lobbies make payments.** While it is true that Lobbies B bid close to zero, on average, in all seven scenarios, Lobbies A's deviation from the theoretical predictions and the apparent willingness of some Lobbies B to incur a (small) loss for winning, leads to average bid levels that are slightly (but significantly) higher than zero in all scenarios (see Tables 5 and 8).

2. **The first-mover lobby will use a leveling strategy.** Indeed, leveling strategies are very prevalent. However, the frequency declines for Scenarios 6 and 7, suggesting that a substantial number of subjects did not entirely understand the rationale of leaving no soft spots (see Tables 5 and 8).

3. **The optimal sizes of the majorities (weakly) decrease in the legislators' biases in favor of the status quo and (weakly) increases with the prize for B.** The comparative statics predictions resulting from these predictions all hold except for the comparison between Scenario 2 and 4 (see Table 4), where the average number of bribes in Scenario 4 is lower than expected because of one third of Lobbies A bidding zero (see Figure 1). However, this deviation is not robust and disappears in our extra sessions.

4. **Either Lobby A will win the vote for sure (if $W_A \geq C_A$), or Lobby B will win for sure (if $W_A < C_A$).** We observe that the lobby that is predicted to win does so with high probability albeit with a probability substantially below 100%. Exceptions are the two Scenarios 4 and 7 where A is predicted to win for sure but B wins frequently. These are the two scenarios in which it is most expensive for A to win (see Tables 5 and 8).

[33] Note that many subjects offer the same total sum of bribes in the three legislator scenarios. Hence, more than 25% can be at or below the 25th percentile of the distribution.

Regarding the predictions for the simultaneous scenarios, we find the following:

1. **Both lobbies will make positive payment offers.** This is supported in the data for all scenarios (see Tables 5 and 8).

2. **The frequency of leveling strategies will be lower in the simultaneous relative to the sequential game set-up.** This is supported in the data.

3. **The optimal sizes of the majorities (weakly) decrease in the legislators' biases in favor of the status quo and (weakly) increases with the prize for B.** Most of the comparative statics predictions resulting from these predictions do indeed hold in the data but several treatment differences are not significant (see Table C1).

4. **The winning probability of A will be lower in the simultaneous game than in the sequential legislative lobbying game.** This hypothesis has not found support in the data (see Tables 5 and 8).

While not all hypotheses are supported in the data, subjects' behaviors mostly respond to the incentives in the predicted direction in both the simultaneous and sequential treatments. As a result, supermajorities are often formed and majority size varies with Lobby B's willingness-to-pay and the legislators' valuations. In an overall mixed picture, the central insights of Groseclose and Snyder (1996) thus appear valid.

4 Conclusions

We set out to test the key predictions of the seminal vote-buying model by Groseclose and Snyder (1996). We design nine different scenarios, varying the number of legislators (three and seven) between sessions, and the relative willingness-to-pay of the lobbies and the preference biases of the legislators within sessions. To the best of our knowledge, this is the first experimental study of this model. A key feature of our experiment is that we run treatments with the sequential-moves structure, as assumed in the original model, as well as treatments in which this assumption is relaxed and the subjects move simultaneously instead. We argue, and show theoretically for the three-legislators scenarios, that the key comparative statics predictions of the GS model carry over to the corresponding simultaneous-move game.

In the experiment, we find for the sequential-move game that many comparative statics predictions are borne out by the data. The main insights regarding how the majority size depends on the preference biases of the legislators are confirmed. However, the results regarding the effect of the relative willingness-to-pay of the lobbies on the majority size are more mixed, and other, more specific predictions regarding the exact number and level of bribes are not entirely accurate. Turning to the simultaneous-move game, we find that key comparative statics predictions still hold but that lobbying behavior shows much larger variations and the predictive power of the model with sequential moves is reduced substantially. Overall, this suggests that the GS model does capture some important insights that are even robust to the relaxation of the central modeling assumption of sequential moves. However, its predictive power is substantially lower when the sequentiality assumption is relaxed, and it is also limited with respect to the more specific predictions regarding individual strategies in the sequential-moves treatments.

In stress-testing a seminal model by relaxing a central model assumption our paper shares similarities with the work of Tremewan and Vanberg (2016), who experimentally study legislative bargaining in an arguably more realistic, but not theoretically (analytically) solvable, set-up than that in the established bargaining models. We see this approach, which is much less often followed than simply implementing the original structure of a game theoretic model, as a useful complement. It allows for new insights into how strongly predictions depend on certain modeling assumptions which might not hold in the field, and thus speaks to external validity concerns regarding a model's predictions. We believe that more studies of this kind would be highly valuable.

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Appendix A – Formal Arguments on the Theoretical Mechanism

We provide a formal discussion of the intuition of the economic forces of the sequential move vote buying game pioneered by Groseclose and Snyder (1996). While illustrating the general intuition behind the mechanism, our discussion will have a focus on the particular scenarios we test in the laboratory. These scenarios have been designed such that if legislator valuations are heterogeneous, there are $(N-1)/2$ legislators with greater appreciation for a policy change towards policy x than the remaining $(N+1)/2$ legislators. We order legislators by their appreciation for policy change. In this way, the first $(N-1)/2$ legislators have the same valuation v_h and are most favorable to x. The next $(N+1)/2$ legislators share the same valuation $v_l \leq v_h$. The scenarios with homogeneous legislator preferences can be characterised by $v = v_h = v_l$.

In building the least expensive majority coalition for policy change x, Lobby A will first include those $(N-1)/2$ legislators with the strongest preference for change. Then Lobby A will need to make offers to at least one further legislator with valuation v_l to secure a majority. Let's denote the number of additional legislators included in the coalition by $m = 1, .., (N+1)/2$. Offering b_h^A to the legislators with preference v_h and b_l^A to those legislators with v_l that are included in the coalition, the cost for Lobby A would be

$$C_A = \frac{N-1}{2}\ b_h^A + m\ b_l^A\ . \tag{1}$$

If the coalition is to secure a majority, Lobby B must not be able to buy back the m legislators which are cheapest from Lobby B's perspective. Consequently:

$$m\ (b_l^A + v_l) \geq W_B \ \Rightarrow\ b_l^A \geq W_B/m - v_l\,. \tag{2}$$

As in fact, Lobby B can buy back any m legislators and will go after the m cheapest ones, we must have

$$(b_l^A + v_l) = (b_h^A + v_h) \ \Rightarrow\ b_h^A = b_l^A - (v_h - v_l)\,. \tag{3}$$

Expression (3) constitutes the rationale for the leveling logic as discussed in Section 2.1. Inserting these expressions for b_h^A and b_l^A into (1) yields

$$C_A = \frac{N-1}{2}\ (W_B/m - v_h) + m\ (W_B/m - v_l)\ . \tag{4}$$

under the assumption that $W_B/m - v_h > 0$ for all m. Otherwise b_h^A would be zero for some values of m, a case we will come back to later in this section. For now we consider the problem of Lobby A of chosing the optimal m to minimise C_A under the given assumption.

Taking the derivative of C_A with respect to m gives

$$\frac{dC_A}{dm} = -v_l - \frac{N-1}{2}\frac{W_B}{m^2} \ . \tag{5}$$

This illustrates the two forces at play when choosing the optimal coalition size: If the legislators preferences v_l are negative, i.e. opposed to the policy change, any addititional legislator in the coalition must be compensated for that. This makes a larger coalition more expensive. However, with a larger coalition, Lobby B needs to buy back more legislators. This allows to reduce the amount of payments offered to each legislator. In particular, as Lobby B only needs to buy back m legislators of the coalition, a larger coalition size allows Lobby A to save on bribes for the additional $(N-1)/2$ legislators they need to make payments to. This effect makes a larger coalition less expensive. We observe in (5) that the costs of the coalition C_A are monotonically declining in coalition size if $v_l \geq 0$. With v_l negative, there is a trade-off and the optimal size can be calculated as[34]

$$m^* = \sqrt{\frac{W_B(N-1)}{-2\,v_l}} \ . \tag{6}$$

Expression 6 reflects the discussion in showing that the optimal coalition size declines with the legislators preference intensity for the status quo $-v_l$ and increases with the willingness-to-pay for Lobby B.

We can now relate our laboratory scenarios to this discussion. As shown in Table 1, legislators have homogeneous preferences in the first five scenarios. Scenarios 1-4 illustrate the effects of the legislators' preferences and Lobby B's willingness-to-pay on the optimal sizes of the coalitions formed by Lobby A.

In Scenario 1, the legislators have no preferences (except the tie breaking -0.5) for any of the two policy options. In accordance with (5), the cost of the coalition of A is strictly declining in coalition size and including all legislators will be optimal. Hence, $m = 4$ and the optimal coalition size is $N = 7$. Comparing Scenario 1 with Scenario 2 illustrates how a stronger preference of the legislators (-19.5) against the policy change favored by Lobby A makes maintaining large coalition sizes much more expensive as illstrated in expressions (5) and (6). As a consequence the optimal size reduces to a simple majority of 4 in Scenario 2. However, when comparing Scenario 2 to Scenario 4, the optimal coalition size increases to 6. The only dfference between these to scenarios is the substiantially higher willingness-to-pay by Lobby B, W_B, which leads to higher marginal reductions in costs of larger coalitions as reflected in (5). Scenarios 1-4 also illustrate that the cost reducing effect of larger coalition size is stronger when Lobby B's prize is larger in the following way: In response to higher status

[34]If expression (6) does not deliver an integer, we need to compare if the costs are lower with coalition size $\lfloor m^* \rfloor$ or with size $\lceil m^* \rceil$, provided that conditions (2) and (3) are observed, respectively the exception for non-flooded coalitions as described in the main text below.

quo bias of the legislators, the reduction in optimal coalition size (by 3) is larger when $W_B = 12$ as observed in the comparison between Scenarios 1 and 3 than the reduction in coalition size (by 1) when $W_B = 60$ observed when comparing Scenarios 2 and 4.

Scenario 5 captures the situation where the prize for Lobby B is so high that the costs of any majority coalition will be much larger than Lobby A's willingness-to-pay. In this example, $C_A = 455 > 200 = W_A$. Therefore, it is optimal for Lobby A to abstain from making positive payment offers.

Scenarios 6 and 7 feature heterogeneous preferences by legislators where 3 of the legislators are in favor of policy change while 4 possess a strong preference for the status quo. Our previous general discussion applies to Scenario 7 where expression (5) reveals that the marginal effects are the same as in Scenario 4 because the preferences of the $(N+1)/2$ legislators most opposed to policy change as well as W_B are the same. Therefore the optimal size of the coalition is 6. In particular, the optimal strategy is to offer a payment of 40 to 3 legislators opposed to policy change and to offer 8 to one and 7 to the other two legislators in favor of policy change.[35] In this way, the condition $W_B/m - v_h > 0$, i.e. $60/3 - 12.5 = 7.5 > 0$ holds and it is optimal for Lobby A to make positive payments to all legislators in the coalition, i.e. build a *flooded coalition*.

This is different in Scenario 6, where $W_B = 12$ and hence $W_B < v_h$. This implies that Lobby B's willingness-to-pay is not high enough to make a pro-change legislator vote for the status quo. The condition $W_B/m - v_h > 0$ will not hold for any m in this scenario. Therefore, it is not necessary for Lobby A to make any payments to the legislators in favor of policy change. It is optimal for Lobby A to form a *non-flooded coalition*. As a consequence, however, the benefit when increasing coalition size of being able to reduce the payments to the $(N-1)/2$ legislators that need not be bought back by Lobby B, as captured by the last summand in expression (5), disappears. When increasing coalition size, Lobby A is then left with only the cost increasing effect of compensating the legislators least favorable to policy change. Hence it is cheapest to form the smallest possible majority coalition of 4.

[35] Note that the reason for not offering the same amount to all legislators favoring policy change is due to allowing only integer payments as discussed in Section 2.1.

Appendix B – Equilibrium Types in Simultaneous-move Game with Three Legislators

In this section, we describe the different equilibrium types in the simultaneous move game with three legislators. The following tables show one mixed strategy profile for each equilibrium type and explain the permutation pattern of the equilibrium types in the text below the corresponding table. In each table, we also provide the number of permutations for each type of equlibrium, the probabilities with which leveling strategies are pursued by Lobby A, the expected size of the coalition formed by Lobby A, the expected payments proposed by both lobbies, as well as the winning probabilities for each lobby. We distinguish the different leveling strategies, summarising by $[1,1]$ the leveling strategy where two legislators are offered a payment of 1 while the third legislator does not receive a positive payment offer. We use the same notation for other amounts of payments promised in leveling strategies in the Tables B2 and B3 accordingly. Note that all the offer schedules listed in the tables will be played with positive probability in some equilibria.

Valuations $v_i = -0.5$

We start with the scenario where the legislators' have a valuation of -0.5. In this case there are 16 equilibria that can be categorised in four equilibrium types.

All 16 equilibria show the same equilibrium strategy by Lobby A and only differ in Lobby B's equilibrium strategies. In the permutation patterns of each equilibrium type, the probability on (0,0,0) as given in the table does not change. The patterns of the permutations can then be described as follows.

- Equilibrium type 1:
    1. Probability 5/467 on one schedule where 2 legislators are proposed payment of 1 and the other legislator 0.
    2. Probability 1/101 on a schedule other than in (1) where 2 legislators are promised payment 1 and the other 0.
    3. Probability 4/413 on schedule where only legislator not promised anything in the schedule under (1) is proposed a payment of 1 and nothing is promised for the other legislators.
    4. Probability 1/103 on schedule where only legislator not promised anything in schedule under (2) is offered payment 1 and others 0.
    5. Probability 1/101 on remaining schedule where only one legislator is offered 1 and others 0.

Table B1: Equilibrium Types for Scenarios with Simulteneous Moves and Three Legislators with Valuation $v_i = -0.5$

		Equilibrium Type			
	Schedule	**1**	**2**	**3**	**4**
Lobby A	(0,1,1)	1/4	1/4	1/4	1/4
	(1,0,1)	1/4	1/4	1/4	1/4
	(1,1,0)	1/4	1/4	1/4	1/4
	(1,1,1)	1/4	1/4	1/4	1/4
Lobby B	(0,0,0)	495/521	24/25	131/138	98/101
	(0,0,1)	4/413	5/516	4/413	1/101
	(0,1,0)	1/101	1/101	8/809	1/101
	(1,0,0)	1/103	1/101	1/103	1/101
	(0,1,1)	1/101	0	8/809	0
	(1,0,1)	0	0	0	0
	(1,1,0)	5/467	5/476	4/373	0
Permuations		6	3	6	1
Prob. Levelling A, $[1,1]$		3/4	3/4	3/4	3/4
Prob. Levelling A, $(1,1,1)$		1/4	1/4	1/4	1/4
Total Prob. Levelling A		1	1	1	1
Exp. Coalition size A		2.25			
Exp. Bribes proposed by A		2.25			
Exp. Payments by A		2.19	2.21	2.19	2.23
Exp. Bribes proposed by B		0.07	0.05	0.07	0.03
Exp. Payments by B		0.06	0.04	0.06	0.02
Winning prob. A		0.96	0.97	0.96	0.99
Winning prob. B		0.04	0.03	0.04	0.01

There are 6 permutations of equilibrium type 1.

- Equilibrium type 2:

  1. Probability 5/476 on one schedule where 2 legislators are promised payment of 1 and remaining legislator is offered nothing.
  2. Probability 5/516 on schedule where only legislator not promised anything in schedule under (1) is offered payment 1 and others 0.
  3. Probability 1/101 on the two schedules other than in (2) where only one legislator is offered a payment of 1 and the others 0.

  There are 3 permutations of equilibrium type 2.

- Equilibrium type 3:

  1. Probability 4/373 on one schedule where 2 legislators are promised a payment of 1 and other legislator nothing.
  2. Probability 8/809 on a schedule other than in (1) where 2 legislators are offered payment 1 and other legislator 0.
  3. Probability 4/413 on schedule where only legislator not offered anything in schedule under (1) obtains payment 1 and others nothing.
  4. Probability 1/103 on schedule where only legislator not promised anything in schedule under (2) is offered payment 1 and others nothing.
  5. Probability 8/809 on remaining schedule where only one legislator is proposed 1 and others 0.

  There are 6 permutations of equilibrium type 3.

- Equilibrium type 4: The only permutation is shown in the table.

Valuations $v_i = -4.5$, Equilibrium types 1-6

We now turn to the scenario where legislators have valuation -4.5. There are 56 equilibria which can be summarised in 12 equilibrium types. We first describe the patterns of the first 6 equilibrium types and will discuss the patterns of the remaining 6 equilibrium types below.

All of these 6 equilibrium types show the same permutation patterns of Lobby A's equilibrium strategies: One legislator is offered a payment of 6 with certainty and the two remaining legislators will receive a payment of 5 or 0 with probability 1/2. The permutation patterns by Lobby B in each equilibrium type can be described as follows.

Table B2: Equilibrium Types for Scenarios with Simulteneous Moves and Three Legislators with Valuation $v_i = -4.5$

	Schedule	Equilibrium Type 1	2	3	4	5	6
Lobby A	(0,5,6)	1/2	1/2	1/2	1/2	1/2	1/2
	(0,6,5)	0	0	0	0	0	0
	(5,0,6)	1/2	1/2	1/2	1/2	1/2	1/2
	(5,6,0)	0	0	0	0	0	0
	(6,0,5)	0	0	0	0	0	0
	(6,5,0)	0	0	0	0	0	0
Lobby B	(0,0,0)	0	2/5	377/405	14/15	386/405	1/5
	(0,0,1)	43/45	5/9	2/81	1/45	1/405	34/45
	(0,1,0)	0	1/45	1/45	1/45	0	0
	(1,0,0)	0	1/45	0	1/45	0	1/45
	(0,1,1)	1/45	0	0	0	1/45	1/45
	(1,0,1)	1/45	0	1/45	0	1/45	0
	(1,1,0)	0	0	0	0	0	0
Permuations		3	3	6	3	3	6
Prob. Levelling A, $[6,6]$		0	0	0	0	0	0
Prob. Levelling A, $[5,5]$		0	0	0	0	0	0
Total Prob. Levelling A		0	0	0	0	0	0
Exp. Coalition size A		2					
Exp. Bribes proposed by A		11					
Exp. Payments by A		10.978					
Exp. Bribes proposed by B		1.044	0.6	0.091	0.067	0.091	0.822
Exp. Payments by B		0.044					
Winning prob. A		0.978					
Winning prob. B		0.022					

- Equilibrium type 1:

  1. Prob. $43/45$ on schedule where only the legislator promised payment of 6 by Lobby A is offered payment of 1 and the other legislators are not promised anything.
  2. Probability $1/45$ on schedules where legislator promised payment 6 from Lobby A together with one additional legislator are offered a payment of 1 and the remaining legislator obtains zero.

  There are 3 permutations of equilibrium type 1.

- Equilibrium type 2:

  1. Prob. $2/5$ on $(0, 0, 0)$.
  2. Prob. $5/9$ on schedule where only the legislator offered payment 6 from Lobby A is promised 1 and others 0.
  3. Probability $1/45$ on schedules other than in (2) where only one legislator is offered 1 and others 0.

  There are 3 permutations of equilibrium type 2.

- Equilibrium type 3:

  1. Prob. $377/405$ on $(0, 0, 0)$.
  2. Prob. $2/81$ on schedule where only the legislator promised payment of 6 by Lobby A is offered 1 and other legislators 0.
  3. Probability $1/45$ on a schedule with two legislators are promised a payment of 1 and the legislator offered 6 by Lobby A is among them. The remaining legislator is offered nothing.
  4. Probability $1/45$ on schedules where only the legislator not offered any payment in (3) is promised payment of 1, others obtain no payment.

  There are 6 permutations of equilibrium type 3.

- Equilibrium type 4:

  1. Prob. $14/15$ on $(0, 0, 0)$.
  2. Probability $1/45$ on schedules where only one legislator is proposed a payment of 1 and others 0.

  There are 3 permutations of equilibrium type 4.

- Equilibrium type 5:

  1. Prob. 386/405 on $(0, 0, 0)$.
  2. Prob. 1/405 on schedule where only the legislator promised payment 6 by Lobby A is offered a payment of 1 and other legislators receive 0.
  3. Probability 1/45 on schedules where two legislators are offered 1 and legislator promised 6 by Lobby A is among them. Remaining legislator is not offered anything.

  There are 3 permutations of equilibrium type 5.

- Equilibrium type 6:

  1. Prob. 1/5 on $(0, 0, 0)$.
  2. Prob. 34/45 on schedule where only legislator promised payment 6 by Lobby A is offerd 1 and other legislators 0.
  3. Probability 1/45 on a schedule where two legislators are offered 1 and legislator promised 6 by Lobby A is among them. Remaining legislator is not offered anything.
  4. Probability 1/45 on schedule where only the legislator not promised any payment in (3) obtains payment of 1 and others 0.

  There are 6 permutations of equilibrium type 6.

Valuations $v_i = -4.5$, Equilibrium types 7-12

Equilibrium types 7-12 are show the same equilibrium strategy by Lobby B choosing (0,0,0) with probability 14/15 and choosing the other schedules where only one legislator is offered a payment of 1 and the other legislators receive 0 with probability 1/45. The permutation patterns of Lobby A in each equilibrium type can be described as follows.

- Equilibrium type 7:

  1. Prob. 1/2 on schedule where two legislators are offered a payment of 6 and third legislator receives nothing.
  2. Probability 1/4 on schedules where two legislators are promised a payment of 5 and legislator offered nothing in (1) is among them.

  There are 3 permutations of equilibrium type 7.

Table B3: Equilibrium Types for Scenarios with Simulteneous Moves and Three Legislators with Valuation −4.5

		Equilibrium Type					
	Schedule	**7**	**8**	**9**	**10**	**11**	**12**
Lobby A	(0,5,5)	1/4	1/4	0	1/3	1/6	1/5
	(5,0,5)	1/4	0	0	0	0	0
	(5,5,0)	0	0	0	0	1/6	0
	(5,5,5)	0	0	0	0	0	0
	(0,5,6)	0	0	1/3	0	0	0
	(0,6,5)	0	0	0	0	0	0
	(5,0,6)	0	1/4	0	0	1/3	2/5
	(5,6,0)	0	1/4	1/3	1/3	0	0
	(6,0,5)	0	0	1/3	0	0	0
	(6,5,0)	0	0	0	0	0	1/5
	(0,6,6)	0	1/4	0	0	1/3	1/5
	(6,0,6)	0	0	0	1/3	0	0
	(6,6,0)	1/2	0	0	0	0	0
Lobby B	(0,0,0)	14/15	14/15	14/15	14/15	14/15	14/15
	(0,0,1)	1/45	1/45	1/45	1/45	1/45	1/45
	(0,1,0)	1/45	1/45	1/45	1/45	1/45	1/45
	(1,0,0)	1/45	1/45	1/45	1/45	1/45	1/45
Permuations		3	9	2	6	6	6
Prob. Levelling A, [6, 6]		1/2	1/4	0	1/3	1/3	1/5
Prob. Levelling A, [5, 5]		1/2	1/4	0	1/3	1/3	1/5
Total Prob. Levelling A		1	1/2	0	2/3	2/3	2/5
Exp. Coalition size A		2					
Exp. Bribes proposed by A		11					
Exp. Payments by A		10.978					
Exp. Bribes proposed by B		0.067					
Exp. Payments by B		0.044					
Winning prob. A		0.978					
Winning prob. B		0.022					

- Equilibrium type 8:

  1. Prob. 1/4 on schedule where two legislators are promised a payment of 6 and third one receives nothing.
  2. Prob. 1/4 on schedule where two legislators are offered a payment of 5 and remaining legislator receives nothing.
  3. Probability 1/4 on those two schedules with payments 6,5 and 0 such that overall one legislator is offered payment 5 with prob. 1/4 and zero otherwise and the other two legislators are each proposed a payment of 6 with prob. 1/2 and a payment of 5 with prob. 1/4.

  There are 9 permutations of equilibrium type 8.

- Equilibrium type 9:

  1. Probability 1/3 on three schedules with payments 6,5 and 0 such that overall each legislator is offered payments 6, 5 and 0 with prob. 1/3.

  There are 2 permutations of equilibrium type 9.

- Equilibrium type 10:

  1. Probability 1/3 on one schedule where two legislators are promised 6 and the remaining legislator is offered nothing.
  2. Probability 1/3 on one schedule where two legislators are offered 5 and the remaining legislator nothing and the legislator receiving nothing in (1) is among the two offered 5.
  3. Probability 1/3 on those schedules with payments 6,5 and 0 such that overall each legislator is offered payments 6, 5 and 0 with prob. 1/3.

  There are 6 permutations of equilibrium type 10.

- Equilibrium type 11:

  1. Probability 1/6 on two schedules where two legislators are promised 5 and the other legislator obtains 0.
  2. Probability 1/3 on one schedule where two legislators are offered 6 and third legislator nothing and probability 1/3 on a schedule with payments 6,5 and 0 in such a way that overall one legislator is offered payments 6, 5 and 0 with probabilies $2/3, 1/6$ and 1/6, one with probabilities $1/3, 1/3$ and 1/3 and one with $0, 1/2$ and 1/2.

There are 6 permutations of equilibrium type 11.

- Equilibrium type 12:

  1. Probability 1/5 on one schedule where two legislators are promised 6 and the remaining legislator obtains 0.
  2. Probability 1/5 on one schedule where the same two legislators as in (1) are offered a payment of 5 and the remaining legislator receives nothing.
  3. Probability 2/5 on a schedule with payments 6,5 and 0 where legislator offered nothing in (1) and (2) is proposed payment of 5.
  4. Probability 1/5 on a schedule with payments 6,5 and 0 where legislator receiving nothing in (1) and (2) is offered a payment of 6 and legislator receiving nothing in (3) is offered 5.

  There are 6 permutations of equilibrium type 12.

Appendix C – Additional Tables and Figures

Table C1: Comparative Statics with Seven Legislators in Simultaneous-Move Game: Number of Bribes of Lobby A

	Sc.2	Sc.3	Sc.4	Sc.5	Sc.6	Sc.7
Sc.1	>	>	>	>	>	>
p-value	.001	.76	.002†	.001†	.000†	.000†
Sc.2		<	<	>	>	<
p-value		.001	.505	.213	.336	.649
Sc.3			>	>	>	>
p-value			.005	.001†	.000	.000
Sc.4				>	>	>
p-value				.130	.207	.382
Sc.5					<	<
p-value					.613	.311
Sc.6						<
p-value						.609

Notes: > (<): Average number of bribes in row scenario greater (smaller) than column scenario; all comparisons are between simultaneous-moves scenarios; *p*-value are for two-sided tests. †: significant at 5% with clustering at subject level but not with clustering at session level.

Table C2: Number of Bribes of Lobby A – Seven Legislators

	1–5 seq	1–5 sim	6–7 seq	6–7 sim	All seq	All sim
GS prediction	0.67***	0.19***	0.53***	0.03	0.62***	0.16***
	(0.05)	(0.05)	(0.08)	(0.06)	(0.05)	(0.04)
_cons	1.01***	4.27***	1.96***	4.57***	1.37***	4.33***
	(0.27)	(0.31)	(0.35)	(0.31)	(0.22)	(0.24)
N	205	200	82	80	287	280
R^2	0.42	0.10	0.35	0.00	0.40	0.07
N_clust	80	77	62	58	80	80

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The first two column refer to Scenarios 1–5, the third and fourth to Scenarios 6–7 and the last two to all scenarios combined.

Table C3: Total Offered Bribes by Lobby A – Seven Legislators

	1–5 seq	1–5 sim	6–7 seq	6–7 sim	All seq	All sim
GS prediction	0.51***	0.17***	0.89***	0.03	0.56***	0.16***
	(0.08)	(0.06)	(0.10)	(0.13)	(0.08)	(0.05)
_cons	60.85***	130.02***	43.60***	124.67***	60.82***	126.26***
	(8.25)	(9.77)	(13.69)	(14.25)	(7.98)	(8.78)
N	205	200	82	80	287	280
R^2	0.21	0.03	0.35	0.00	0.23	0.02
N_clust	80	77	62	58	80	80

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The first two column refer to Scenarios 1–5, the third and fourth to Scenarios 6–7 and the last two to all scenarios combined.

Table C4: Costs of Deviating from Equilibrium – Seven Legislators

	All Sc.	All Sc.
Error in # Bribes	-12.02***	
	(3.49)	
Error in total bribes		-0.37***
		(0.08)
_cons	83.72***	86.37***
	(8.83)	(8.41)
Scenario fixed effects	yes	yes
N	287	287
R^2	0.36	0.38
N_clust	80	80

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The dependent variable is A's payoff in the sequential scenarios. The explanatory variables are the difference to the theoretical prediction for number (#) of bribes or the total sum of offered bribes by Lobby A.

Table C5: Learning – Seven Legislators

	# Bribes	total bribes
Round Number	-0.08*	-3.37**
	(0.05)	(1.63)
_cons	1.73***	66.64***
	(0.23)	(9.25)
Scenario fixed effects	yes	yes
N	287	287
R^2	0.16	0.12
N_clust	80	80

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The dependent variable is the absolute value of difference to the theoretical prediction for number (#) of bribes or the total sum of offered bribes by Lobby A in all sequential scenarios.

Table C6: Number of Bribes by Lobby A – Three Legislators

	seq		sim		sim	
GS prediction	0.58***	(0.09)	0.19**	(0.07)		
sim eq prediction					0.77**	(0.30)
_cons	0.92***	(0.22)	1.76***	(0.21)	0.61	(0.65)
N	280		280		280	
R^2	0.21		0.03		0.03	
N_clust	56		56		56	

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. "sim eq prediction" refers to the expected value of the theoretically predicted mixed-strategy equilibria.

Table C7: Total Offered Bribes by Lobby A – Three Legislators

	seq		sim		sim	
GS prediction	0.85***	(0.06)	0.81***	(0.09)		
sim eq prediction					0.74***	(0.08)
_cons	1.67***	(0.61)	1.73*	(0.88)	4.93***	(0.55)
N	280		280		280	
R^2	0.49		0.43		0.43	
N_clust	56		56		56	

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. "sim eq prediction" refers to the expected value of the theoretically predicted mixed-strategy equilibria.

Table C8: Costs of Deviating from Equilibrium – Three Legislators

	All seq	Sc.2 sim	All seq	All sim
Error in # Bribes	-1.69**	-4.60***		
	(0.75)	(1.03)		
Error in total bribes			-0.72***	-0.69***
			(0.10)	(0.10)
_cons	10.51***	9.41***	11.39***	14.81***
	(0.61)	(0.69)	(0.60)	(0.71)
Scenario fixed effects	yes		yes	yes
N	280	140	280	280
R^2	0.26	0.12	0.31	0.35
N_clust	56	54	56	56

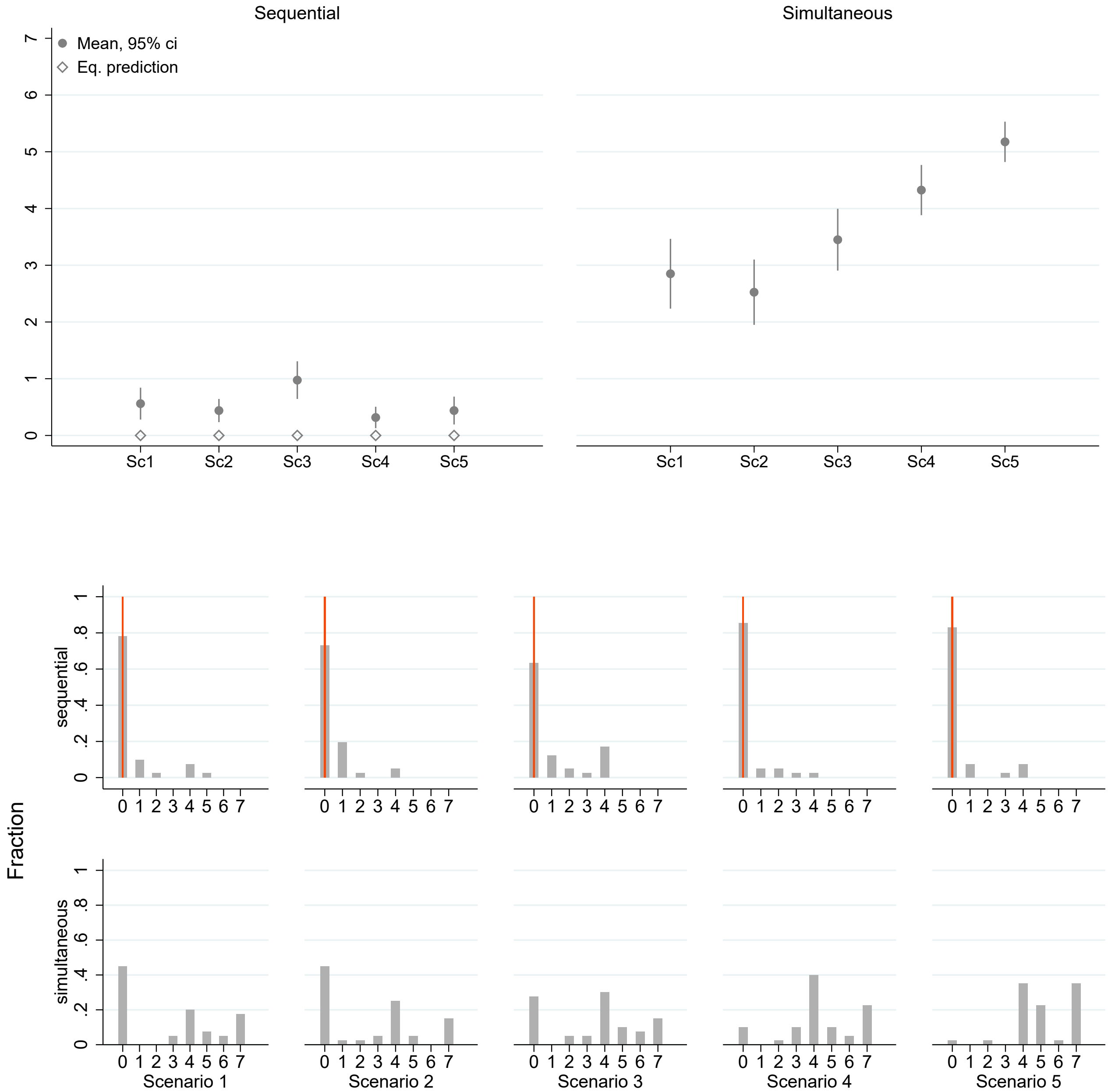
Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The dependent variable is A's payoff in the sequential/simultaneous scenarios. The explanatory variables are the difference to the theoretical prediction for number (#) of bribes or the total sum of offered bribes by Lobby A. For the second regression we focus on Scenario 2 as the # of bribes is either 2 or 3 in the equilibria with simultaneous moves.

Table C9: Learning – Three Legislators

	All seq, #	Sc.2 sim, #	All seq, total	All sim, total
Round Number	0.02	-0.02	0.00	-0.16**
	(0.02)	(0.02)	(0.07)	(0.08)
_cons	0.22**	0.39**	1.96***	4.64***
	(0.09)	(0.15)	(0.46)	(0.56)
Scenario fixed effects	yes		yes	yes
N	280	140	280	280
R^2	0.01	0.02	0.03	0.05
N_clust	56	54	56	56

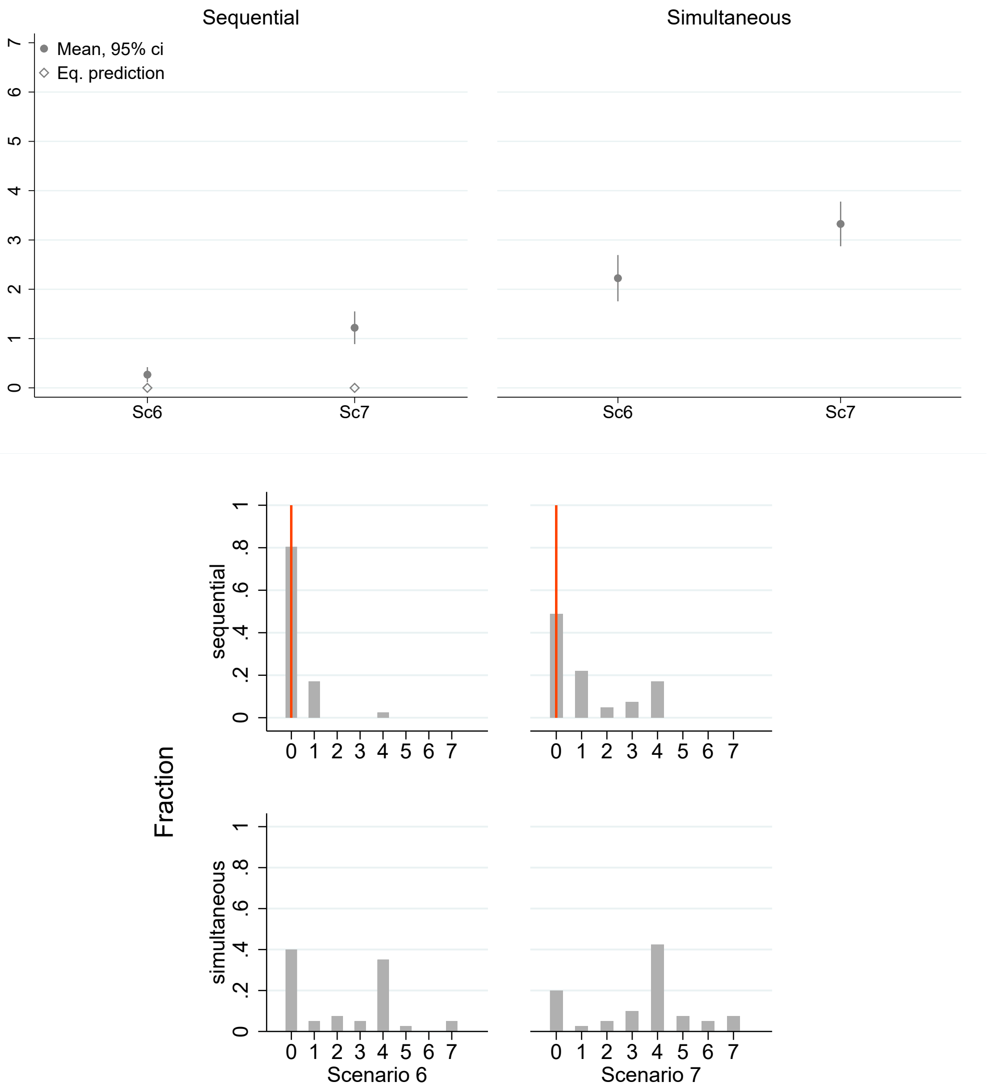
Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at the subject level. The dependent variable is the absolute value of difference to the theoretical prediction for number (#) of bribes or total sum of offered bribes by Lobby A in the sequential/simultaneous scenarios. For the second regression we focus on Scenario 2 as the # of bribes is either 2 or 3 in the equilibria with simultaneous moves.

Figure C1: Number of Bribes by Lobby B in Scenarios 1–5 with Seven Legislators



Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C2: Number of Bribes by Lobby B in Scenarios 6 and 7 with Seven Legislators



Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C3: Bribes Offered to the Seven Legislators in Scenarios 1–5 by Lobby A

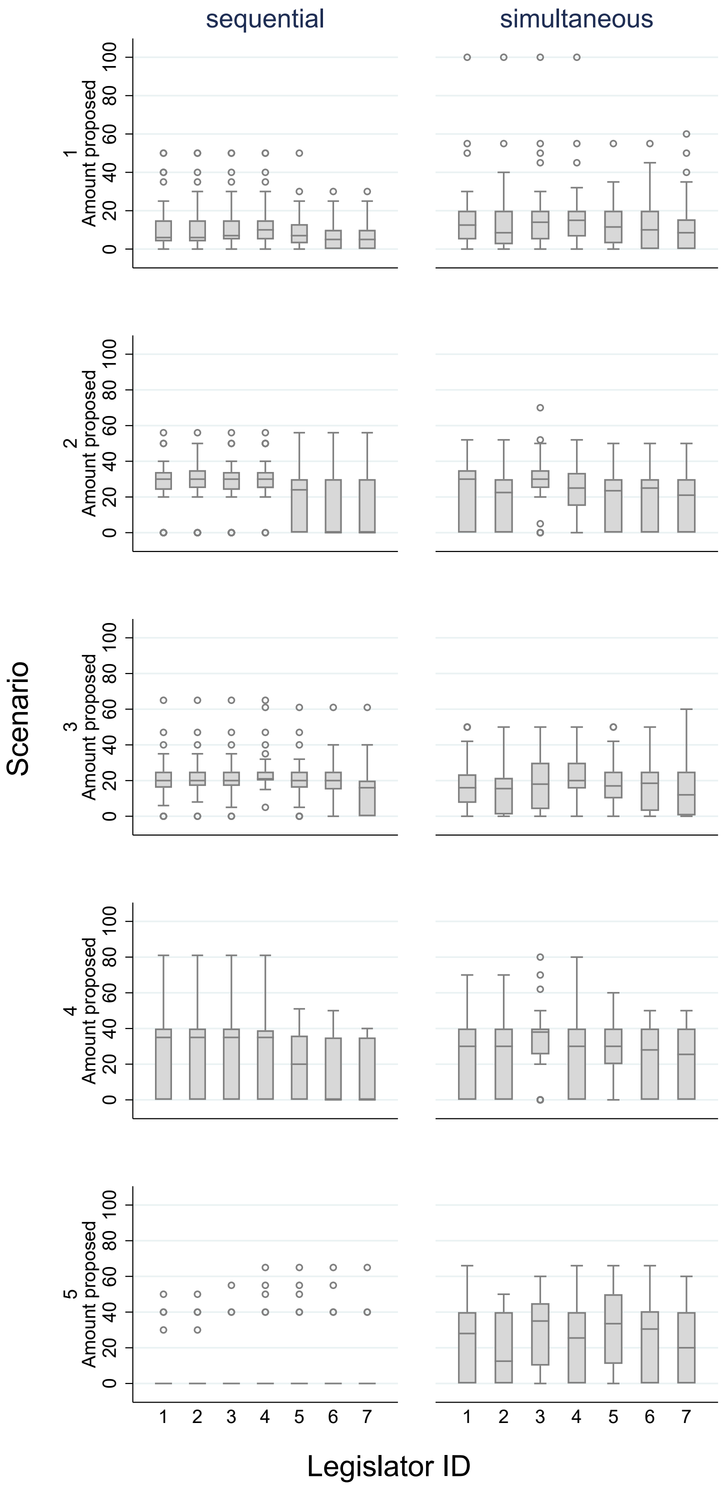


Figure C4: Bribes Offered to the Seven Legislators in Scenarios 6 and 7 by Lobby A

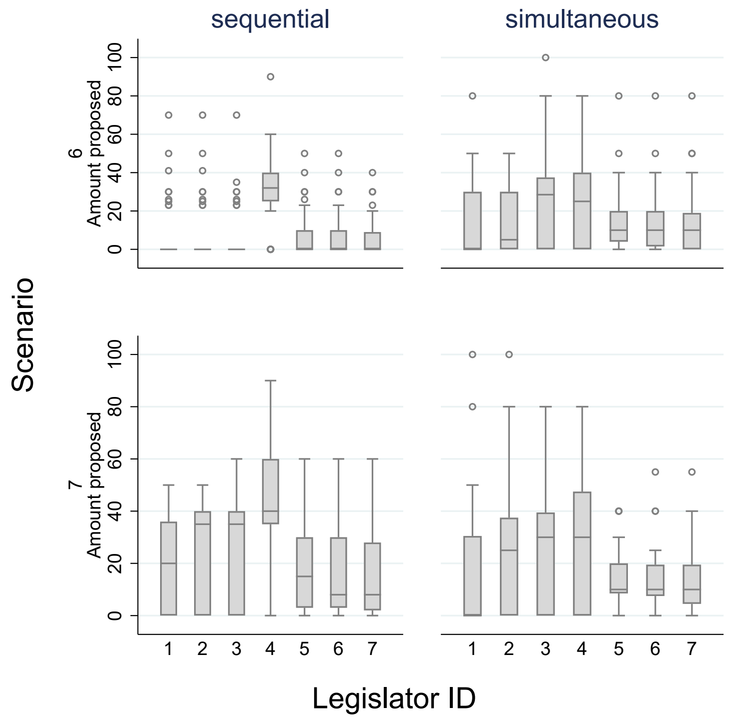


Figure C5: Bribes Offered to the Seven Legislators in Scenarios 1–5 by Lobby B

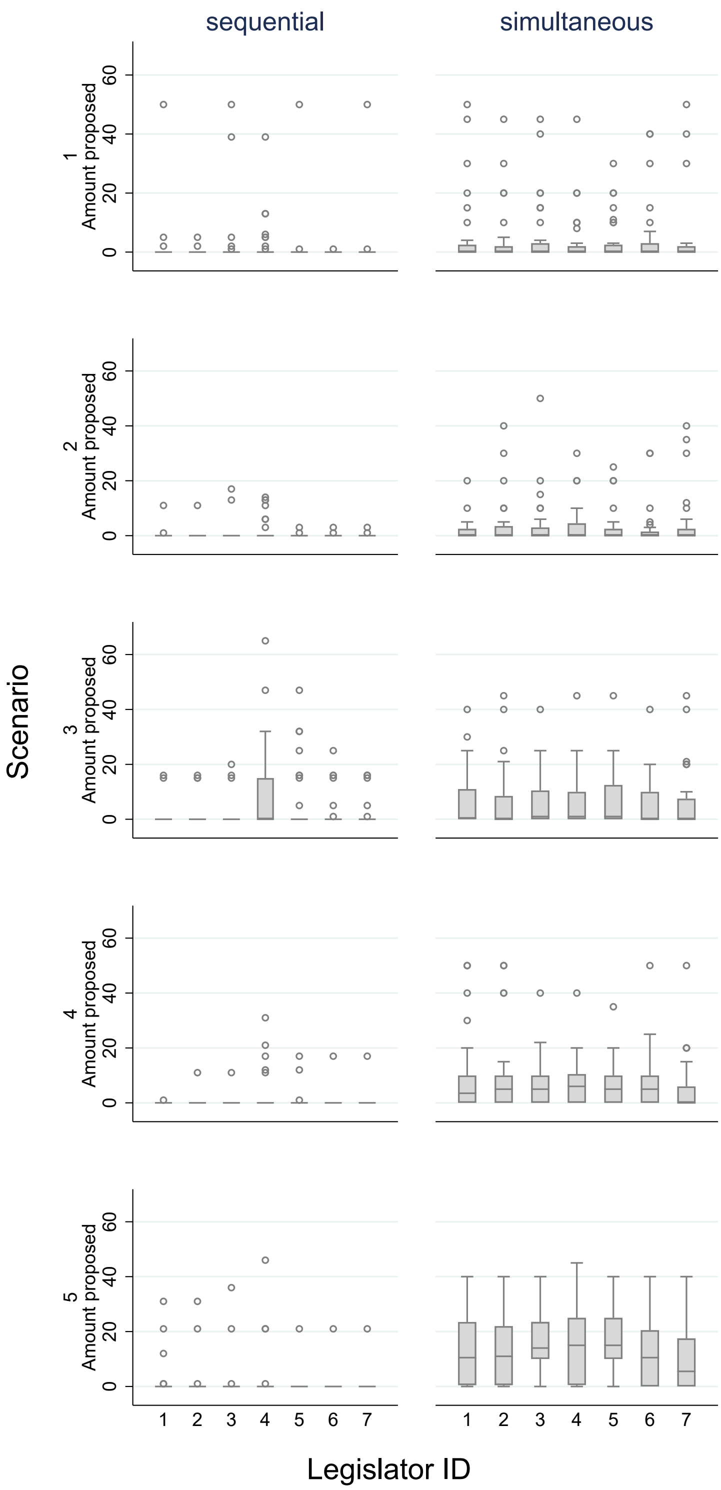


Figure C6: Bribes Offered to the Seven Legislators in Scenarios 6 and 7 by Lobby B

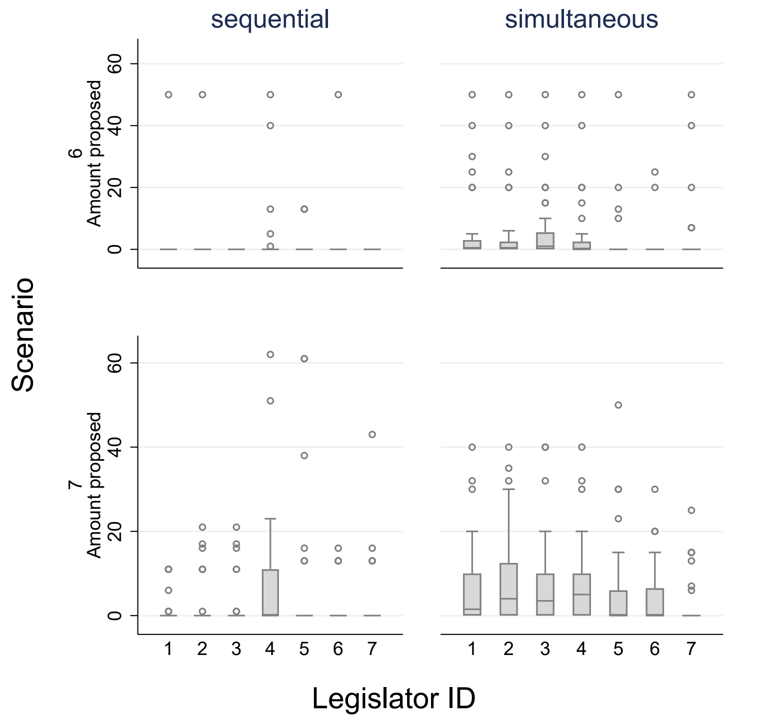
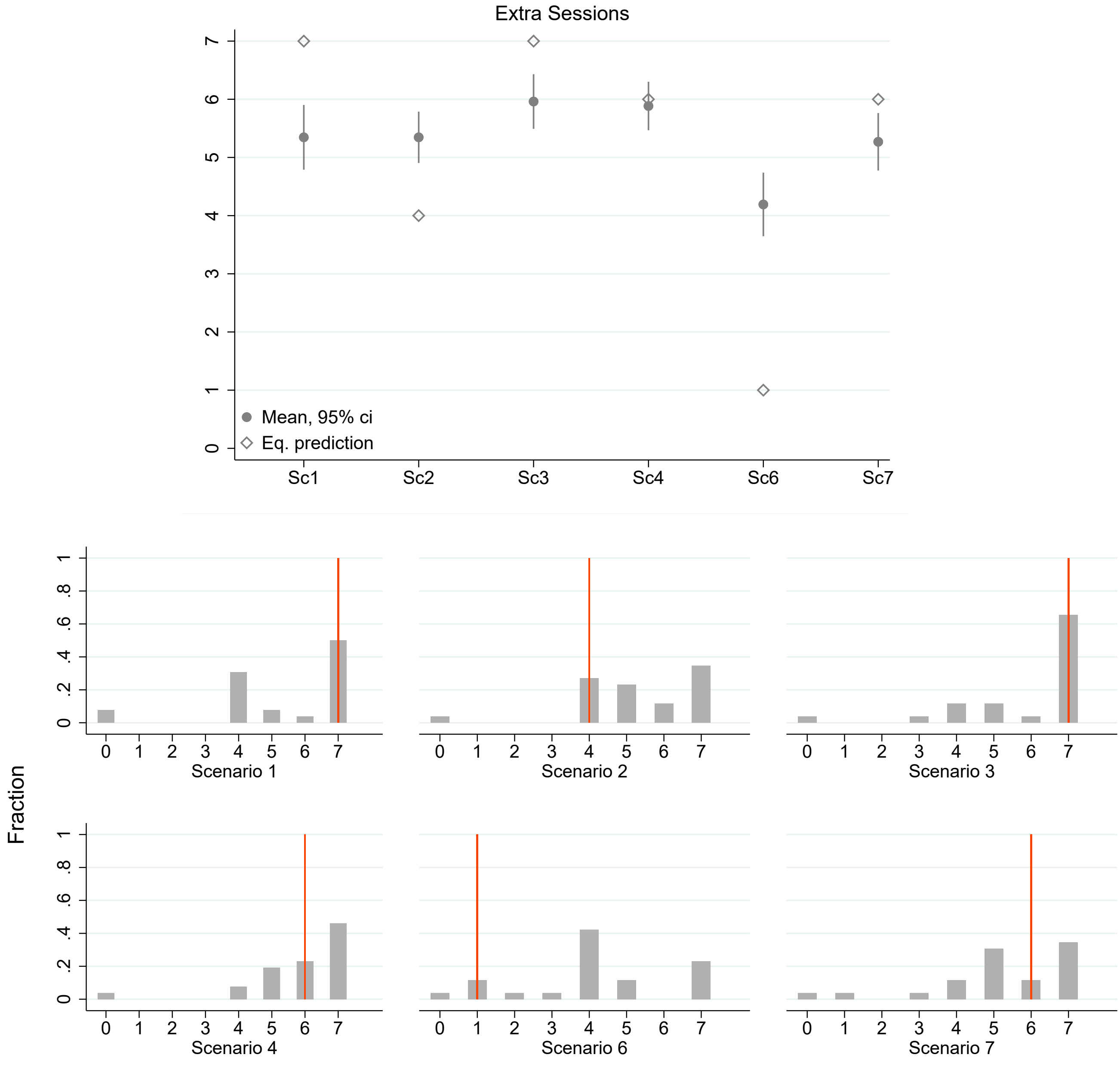
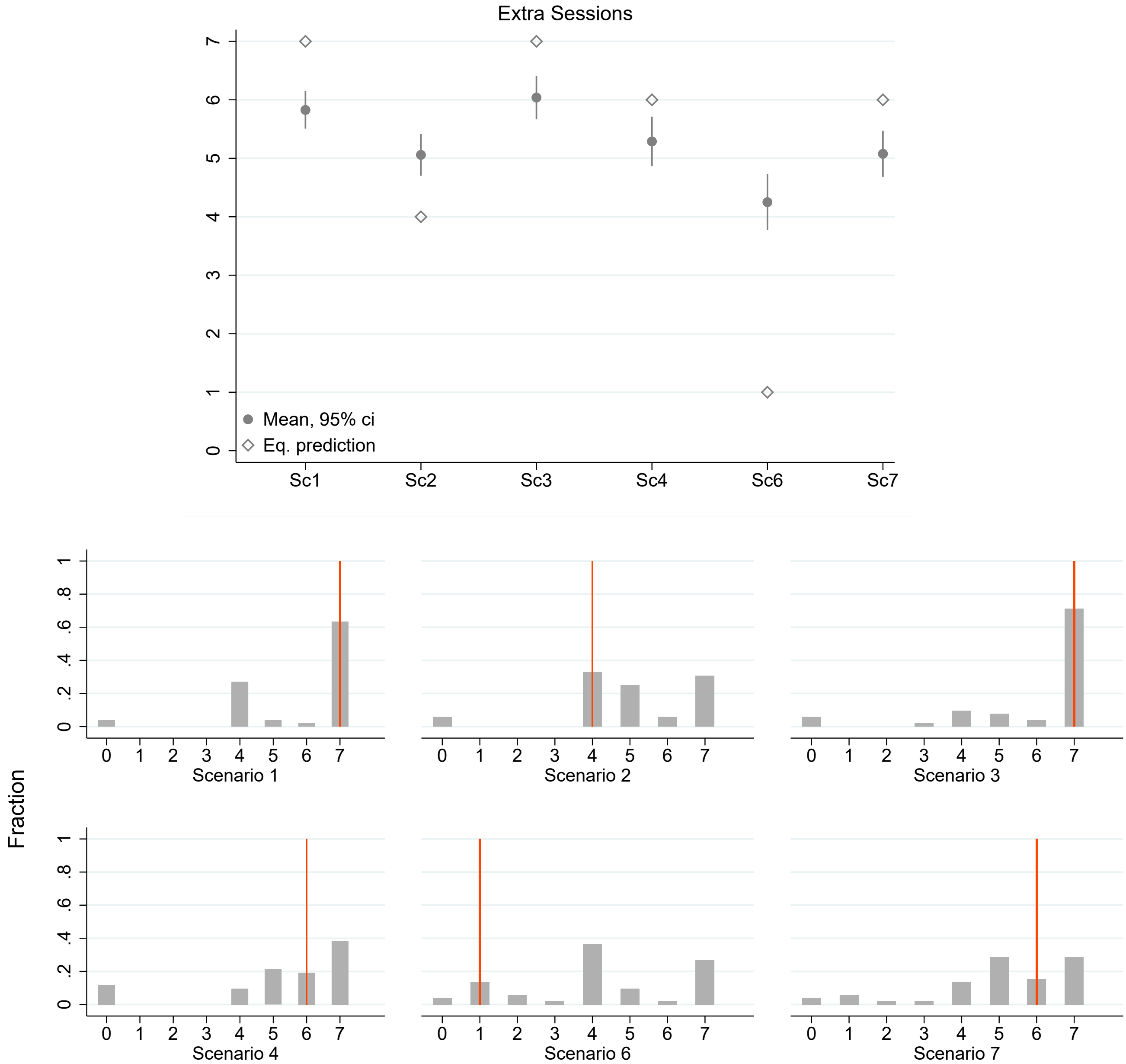


Figure C7: Number of Bribes by Lobby A for Extra Sessions with Seven Legislators – Last Round



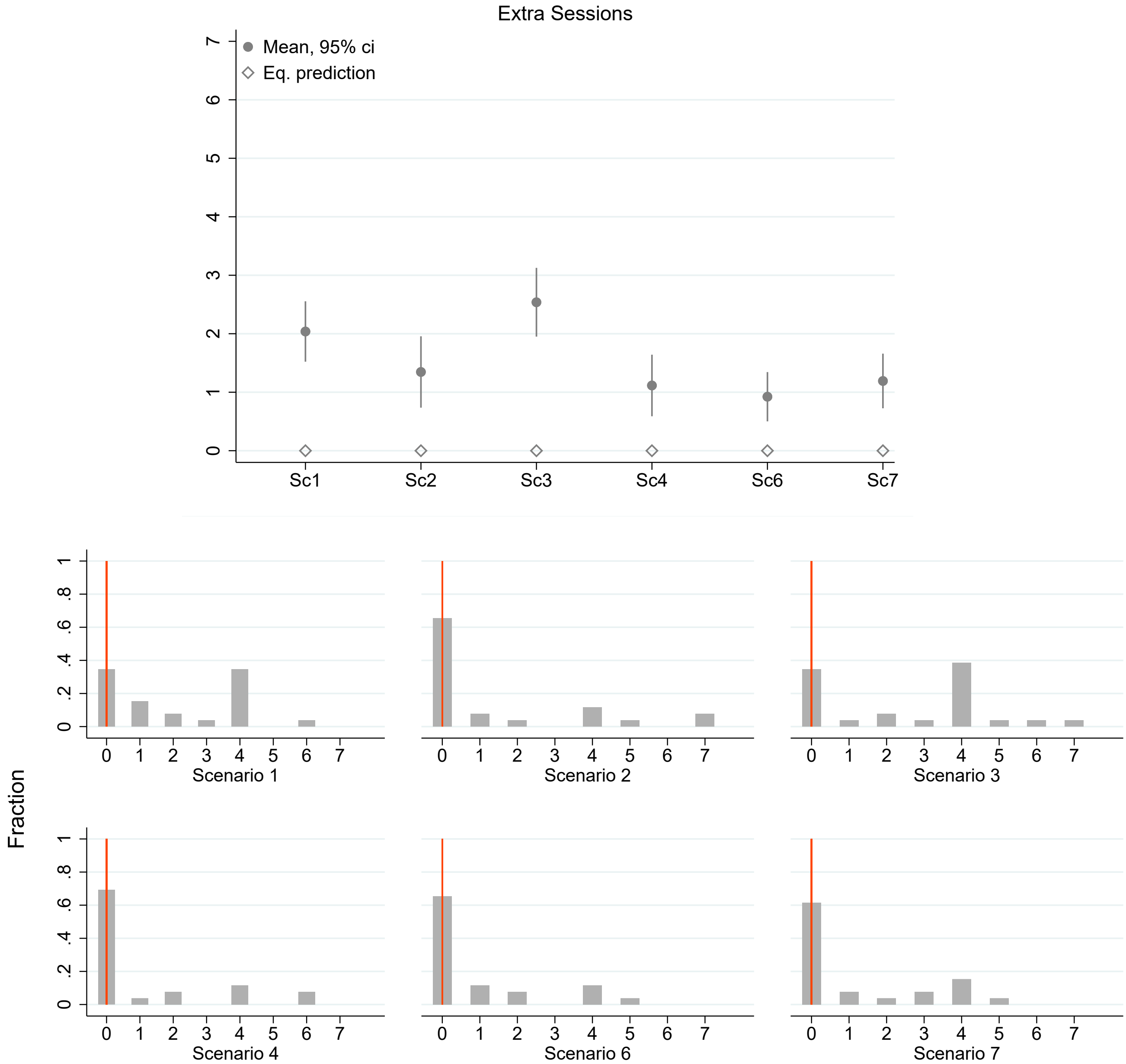
Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C8: Number of Bribes by Lobby A for Extra Sessions with Seven Legislators – Last Two Rounds



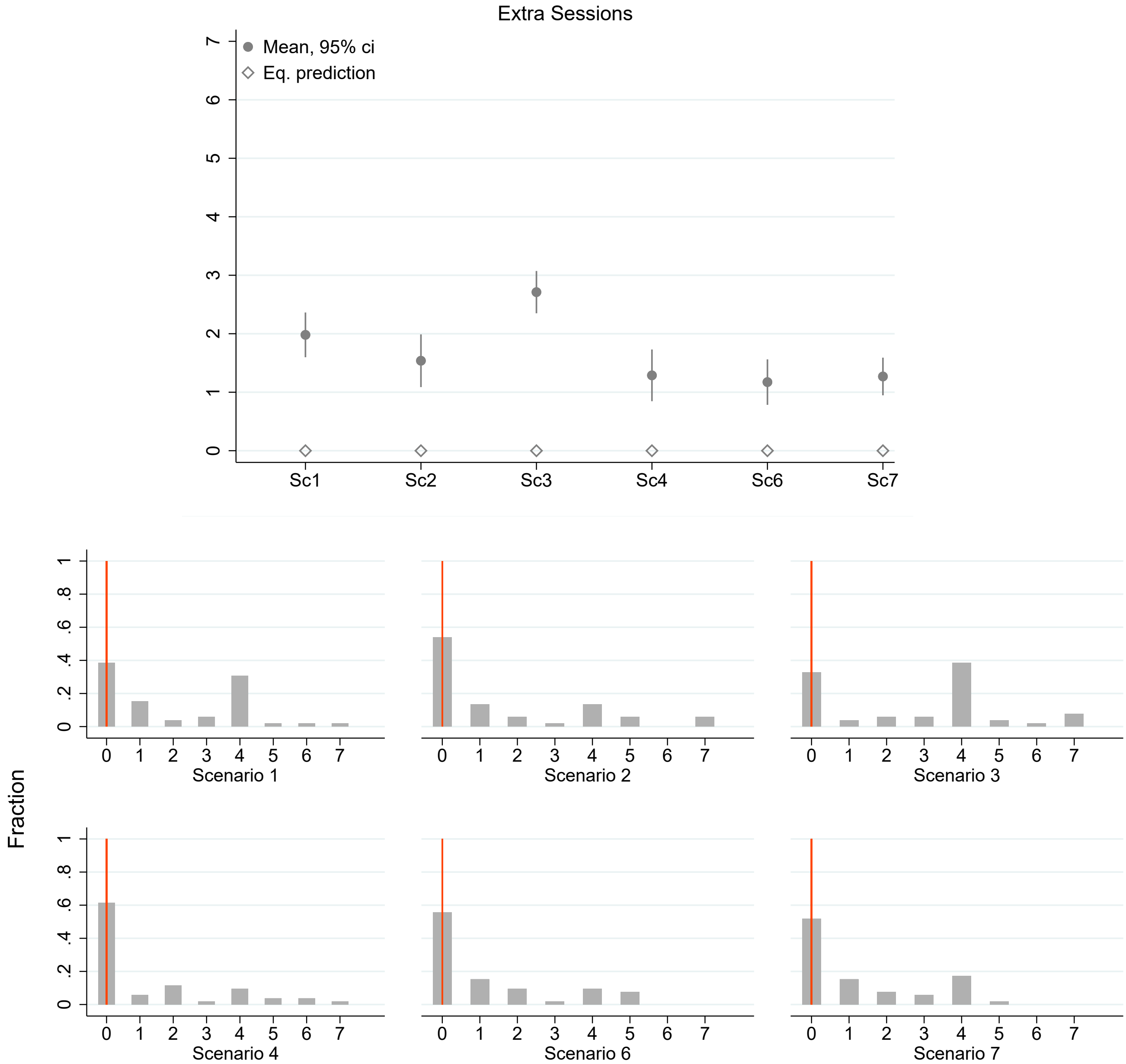
Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C9: Number of Bribes by Lobby B for Extra Sessions with Seven Legislators – Last Round



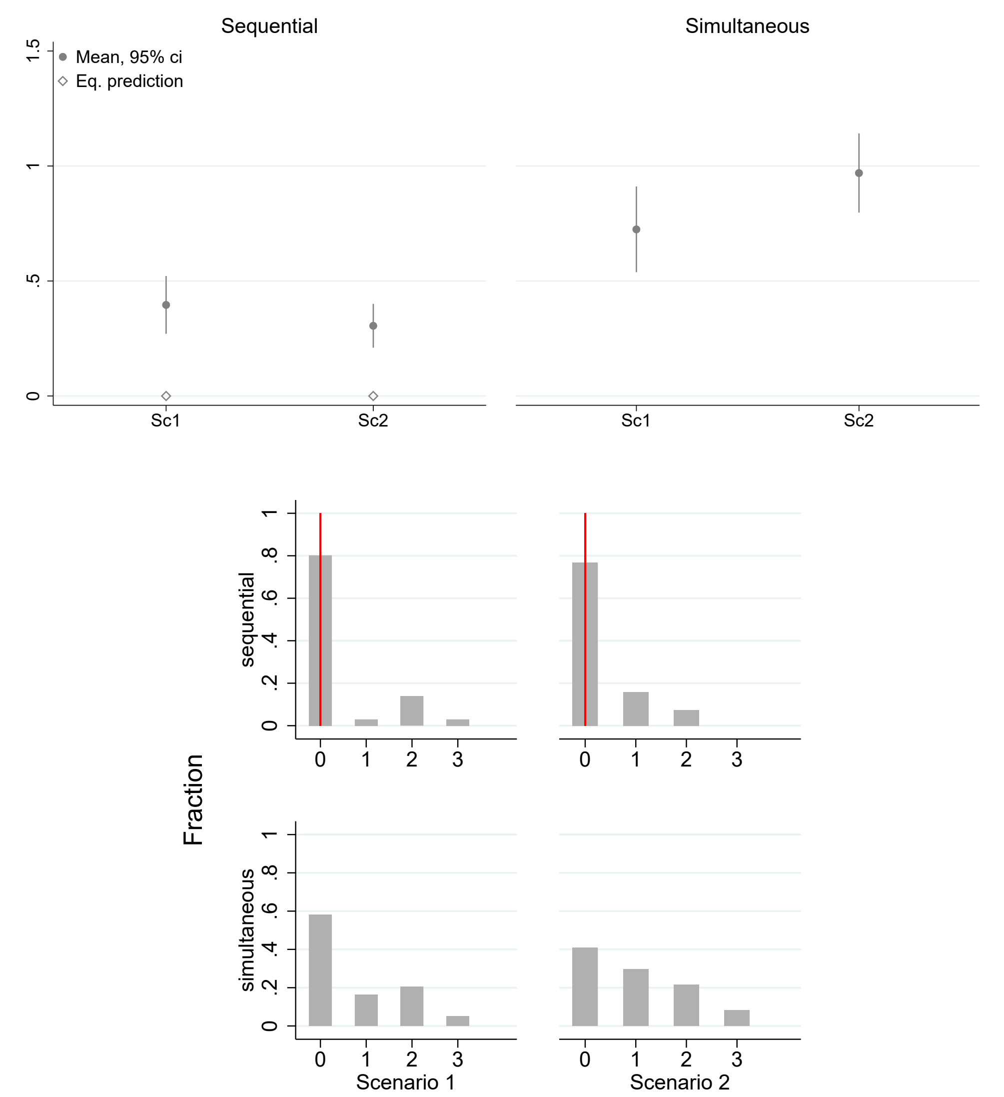
Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C10: Number of Bribes by Lobby B for Extra Sessions with Seven Legislators – Last Two Rounds



Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C11: Number of Bribes by Lobby B for Scenarios with Three Legislators



Notes: The upper panel shows the means, their 95% confidence intervals based on standard errors clustered at the subject level and the theoretical point predictions (as diamonds). The lower panel displays the observed and theoretically predicted (in red) distributions.

Figure C12: Bribes Offered to the Three Legislators by Lobby A

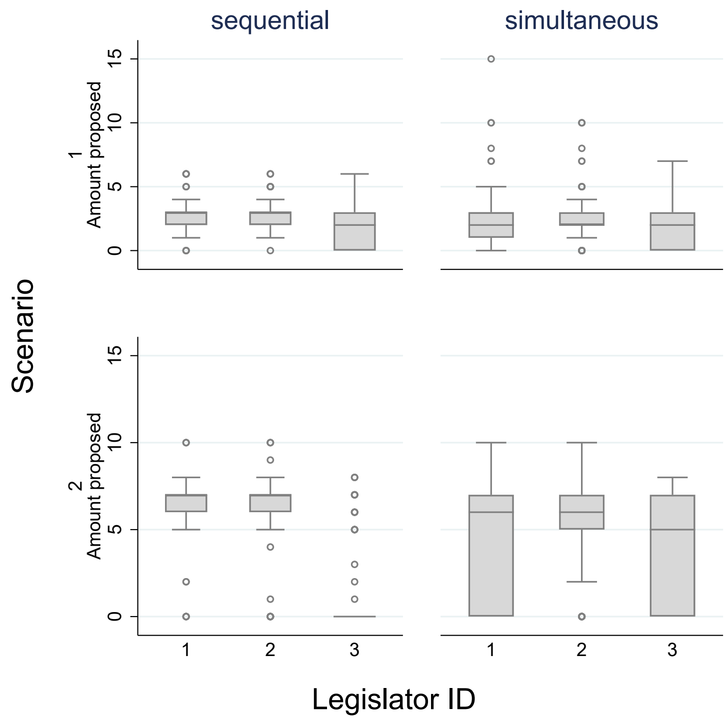
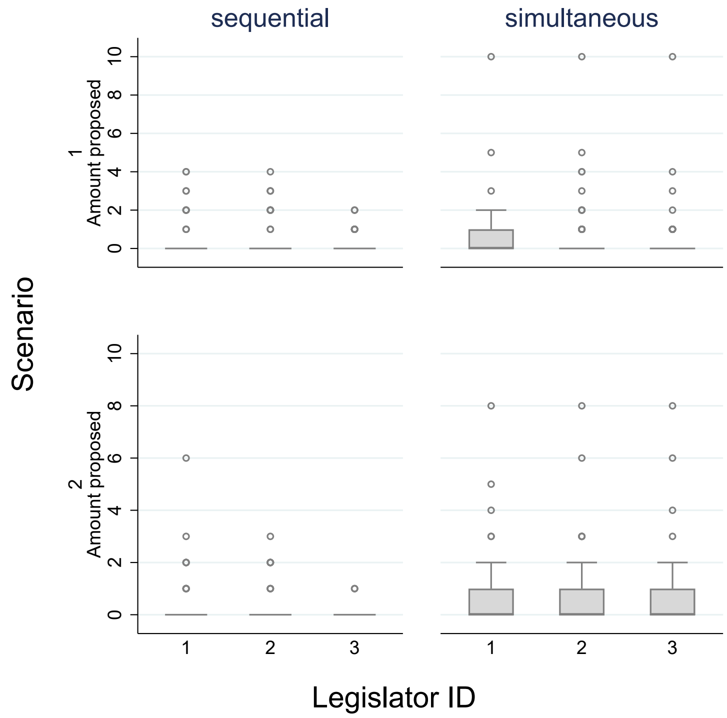


Figure C13: Bribes Offered to the Three Legislators by Lobby B



Appendix D – Experimental Instructions and Quiz

[Below are the instructions for the seven-legislators sequential-moves treatment. Instructions for the other treatments were very similar and are therefore omitted here. They can be obtained from the authors upon request, along with the original instructions in German.]

Overview Welcome to this experiment. We ask you not to speak with other participants during the experiment and to switch off your mobile phones and other mobile electronic devices.

For your participation in today's session, you will be paid in cash at the end of the experiment. The amount of the payout depends in part on your decisions and partly on the decisions of other participants. It is therefore important that you carefully read and understand the instructions before the start of the experiment.

In this experiment, every interaction between participants goes through the computers you are sitting in front of. You will interact with each other anonymously and your decisions will only be saved along with your random ID number. Neither your name nor the names of other participants will be made public, either today or in future written evaluations.

Today's session includes several rounds. Your payout amount is the sum of the earned points in all rounds, converted into Swiss francs, plus your participation fee of CHF 5. The conversion of points into Swiss francs is done as follows. Each point is worth 2 cents, so the following applies: 50 points = CHF 1.00.

Each participant will be paid privately at the disbursement desk, so that other participants will not be able to see how much they have earned.

Experiment This experiment consists of seven structurally identical rounds.

The group of two Participants are randomly divided into groups of two members each. Each round, these groups are re-formed at random. All decisions within a round and a group of two affect only the members of the group of two and have no influence on other groups.

The person you are forming a group with remains anonymous: that is, neither you nor the other member learns the identity of the other member during or after the experiment.

Two group members, a committee and two alternatives In each group of two, there is a member Ma and a member Mb. Chance decides each new round who is Ma and who is Mb, so you will most likely be Ma in some rounds and Mb in other rounds.

In addition to Ma and Mb, there is a committee in each round and for each group, which consists of seven committee members. The committee members are automated, that is they are played by computers and not by other participants. The individual committee members are labeled with the labels K1–K7 and thus are distinguishable from each other.

The committee decides by vote on one of two alternatives, A or B. A simple majority of votes for an alternative is enough for it to be selected. That is, if alternative A receives 4, 5, 6, or 7 votes from the seven committee members, then alternative A wins and B loses; where there are 4, 5, 6 or 7 votes for alternative B, alternative B wins.

Your payout depends on this decision of the committee. If you are a group member Ma, you prefer alternative A and the other group member (Mb) prefers alternative B. If you are a group member Mb, you prefer alternative B and the other group member (Ma) prefers alternative A.

The committee members automatically receive a certain number of points from the computer each time they vote for A or B. Below we denote by Va the number of points a committee member gets more if it votes for A than for B. If it gets more points for a vote for B, Va is negative. The Va values of the committee members are numbered according to their labels, so we refer to the Va value of member K2 as Va2. For example, if a committee member K4 receives 3 points more for a vote for A than for a vote for B, then Va4 = 3. If a committee member K2 receives 4 points more for a vote for B than for a vote for A, then Va2 = -4.

Before the committee vote, you can try to convince committee members to vote for your preferred alternative. You can make offers to any number of committee members. An offer includes a number of points that you pay to the committee member if it votes for your preferred alternative.

Budgets and offers Group member Ma receives a budget of 400 points at the beginning of the round. Group member Mb receives a budget of 200 points at the beginning of the round.

If Ma's preferred alternative wins the vote in the committee – that is, alternative A – Ma gets a number of points Xa, while Mb receives no extra points. If Mb's preferred alternative wins the vote on the committee – that is, alternative B – Mb receives a number of points Xb, while Ma receives no additional points. Xa is 300 points in each round, while Xb can be different in different rounds. Both members learn the value of Xb at the beginning of the round.

Ma and Mb may offer committee members a number of points, Pa and Pb respectively, to vote for their preferred alternative. These offers are binding: that is, if, for example, committee member K3 is offered by Ma Pa3 = 5 points to vote for A, and actually votes for A, 5 points will be transferred from Ma's budget to K3. Should K3 vote for B despite Ma's offer, K3 will not receive points from Ma.

Ma and Mb can each submit offers to any number of the 7 committee members. It should be noted that in total no more points can be offered than the budget includes. It should also be noted that only integer scores can be offered.

Ma makes his offers first. Mb then learns the offers of Ma and makes his offers, after which the committee decides.

The decision of the committee members The individual committee members decide according to the following decision rule:

$Va + Pa - Pb > 0$: vote for A

$Va + Pa - Pb < 0$: vote for B

This means that a committee member always votes for an alternative if it receives more points from this decision than from the decision for the other alternative.

The result for member Mb is as follows: If Mb wants to induce a committee member, for example, K4, to move to vote for B, his offer must be at least as high as the sum of the offer of Ma and Va: that is, in the example, his offer must meet the following condition: $Pb4 > Va4 + Pa4$.

Example: Committee member K3 automatically receives 3.5 points more from the computer when voting for alternative B, that is Va3 = -3.5. Ma offers 8 points if K3 votes for A, that is Pa3 = 8, and Mb offers 5 points, that is Pb3 = 5. In this case, K3 will decide on B because: $Va3 + Pa3 - Pb3 = -0.5 < 0$.

Sequence of a round At the beginning of a round, the first screen tells you whether you are Ma or Mb, and thus whether your budget is 400 or 200 points. In addition, you will see the number of points Xa and Xb that Ma or Mb receive if their preferred alternative, A or B, is selected by the committee (where Xa is 300 points in each round).

Then Ma first takes an action and can submit offers Pa1–Pa7 to any number of committee members in the following input mask [omitted here]. As you can see, Ma finds the Va values of each committee member on the same screen (example values).

If Ma leaves a field blank, this is interpreted as an offer of Pa = 0 points to the appropriate committee member.

After Ma has submitted his offers, it is Mb's turn. Mb can now also submit offers to any number of committee members. This is done via the following input mask [omitted here], on which Mb can see the Va values of the individual committee members, as well as the offers of Ma to the individual committee members (example values).

If Mb releases a field, this is interpreted as an offer of Pb = 0 points to the corresponding committee member.

After Mb has made his offers, the committee members decide on the decision rule above for A or B. The committee chooses the alternative for which most votes were cast.

Payment in each round (in points) Group member Ma receives the following payout in a round: the budget (400) plus Xa (300) when his preferred alternative A is selected by the committee, minus Ma's offers to committee members who actually voted for A.

Group member Mb receives the following payouts in a round: the budget (200) plus Xb if his preferred alternative B is selected by the committee, minus Mb's offers to committee members who actually voted for B.

Example 1: Ma made offers Pa1, Pa4, Pa5 and Pa7, Mb has made offers Pb1, Pb2 and Pb6 and committee members K1, K2, K3 and K7 voted for A, while K4, K5 and K6 voted for B, thus alternative A was selected by the committee. In this case, the following round payments result in points as follows:

Ma's Points $= 400 + Xa - Pa1 - Pa7$

Mb's Points $= 200 - Pb6$

Example 2: Ma made offers Pa2, Pa4, Pa5 and Pa7, Mb made offers Pb1, Pb2 and Pb6 and committee members K2, K3 and K7 voted for A, while K1, K4, K5 and K6 voted for B, thus alternative B was selected by the committee. In this case, the following round payments result in points:

Ma's Points $= 400Pa2 - Pa7$

Mb's Points $= 200 + Xb - Pb1 - Pb6$

Payment at the end (in CHF) At the end of the experiment, the earned income is converted into Swiss francs is paid in private together with your participation fee of CHF 5.

Practice rounds and quiz Before the 7 rounds of the experiment, there will be a short quiz on the screen, as well as 3 practice rounds; these are intended to aid your understanding but are not taken into account for the payout. The practice rounds and the quiz are designed to ensure that all participants have fully understood the instructions.

Questions? Take your time to review the instructions. If you have questions, please raise your hand. An experimenter will then come to your cubicle.

Important Terms

Ma	Member who prefers alternative A and can make offers first. Ma has a budget of 400.
Mb	Member who prefers alternative B and can make offers second. Mb has a budget of 200.
Xa	Number of points for Ma should alternative A win. Xa = 300 in all rounds.
Xb	Number of points for Mb should alternative B win. Xb can be different from round to round.
K1–K7	Committee members 1–7.
Va1–Va7	Number of points a committee member with the corresponding number will automatically receive if it votes for alternative A instead of alternative B. If this value is negative, the amount indicates the number of points that the committee member receives less if it votes for alternative A instead of alternative B.
Pa1–Pa7	Ma's offer to the committee member with the appropriate number to vote for alternative A. Ma only has to pay this amount to the committee member if it actually votes for alternative A.
Pb1–Pb7	Mb's offer to the committee member with the appropriate number to vote for alternative B. Mb only has to pay this amount to the committee member if it actually votes for alternative B.

Quiz [on screen]

[Answer options in brackets. The correct answers appeared on the next screen.]

1. How many rounds does the experiment have (not counting the practice rounds)?

   [1, 7]

2. In every round...

   [...you play with the same member, ...new groups are randomly formed]

3. Member Ma offers Pa2=12 points for a vote for A to committee member K2, whose valuation is Va2=-9.5. Mb offers Pb2=1 point for a vote for B.

   (a) Which alternative will K2 vote for?

   [A, B]

   (b) How much does Ma have to pay to K2?

   [0, 1, 12]

4. Member Ma offers Pa4=10 points for a vote for A to committee member K4, whose valuation is Va4=-0.5. Mb also offers Pb4=10 point for a vote for B.

   (a) Which alternative will K4 vote for?

   [A, B]

   (b) How much does Ma have to pay to K4?

   [0, 1, 10]

5. How many committee members have to vote for an alternative to make it the one that is implemented?

   [1, 3 or more, 4 or more]