Public versus Secret Voting in Committees

Online Appendix (NOT FOR PUBLICATION)

This online appendix is organized as follows: section A discusses a number of extensions to our benchmark model, section B presents additional experimental results omitted from the main text, section C collects the proofs of the propositions of the paper, section D presents the derivation of the version of the model tested in the lab and, finally, section E presents the English version of the experiment instructions.

Appendix A. Discussion and Extensions

This section discusses a number of assumptions which we have made throughout our main analysis as well as some possible extensions to our basic model.

A.1 Ex-Post Observability of the State of the World

An important assumption in our model is that the external evaluator always observes the state of the world ex-post. This feature guarantees that, under transparency, voting for the correct alternative is always associated with strictly positive career concern rewards, whereas an incorrect vote is not rewarded in equilibrium. Note that if the evaluator did not observe the state of the world, then the role played by career concerns in providing incentives for agents to vote correctly would be weakened. In particular, as emphasized by Canes-Wrone et al [2], the desire to acquire reputation could create an incentive for committee members to ignore whatever information they might have about the state of the world and simply vote for the alternative which the evaluator believes is more likely to be the correct one.[1] Furthermore, as in Swank and Visser [8], there would be an incentive for the members of the committee to show "internal agreement", since competent agents always receive the same signal. The incentive to pander to the evaluator's opinion makes transparency in committees less appealing in general, a result also emphasized by Stasavage [7]. Finally, note that the assumption that the external evaluator observes the state of the world seems plausible whenever the evaluator himself is either an expert or very well-informed about the environment in which the decision is taking place. Consider, for instance, the case of an institutional investor evaluating the performance of a mutual fund, the "market" evaluating the performance of a monetary committee or a constituency evaluating the performance of a legislature deciding on policies that have direct impact on their daily lives.

[1] See Morris [6] and Maskin and Tirole [5] for studies that also emphasize the importance of pandering incentives in principal-agent models.

A.2 Precision of Signals

Following Feddersen and Pesendorfer [3] and Battaglini et al [1], our analysis assumed that competent members receive perfectly informative signals about the state of the world, while incompetent members received no information at all. Although our main results do rely on the hypothesis that the precision of signals received by competent and incompetent model be sufficiently different, the extreme assumption of perfectly informative and non-informative signals is not crucial for our results. Formally, our main comparative static results regarding the impact of public and secret voting on the behavior of committee members would still hold in an environment where competent agents received signals with precision $\Pr(s = \omega|\omega) = 1 - \varepsilon$, while incompetent agents received signals with precision $\Pr(s = \omega|\omega) = \frac{1}{2} + \delta$, for $\omega \in \{A, B\}$, $\varepsilon > 0$ and $\delta > 0$, provided that ε and δ are relatively small. In particular, the set of possible equilibria would still consist of the same three classes of equilibria characterized in Proposition 1, although the precise conditions for the existence of each class of equilibrium would have to be adjusted in order to take into account the fact that competent agents may now vote for the incorrect alternative even if they follow their signals.

A.3 Voting Rule and Degree of Transparency

Throughout the analysis we have assumed that the main difference between public and secret voting is that, while all votes are observed under public voting, only the vote tally is revealed under secret voting. Note that, in this case, neither the final decision of the committee nor the size of the majority required for an alternative to be chosen has any impact on the evaluator's posterior beliefs, given that the observation of the aggregate voting outcome alone provides strictly more information about the behavior of agents than knowledge of the committee's decision and/or the voting rule. As a consequence, a change in the size of the majority required for an alternative to be approved would have no major impact on our main qualitative results. If we had assumed, as in Levy [4] and Swank and Visser [8], that only the final decision of the committee is observed under secrecy, then the voting rule would have played a more important role in determining how much information is conveyed to the evaluator. Nonetheless, our basic comparative static results would remain unchanged, since the dilution of career concern rewards, the key mechanism behind our results, would still be present under secret voting.

A.4 Unbiased Agents

Although our basic model assumes that all committee members are biased towards one of the alternatives, the main qualitative results of the analysis are robust to allowing for the existence of unbiased agents. In fact, note that unbiased competent members would always have an incentive to follow their signals, since they care only about the common value and the career concern reward associated with a correct vote, while unbiased incompetent members would always be more willing to abstain relatively to biased agents of the same type. Now, given these observations, it would be interesting to consider what would happen if we allowed for the existence of correlation between the voters' level of competence and their biases. Suppose, for instance, that we expected competent members to be ideologically more neutral and consider, in particular, the extreme case where all competent members are unbiased, whereas incompetent members may be either biased or unbiased. Observe that in this case competent agents would always have an incentive to vote for the correct alternative, so that the degree of transparency would have no impact on their behavior. For incompetent agents, on the other hand, public voting would always make them more willing to vote, so that we should expect secret voting to lead to better decisions. Conversely, if competent members were either biased or unbiased and all incompetent members were unbiased, then none of our main comparative static results would change. Observe that unbiased incompetent agents would still have an incentive to vote due to career concerns, though they would not have a preferred alternative in this case. Therefore, the basic trade-off between public and secret voting would remain unchanged, although the region of the parameters where a fully competent equilibrium can be sustained would be larger in this case.

Appendix B. Additional Experimental Results

B.1 Learning Effects

This subsection investigates whether learning within a treatment affects the behavior of voters. In fact, as individuals become more familiar with the structure of the game, we would expect their choices to converge towards the theoretical predictions of the model. In order to test whether this is the case, we compare the aggregate behavior of voters across periods 1-10, 11-20 and 21-30 and check whether any pattern emerges from the data. Table B.1 reports the aggregate choices of uninformed voters. Note, first, that abstentions under Low/Secret are significantly higher in later periods, increasing from 39.17% in periods 1-10 to 48.33% in period 21-30.[2] Furthermore, we observe an increase in the percentage of uninformed subjects who vote for their biases under High/Secret from 85.83% in periods 1-10 to 90.83% in periods 21-30.[3] Both of these results are consistent with the learning hypothesis in that they show that the observed behavior tends to converge towards the predictions of the model.

Next, Table B.2 reports separately for periods 1-10, 11-20 and 21-30 the aggregate choices of informed voters who received a signal different than their biases. Note, first, that the percentage of informed subjects who vote in accordance with their signals under High/Secret decreases from 25.88% in periods 1-10 to 16.57% in periods 21-30.[4] We also observe a significant reduction in the proportion of subjects who vote for their biases under High/Public from 17.20% in periods 1-10 to 5.00% in periods 21-30.[5] While these result are consistent with the learning hypothesis, the percentage of abstentions under High/Secret increases slightly from 12.94% in periods 1-10 to

[2] The χ^2 statistic for this difference is 6.14, with $p = 0.01$.
[3] The χ^2 statistic for this difference is 4.36, with $p = 0.04$.
[4] The χ^2 statistic for this difference is 4.48, with $p = 0.03$.
[5] The χ^2 statistic for this difference is 14.8, with $p = 0.00$.

18.86% in periods 21-30.[6] As conjectured in section 7.2 of the paper, this result could be due to the fact that both common and private values are relatively close to each other in our setting. Thus, it is possible that some informed agents may have simply decided to abstain as a result of being "practically" indifferent between the two alternatives.

Finally, Figure B.1 plots the dynamics of average voting behavior across all periods for each treatment together with a local polynomial smooth. Note that, consistently with our previous discussion, abstention rates increase steadily across periods under Low/Secret, while remaining relatively stable under Low/Public. Moreover, while the percentage of correct votes decreases under High/Secret, it increases under High/Public. Importantly, voters' behavior seems to stabilize towards the end of each treatment, as evidenced by the fact that the learning curves become flatter in the last ten periods.

B.2 Sequencing Effects

This subsection investigates whether the main comparative static results presented in section 7.3 are robust to the sequence of treatments. Table B.3 summarizes the behavior of uninformed voters by sequence and treatment. Observe that, consistently with previous results, the percentage of abstentions is significantly higher under Low/Secret than under Low/Public irrespective of the order of treatments; that is, when the magnitude of the bias is low, abstentions are always higher under secret voting. However, the order of treatments does seem to affect the behavior of uninformed voters in one dimension, namely the proportion of abstentions is significantly higher when the session starts with Low/Secret.[7] Thus, it seems that once an individual "learns" to behave in a certain way (e.g. abstaining or voting for his bias), he will tend to repeat the same behavior in later treatments even though it is no longer optimal for him to do so. Nonetheless, it is interesting to observe that the reduction in abstentions associated with a change from Low/Secret to Low/Public is almost identical in both sequences and approximately equal to 25%. Thus, while the order of treatments affects the baseline abstention rate, it has no impact on the size of the treatment effect itself.

Next, Table B.4 reports the behavior of informed voters broken down by sequence and treatment, focusing, as before, on the individuals who received a signal different than their biases. Observe that our main comparative static result is robust to the order of treatments, namely: under both sequences, when the magnitude of the bias is high, the proportion of informed individuals who vote in accordance with their signals is significantly higher under public voting. However, it should be noted that the proportion of subjects who vote correctly under High/Public is larger when the session starts with High/Public (89.62%) than when it starts with High/Secret (82.28%).[8]

[6] Note, however, that this difference is only marginally significant, with $\chi^2 = 2.25$ and $p = 0.13$.

[7] Note that the percentage of subjects who abstain under Low/Secret is 47.65% when the session starts with Low/Secret and 33.70% when the session starts with High/Secret − the χ^2 statistic associated with this difference is 15.9, with $p = 0.00$. Similarly, the percentage of subjects who abstain under Low/Public is 22.59% when the session starts with Low/Secret but only 8.15% when the session starts with Low/Public − the χ^2 statistic associated with this difference is 27.4, with $p = 0.00$.

[8] The χ^2 statistic for this difference is 5.17, with $p = 0.02$.

Furthermore, a change from High/Secret to High/Public leads to an increase of 68.79% (=82.28% − 13.49%) in the percentage of correct votes when the session starts with High/Secret in comparison with an increase of 51.55% (=89.62% − 38.07%) when the session starts with High/Public. Thus, it seems that a change in behavior from voting incorrectly to voting correctly is more likely to occur than the opposite.

Appendix C. Proofs

C.1 Lemma 1

Suppose, without loss of generality, that the state of the world is $\omega = A$. (All arguments are valid for the opposite case, where $\omega = B$.) Consider, first, the behavior of a competent member whose signal, $s_i = A$, is *equal* to his bias, $\beta_i = A$. Given the beliefs of the external evaluator and the strategies of other players, the expected payoffs associated with each of his pure strategies, $v_i \in \{A, \emptyset, B\}$, are the following:

$$U^{\beta_i=A,\lambda}(v_i = A, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = A) + \rho^{\omega=A}(v_i = A)(\alpha + \gamma)$$

$$U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = \emptyset) + \rho^{\omega=A}(v_i = \emptyset)(\alpha + \gamma)$$

$$U^{\beta_i=A,\lambda}(v_i = B, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = B) + \rho^{\omega=A}(v_i = B)(\alpha + \gamma),$$

where:

$$\rho^{\omega=A}(v_i = B) \leq \rho^{\omega=A}(v_i = \emptyset) \leq \rho^{\omega=A}(v_i = A) \tag{C.1}$$

$$\widetilde{r}^{\omega=A,\lambda}(v_i = \emptyset) = \widetilde{r}^{\omega=A,\lambda}(v_i = B) \leq \widetilde{r}^{\omega=A,\lambda}(v_i = A), \tag{C.2}$$

i.e. voting for A leads to a larger probability that the committee's decision is A and is also associated with a higher career concern rewards. Thus, it follows that:

$$\max\left\{U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = A), U^{\beta_i=A,\lambda}(v_i = B, s_i = A)\right\} \leq U^{\beta_i=A,\lambda}(v_i = A, s_i = A) \tag{C.3}$$

Therefore, both voting against the signal and abstaining are weakly dominated strategies for a competent member whose signal is equal to his bias.

Next, consider the behavior of a competent member whose signal, $s_i = A$, is *different* than his bias, $\beta_i = B$. Given the beliefs of the external evaluator and the strategies of other players, the expected payoffs associated with each of his pure strategies, $v_i \in \{A, \emptyset, B\}$, are the following:

$$U^{\beta_i=B,\lambda}(v_i = A, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = A) + \rho^{\omega=A}(v_i = A)\alpha + \left(1 - \rho^{\omega=A}(v_i = A)\right)\gamma$$

$$U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = \emptyset) + \rho^{\omega=A}(v_i = \emptyset)\alpha + \left(1 - \rho^{\omega=A}(v_i = \emptyset)\right)\gamma$$

$$U^{\beta_i=B,\lambda}(v_i = B, s_i = A) = \phi\widetilde{r}^{\omega=A,\lambda}(v_i = B) + \rho^{\omega=A}(v_i = B)\alpha + \left(1 - \rho^{\omega=A}(v_i = B)\right)\gamma$$

Note that the conditions $(C.1)$ and $(C.2)$ still hold in this case, so that if $\alpha \geq \gamma$, then:

$$U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = A) \leq U^{\beta_i=B,\lambda}(v_i = A, s_i = A), \tag{C.4}$$

whereas if $\alpha < \gamma$, then:

$$U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = A) \leq U^{\beta_i=B,\lambda}(v_i = B, s_i = A) \tag{C.5}$$

Therefore, abstaining is a weakly dominated strategy for a competent member whose signal is different than his bias. ■

C.2 Lemma 2

In any equilibrium where committee members do not use weakly dominated strategies, it must be the case that every competent member whose signal is equal to his bias votes correctly, $v_i = \omega$ (Lemma 1, part a). Therefore, by the Bayes' rule, the probability that an agent is competent given that he voted correctly is strictly positive:

$$\Pr(t = \mathsf{c}|v = \omega) > 0$$

Given the beliefs of the external evaluator, it follows from equations (6) and (7) in the paper that the expected career concern gains associated with a correct vote under public and secret voting are, respectively given, by:

$$\widetilde{r}^{\omega,\mathtt{p}}\,(v_i = \omega) = \Pr(t = \mathsf{c}|v = \omega) \tag{C.6}$$

and

$$\widetilde{r}^{\omega,\mathtt{s}}(v_i = \omega) = \Pr(t = \mathsf{c}|v = \omega).\tfrac{1}{n}(1+\mathbb{E}(\textstyle\sum_{j\neq i} \mathbb{I}_{\{v_j=\omega\}})), \tag{C.7}$$

while the expected career concern gains associated with an abstention or an incorrect vote under public and secret voting are, respectively, given by:

$$\widetilde{r}^{\omega,\mathtt{p}}\,(v_i \neq \omega) = 0 \tag{C.8}$$

and

$$\widetilde{r}^{\omega,\mathtt{s}}(v_i \neq \omega) = \Pr(t = \mathsf{c}|v = \omega).\tfrac{1}{n}\mathbb{E}(\textstyle\sum_{j\neq i} \mathbb{I}_{\{v_j=\omega\}})) \tag{C.9}$$

Therefore, since $\Pr(t = \mathsf{c}|v = \omega) > 0$, we have that:

$$\widetilde{r}^{\omega,\lambda}(v_i = \omega) > \widetilde{r}^{\omega,\lambda}(v_i \neq \omega),$$

for $\lambda \in \{\mathtt{p},\mathtt{s}\}$.

Furthermore, observe that:

$$\widetilde{r}^{\omega,\mathtt{p}}\,(v_i = \omega) > \widetilde{r}^{\omega,\mathtt{s}}(v_i = \omega)$$

and

$$\widetilde{r}^{\omega,\mathrm{p}}\left(v_i \neq \omega\right) < \widetilde{r}^{\omega,\mathrm{s}}(v_i \neq \omega),$$

since $0 < \frac{1}{n}\mathbb{E}(\sum_{j\neq i}\mathbb{I}_{\{v_j=\omega\}})) < 1$. ■

C.3 Lemma 3

Suppose, for concreteness and without loss of generality, that the state of the world is $\omega = A$ and consider the behavior of a competent member whose bias is B. Suppose, in addition, that in equilibrium all competent members biased towards B vote against the state of the world. In this case, we must have that:

$$U^{\beta_i=B,\lambda}(v_i = B, s_i = A) \geq U^{\beta_i=B,\lambda}(v_i = A, s_i = A), \tag{C.10}$$

so that, by equation (10) in the paper, we have:

$$\phi\widetilde{r}^{\omega=A,\lambda}(B) + \rho^{\omega=A}(B)\alpha + (1-\rho^{\omega=A}(B))\gamma \geq \phi\widetilde{r}^{\omega=A,\lambda}(A) + \rho^{\omega=A}(A)\alpha + (1-\rho^{\omega=A}(A))\gamma$$

Note that since $\widetilde{r}^{\omega=A,\lambda}(B) < \widetilde{r}^{\omega=A,\lambda}(A)$, i.e. the career concern reward associated with a correct vote is strictly larger than that associated with an incorrect vote (by Lemma 2), and $\rho^{\omega=A}(B) \leq \rho^{\omega=A}(A)$, i.e. the probability that the decision is A is larger when the agent votes for A than when he votes for B, the above inequality holds if, and only if:

$$\gamma > \alpha, \tag{C.11}$$

i.e. the bias term must be strictly larger than the common value. Furthermore, from Lemma 1, part b, it follows that, when $\gamma > \alpha$, we must have:

$$U^{\beta_i=B,\lambda}(v_i = B, s_i = A) \geq U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = A) \tag{C.12}$$

and by the same token:

$$U^{\beta_i=A,\lambda}\left(v_i = A, s_i = B\right) \geq U^{\beta_i=A,\lambda}\left(v_i = \emptyset, s_i = B\right) \tag{C.13}$$

Let us now consider the behavior of an *incompetent* member biased towards B. We want to show that it can never be optimal for agents of this type to abstain. Remember that the expected utility of committee members of this type is given by:

$$U^{\beta_i=B,\lambda}\left(v_i, s_i = \emptyset\right) = qU^{\beta_i=B,\lambda}\left(v_i, s_i = A\right) + (1-q)\, U^{\beta_i=B,\lambda}\left(v_i, s_i = B\right),$$

where $q \in (0,1)$ is the prior probability that the state of the world is A. In this case, we can show that voting for B is preferred than abstaining, since $U^{\beta_i=B,\lambda}\left(v_i = B, s_i = A\right) \geq U^{\beta_i=B,\lambda}\left(v_i = \emptyset, s_i = A\right)$, by (C.12), and $U^{\beta_i=B,\lambda}\left(v_i = B, s_i = B\right) > U^{\beta_i=B,\lambda}\left(v_i = \emptyset, s_i = B\right)$, since the bias and the state of the world are aligned in this case and, by Lemma 2, the career concern reward associated with a correct vote is strictly larger. Thus, for any prior $q \in (0,1)$, we have:

$$U^{\beta_i=B,\lambda}(v_i = B, s_i = \emptyset) > U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = \emptyset)$$

Next, consider the behavior of an incompetent member biased towards A. As before, we want to show that it can never be optimal for members of this type to abstain. The expected utility of these agents can be expressed as:

$$U^{\beta_i=A,\lambda}(v_i, s_i = \emptyset) = qU^{\beta_i=A,\lambda}(v_i, s_i = A) + (1-q)\,U^{\beta_i=A,\lambda}(v_i, s_i = B)$$

Here, it is possible to show that voting for A is preferred than abstaining. In fact, note that $U^{\beta_i=A,\lambda}(v_i = A, s_i = B) \geq U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = B)$ by $(C.13)$, and $U^{\beta_i=A,\lambda}(v_i = A, s_i = A) > U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = A)$, since the bias and the state of the world are aligned in this case and, by Lemma 2, the career concern reward associated with a correct vote is strictly larger. Thus, for any prior $q \in (0,1)$, we have:

$$U^{\beta_i=A,\lambda}(v_i = A, s_i = \emptyset) > U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = \emptyset)$$

Note that none of the above results depend on the value of the prior probability, so that a similar argument applies to the case where B is the state of the world. ∎

C.4 Proposition 1

We focus on symmetric pure-strategy equilibria where agents do not use weakly dominated strategies. From Lemma 1, it follows that competent members never abstain in equilibrium. Therefore, we can divide their possible equilibrium strategies into two categories: either (a) they all vote in accordance with the signal; or (b) some of them vote against the signal. Next, from Lemma 3, it follows that incompetent agents never abstain when a competent member votes against the state of the world, which corresponds to the situation described in case (b) above. Therefore, combining the results in Lemmas 1 and 3, the result follows. ∎

C.5 Proposition 2

The conditions for the existence of a fully competent equilibrium are the following: First, every competent member who receives a signal different than his bias must prefer to vote in accordance with the state of the world:

$$U_{full}^{\beta=A,\lambda}(v_i = B, s_i = B) \geq U_{full}^{\beta=A,\lambda}(v_i = A, s_i = B)$$

and

$$U_{full}^{\beta=B,\lambda}(v_i = A, s_i = A) \geq U_{full}^{\beta=B,\lambda}(v_i = B, s_i = A)$$

Second, all incompetent members must prefer to abstain rather than to vote for either one of the alternatives:

$$U_{full}^{\beta=A,\lambda}(v_i=\emptyset,s_i=\emptyset)\geq\max\{U_{full}^{\beta=A,\lambda}(v_i=A,s_i=\emptyset),U_{full}^{\beta=A,\lambda}(v_i=B,s_i=\emptyset)\}$$

and

$$U_{full}^{\beta=B,\lambda}(v_i=\emptyset,s_i=\emptyset)\geq\max\{U_{full}^{\beta=B,\lambda}(v_i=A,s_i=\emptyset),U_{full}^{\beta=B,\lambda}(v_i=B,s_i=\emptyset)\},$$

where we assume that the beliefs of all agents, including the external evaluator, are consistent with the equilibrium strategies.

After some algebra, it is possible to re-express the conditions on the behavior of competent members more compactly as:

$$\gamma\leq\alpha+\Lambda_{1,full}^{\lambda} \tag{C.14}$$

and

$$\gamma\leq\alpha+\Lambda_{2,full}^{\lambda}, \tag{C.15}$$

whereas the conditions on the behavior of incompetent members can be rewritten as:

$$\gamma\leq\alpha\Gamma_{1,full}^{\lambda}-\Gamma_{2,full}^{\lambda} \tag{C.16}$$

$$\gamma\geq-\alpha\Gamma_{3,full}^{\lambda}+\Gamma_{4,full}^{\lambda} \tag{C.17}$$

and

$$\gamma\leq\alpha\Gamma_{3,full}^{\lambda}-\Gamma_{4,full}^{\lambda} \tag{C.18}$$

$$\gamma\geq-\alpha\Gamma_{1,full}^{\lambda}+\Gamma_{2,full}^{\lambda}, \tag{C.19}$$

where we define:

$$\Lambda_{1,full}^{\lambda}\equiv\frac{\phi(\widetilde{r}_{full}^{\omega=B,\lambda}(B)-\widetilde{r}_{full}^{\omega=B,\lambda}(A))}{\rho_{full}^{\omega=B}(A)-\rho_{full}^{\omega=B}(B)}\geq0$$

$$\Lambda_{2,full}^{\lambda}\equiv\frac{\phi(\widetilde{r}_{full}^{\omega=A,\lambda}(A)-\widetilde{r}_{full}^{\omega=A,\lambda}(B))}{\rho_{full}^{\omega=A}(A)-\rho_{full}^{\omega=A}(B)}\geq0$$

$$\Gamma_{1,full}^{\lambda}\equiv\frac{(1-q)\,(\rho_{full}^{\omega=B}(A)-\rho_{full}^{\omega=B}(\emptyset))-q(\rho_{full}^{\omega=A}(A)-\rho_{full}^{\omega=A}(\emptyset))}{q(\rho_{full}^{\omega=A}(A)-\rho_{full}^{\omega=A}(\emptyset))+(1-q)\,(\rho_{full}^{\omega=B}(A)-\rho_{full}^{\omega=B}(\emptyset))}\gtreqless0$$

$$\Gamma_{2,full}^{\lambda}\equiv\frac{q\phi(\widetilde{r}_{full}^{\omega=A,\lambda}(A)-\widetilde{r}_{full}^{\omega=A,\lambda}(\emptyset))}{q(\rho_{full}^{\omega=A}(A)-\rho_{full}^{\omega=A}(\emptyset))+(1-q)\,(\rho_{full}^{\omega=B}(A)-\rho_{full}^{\omega=B}(\emptyset))}\geq0$$

$$\Gamma_{3,full}^{\lambda}\equiv\frac{q(\rho_{full}^{\omega=A}(\emptyset)-\rho_{full}^{\omega=A}(B))-(1-q)\,(\rho_{full}^{\omega=B}(\emptyset)-\rho_{full}^{\omega=B}(B))}{q(\rho_{full}^{\omega=A}(\emptyset)-\rho_{full}^{\omega=A}(B))+(1-q)\,(\rho_{full}^{\omega=B}(\emptyset)-\rho_{full}^{\omega=B}(B))}\gtreqless0$$

$$\Gamma^{\lambda}_{4,full} \equiv \frac{(1-q)\,\phi(\widetilde{r}^{\omega=B,\lambda}_{full}(B) - \widetilde{r}^{\omega=B,\lambda}_{full}(\emptyset))}{q(\rho^{\omega=A}_{full}(\emptyset) - \rho^{\omega=A}_{full}(B)) + (1-q)\,(\rho^{\omega=B}_{full}(\emptyset) - \rho^{\omega=B}_{full}(B))} \geq 0$$

Note also that, although we cannot determine the sign of the terms $\Gamma^{\lambda}_{1,full}$ and $\Gamma^{\lambda}_{3,full}$, it must be the case that $-1 \leq \Gamma^{\lambda}_{1,full} \leq 1$ and $-1 \leq \Gamma^{\lambda}_{3,full} \leq 1$.

In equilibrium, all of the above conditions must hold simultaneously. However, observe that if condition $(C.16)$ is satisfied, then it must be that $\alpha\Gamma^{\lambda}_{1,full} - \Gamma^{\lambda}_{2,full} > 0$, since $\gamma > 0$, which, in turn, implies that $\Gamma^{\lambda}_{1,full} > 0$. We must, then, have that $-\alpha\Gamma^{\lambda}_{1,full} + \Gamma^{\lambda}_{2,full} < 0$, which means that condition $(C.19)$ is necessarily satisfied. Furthermore, since $0 < \Gamma^{\lambda}_{1,full} \leq 1$ and $\Gamma^{\lambda}_{2,full} \geq 0$, condition $(C.14)$ also holds, given that $\alpha\Gamma^{\lambda}_{1,full} - \Gamma^{\lambda}_{2,full} < \alpha + \Lambda^{\lambda}_{1,full}$. Therefore, we conclude that whenever $(C.16)$ is satisfied, then $(C.14)$ and $(C.19)$ also hold. Similarly, observe that if condition $(C.18)$ is satisfied, then $\alpha\Gamma^{\lambda}_{3,full} - \Gamma^{\lambda}_{4,full} > 0$, which, in turn, implies that $\Gamma^{\lambda}_{3,full} > 0$. We must then have that $-\alpha\Gamma^{\lambda}_{3,full} + \Gamma^{\lambda}_{4,full} < 0$, which means that condition $(C.17)$ is necessarily satisfied. Moreover, since $0 < \Gamma^{\lambda}_{3,full} \leq 1$ and $\Gamma^{\lambda}_{4,full} \geq 0$, then condition $(C.15)$ must also hold. Hence, we conclude that whenever $(C.18)$ is satisfied, then $(C.15)$ and $(C.17)$ also hold.

Intuitively, what we have shown is that, given the equilibrium beliefs, if incompetent members from both types prefer to abstain rather than to vote in accordance with their biases, then no incompetent member would ever have an incentive to vote against his bias and, likewise, no competent member would ever prefer to vote against his bias rather than to vote in accordance with the state of the world. Therefore, for a fully competent equilibrium to be sustained it is enough that conditions $(C.16)$ and $(C.18)$ both hold. Observe that we can express these conditions more compactly as:

$$\gamma \leq \overline{\gamma}^{\lambda}_{full}\,(\alpha, \phi, \sigma, n)\,, \tag{C.20}$$

where:

$$\overline{\gamma}^{\lambda}_{full}\,(\alpha, \phi, \sigma, n) \equiv \min\{\alpha\Gamma^{\lambda}_{1,full} - \Gamma^{\lambda}_{2,full}, \alpha\Gamma^{\lambda}_{3,full} - \Gamma^{\lambda}_{4,full}\} \tag{C.21}$$

and note that $\overline{\gamma}^{\lambda}_{full}\,(\alpha, \phi, \sigma, n) < \alpha$, since $\Gamma^{\lambda}_{2,full}, \Gamma^{\lambda}_{4,full} \geq 0$ and $-1 < \Gamma^{\lambda}_{1,full} < 1$ and $-1 < \Gamma^{\lambda}_{3,full} < 1$.

Finally, we have:

$$\overline{\gamma}^{\mathtt{p}}_{full}\,(\alpha, \phi, \sigma, n) < \overline{\gamma}^{\mathtt{s}}_{full}\,(\alpha, \phi, \sigma, n)\,, \tag{C.22}$$

since $\Gamma^{\mathtt{p}}_{1,full} = \Gamma^{\mathtt{s}}_{1,full}$ and $\Gamma^{\mathtt{p}}_{3,full} = \Gamma^{\mathtt{s}}_{3,full}$, given that the expressions $\Gamma^{\lambda}_{1,full}$ and $\Gamma^{\lambda}_{3,full}$ are independent of the degree of transparency, λ. Furthermore, note that $\Gamma^{\mathtt{p}}_{2,full} > \Gamma^{\mathtt{s}}_{2,full}$ and $\Gamma^{\mathtt{p}}_{4,full} > \Gamma^{\mathtt{s}}_{4,full}$, which follow, respectively, from the facts that:

$$\widetilde{r}^{\omega=A,\mathtt{p}}_{full}(A) - \widetilde{r}^{\omega=A,\mathtt{p}}_{full}(\emptyset) > \widetilde{r}^{\omega=A,\mathtt{s}}_{full}(A) - \widetilde{r}^{\omega=A,\mathtt{s}}_{full}(\emptyset)$$

and

$$\widetilde{r}^{\omega=B,\mathtt{p}}_{full}(B) - \widetilde{r}^{\omega=B,\mathtt{p}}_{full}(\emptyset) > \widetilde{r}^{\omega=B,\mathtt{s}}_{full}(B) - \widetilde{r}^{\omega=B,\mathtt{s}}_{full}(\emptyset),$$

by Lemma 2. Intuitively, the career concern reward associated with a correct vote relatively to that associated with an abstention is larger under public voting, so that incompetent members have less incentive to abstain under transparency. ■

C.6 Proposition 3

The conditions for the existence of a partially competent equilibrium are the following: First, every competent member who receives a signal different than his bias must prefer to vote in accordance with the state of the world:

$$U_{part}^{\beta=A,\lambda}(v_i = B, s_i = B) \geq U_{part}^{\beta=A,\lambda}(v_i = A, s_i = B)$$

and

$$U_{part}^{\beta=B,\lambda}(v_i = A, s_i = A) \geq U_{part}^{\beta=B,\lambda}(v_i = B, s_i = A)$$

Second, some incompetent members must prefer to vote for either one of the alternatives rather than to abstain:

$$U_{part}^{\beta,\lambda}(v_i = \emptyset, s_i = \emptyset) \leq \min\{U_{part}^{\beta,\lambda}(v_i = A, s_i = \emptyset), U_{part}^{\beta,\lambda}(v_i = B, s_i = \emptyset)\},$$

for at least one type $\beta \in \{A, B\}$, where we assume that the beliefs of all agents, including the external evaluator, are consistent with the equilibrium strategies.

After some algebra, it is possible to re-express the conditions on the behavior of competent members more compactly as:

$$\gamma \leq \alpha + \Lambda_{1,part}^{\lambda} \tag{C.23}$$

and

$$\gamma \leq \alpha + \Lambda_{2,part}^{\lambda}, \tag{C.24}$$

whereas the conditions on the behavior of incompetent members can be rewritten as:

$$\gamma \geq \alpha\Gamma_{1,part}^{\lambda} - \Gamma_{2,part}^{\lambda} \tag{C.25}$$

and/or

$$\gamma \leq -\alpha\Gamma_{3,part}^{\lambda} + \Gamma_{4,part}^{\lambda} \tag{C.26}$$

and/or

$$\gamma \geq \alpha\Gamma_{3,part}^{\lambda} - \Gamma_{4,part}^{\lambda} \tag{C.27}$$

and/or

$$\gamma \leq -\alpha\Gamma_{1,part}^{\lambda} + \Gamma_{2,part}^{\lambda}, \tag{C.28}$$

where we define:

$$\Lambda_{1,part}^{\lambda} \equiv \frac{\phi(\widetilde{r}_{part}^{\omega=B,\lambda}(B) - \widetilde{r}_{part}^{\omega=B,\lambda}(A))}{\rho_{part}^{\omega=B}(A) - \rho_{part}^{\omega=B}(B)} \geq 0$$

$$\Lambda_{2,part}^{\lambda} \equiv \frac{\phi(\widetilde{r}_{part}^{\omega=A,\lambda}(A) - \widetilde{r}_{part}^{\omega=A,\lambda}(B))}{\rho_{part}^{\omega=A}(A) - \rho_{part}^{\omega=A}(B)} \geq 0$$

$$\Gamma_{1,part}^{\lambda} \equiv \frac{(1-q)\left(\rho_{part}^{\omega=B}(A) - \rho_{part}^{\omega=B}(\emptyset)\right) - q(\rho_{part}^{\omega=A}(A) - \rho_{part}^{\omega=A}(\emptyset))}{q(\rho_{part}^{\omega=A}(A) - \rho_{part}^{\omega=A}(\emptyset)) + (1-q)\left(\rho_{part}^{\omega=B}(A) - \rho_{part}^{\omega=B}(\emptyset)\right)} \gtrless 0$$

$$\Gamma_{2,part}^{\lambda} \equiv \frac{q\phi(\widetilde{r}_{part}^{\omega=A,\lambda}(A) - \widetilde{r}_{part}^{\omega=A,\lambda}(\emptyset))}{q(\rho_{part}^{\omega=A}(A) - \rho_{part}^{\omega=A}(\emptyset)) + (1-q)\left(\rho_{part}^{\omega=B}(A) - \rho_{part}^{\omega=B}(\emptyset)\right)} \geq 0$$

$$\Gamma_{3,part}^{\lambda} \equiv \frac{q(\rho_{part}^{\omega=A}(\emptyset) - \rho_{part}^{\omega=A}(B)) - (1-q)\left(\rho_{part}^{\omega=B}(\emptyset) - \rho_{part}^{\omega=B}(B)\right)}{q(\rho_{part}^{\omega=A}(\emptyset) - \rho_{part}^{\omega=A}(B)) + (1-q)\left(\rho_{part}^{\omega=B}(\emptyset) - \rho_{part}^{\omega=B}(B)\right)} \gtrless 0$$

$$\Gamma_{4,part}^{\lambda} \equiv \frac{(1-q)\,\phi(\widetilde{r}_{part}^{\omega=B,\lambda}(B) - \widetilde{r}_{part}^{\omega=B,\lambda}(\emptyset))}{q(\rho_{part}^{\omega=A}(\emptyset) - \rho_{part}^{\omega=A}(B)) + (1-q)\left(\rho_{part}^{\omega=B}(\emptyset) - \rho_{part}^{\omega=B}(B)\right)} \geq 0$$

Note also that, although we cannot determine the sign of the terms $\Gamma_{1,part}^{\lambda}$ and $\Gamma_{3,part}^{\lambda}$, it must be the case that $-1 \leq \Gamma_{1,part}^{\lambda} \leq 1$ and $-1 \leq \Gamma_{3,part}^{\lambda} \leq 1$.

In equilibrium, both conditions on competent agents must be satisfied, plus at least one of the conditions on incompetent agents must hold. Thus, the following condition must always be satisfied:

$$\gamma \leq \overline{\gamma}^{\mathtt{c}} \equiv \min\{\alpha + \Lambda_{1,part}^{\lambda}, \alpha + \Lambda_{2,part}^{\lambda}\}$$

Now, let:

$$\overline{\gamma}^{\mathtt{nc}} \equiv \max\{-\alpha\Gamma_{1,part}^{\lambda} + \Gamma_{2,part}^{\lambda}, -\alpha\Gamma_{3,part}^{\lambda} + \Gamma_{4,part}^{\lambda}\}$$

and

$$\underline{\gamma}^{\mathtt{nc}} \equiv \min\{\alpha\Gamma_{1,part}^{\lambda} - \Gamma_{2,part}^{\lambda}, \alpha\Gamma_{3,part}^{\lambda} - \Gamma_{4,part}^{\lambda}\},$$

where $\overline{\gamma}^{\mathtt{nc}} = -\underline{\gamma}^{\mathtt{nc}}$. Observe that if $\underline{\gamma}^{\mathtt{nc}} < 0$, then either $(C.25)$ or $(C.27)$ or both are necessarily satisfied, in which case the condition for the existence of a partially competent equilibrium is simply given by:

$$\gamma \leq \overline{\gamma}^{\mathtt{c}}$$

On the other hand, if $\underline{\gamma}^{\mathtt{nc}} > 0$, then we must necessarily have $\overline{\gamma}^{\mathtt{nc}} < 0$, so that that $(C.26)$ and $(C.28)$ cannot be satisfied, in which case the following condition must hold:

$$\underline{\gamma}^{\mathtt{nc}} \leq \gamma \leq \overline{\gamma}^{\mathtt{c}}$$

Thus, the condition for the existence of a partially competent equilibrium can be written as:

$$\underline{\gamma}_{part}^{\lambda}(\alpha, \phi, \sigma, n) \leq \gamma \leq \overline{\gamma}_{part}^{\lambda}(\alpha, \phi, \sigma, n), \tag{C.29}$$

where:

$$\underline{\gamma}_{part}^{\lambda}(\alpha, \phi, \sigma, n) \equiv \min\{\alpha\Gamma_{1,part}^{\lambda} - \Gamma_{2,part}^{\lambda}, \alpha\Gamma_{3,part}^{\lambda} - \Gamma_{4,part}^{\lambda}\} \tag{C.30}$$

and

$$\overline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n) \equiv \min\{\alpha+\Lambda_{1,part}^{\lambda}, \alpha+\Lambda_{2,part}^{\lambda}\} \tag{C.31}$$

Note that $\underline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n) < \alpha$, since $\Gamma_{2,part}^{\lambda}, \Gamma_{4,part}^{\lambda} \geq 0$ and $-1 < \Gamma_{1,part}^{\lambda} < 1$ and $-1 < \Gamma_{3,part}^{\lambda} < 1$. Moreover, $\overline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n) > \alpha$, since $\Lambda_{1,part}^{\lambda}, \Lambda_{2,part}^{\lambda} > 0$.

Finally, observe that:

$$\overline{\gamma}_{part}^{\mathsf{s}}(\alpha,\phi,\sigma,n) < \overline{\gamma}_{part}^{\mathsf{p}}(\alpha,\phi,\sigma,n), \tag{C.32}$$

since $\Lambda_{1,part}^{\mathsf{p}} > \Lambda_{1,part}^{\mathsf{s}}$ and $\Lambda_{2,part}^{\mathsf{p}} > \Lambda_{2,part}^{\mathsf{s}}$, which follow, respectively, from the facts that:

$$\widetilde{r}_{part}^{\omega=B,\mathsf{p}}(B) - \widetilde{r}_{part}^{\omega=B,\mathsf{p}}(A) > \widetilde{r}_{part}^{\omega=B,\mathsf{s}}(B) - \widetilde{r}_{part}^{\omega=B,\mathsf{s}}(A)$$

and

$$\widetilde{r}_{part}^{\omega=A,\mathsf{p}}(A) - \widetilde{r}_{part}^{\omega=A,\mathsf{p}}(B) > \widetilde{r}_{part}^{\omega=A,\mathsf{s}}(A) - \widetilde{r}_{part}^{\omega=A,\mathsf{s}}(B),$$

by Lemma 2. Furthermore, we also have that:

$$\underline{\gamma}_{part}^{\mathsf{p}}(\alpha,\phi,\sigma,n) < \underline{\gamma}_{part}^{\mathsf{s}}(\alpha,\phi,\sigma,n), \tag{C.33}$$

since $\Gamma_{1,part}^{\mathsf{p}} = \Gamma_{1,part}^{\mathsf{s}}$, $\Gamma_{3,part}^{\mathsf{p}} = \Gamma_{3,part}^{\mathsf{s}}$, $\Gamma_{2,part}^{\mathsf{p}} > \Gamma_{2,part}^{\mathsf{s}}$ and $\Gamma_{4,part}^{\mathsf{p}} > \Gamma_{4,part}^{\mathsf{s}}$. Note that these last two inequalities follow from the facts that:

$$\widetilde{r}_{part}^{\omega=A,\mathsf{p}}(A) - \widetilde{r}_{part}^{\omega=A,\mathsf{p}}(\emptyset) > \widetilde{r}_{part}^{\omega=A,\mathsf{s}}(A) - \widetilde{r}_{part}^{\omega=A,\mathsf{s}}(\emptyset)$$

and

$$\widetilde{r}_{part}^{\omega=B,\mathsf{p}}(B) - \widetilde{r}_{part}^{\omega=B,\mathsf{p}}(\emptyset) > \widetilde{r}_{part}^{\omega=B,\mathsf{s}}(B) - \widetilde{r}_{part}^{\omega=B,\mathsf{s}}(\emptyset),$$

by Lemma 2. ■

C.7 Proposition 4

The conditions for the existence of a biased equilibrium are the following: First, some competent members who receive a signal different than their bias must prefer to vote against the state of the world:

$$U_{bias}^{\beta=A,\lambda}(v_i=B, s_i=B) \leq U_{bias}^{\beta=A,\lambda}(v_i=A, s_i=B) \tag{C.34}$$

and/or

$$U_{bias}^{\beta=B,\lambda}(v_i=A, s_i=A) \leq U_{bias}^{\beta=B,\lambda}(v_i=B, s_i=A) \tag{C.35}$$

Second, all incompetent members must prefer to vote rather than to abstain:

$$U_{bias}^{\beta,\lambda}(v_i=\emptyset, s_i=\emptyset) \leq \min\{U_{bias}^{\beta,\lambda}(v_i=A, s_i=\emptyset), U_{bias}^{\beta,\lambda}(v_i=B, s_i=\emptyset)\}, \tag{C.36}$$

where we assume that the beliefs of all agents, including the external evaluator, are consistent with the equilibrium strategies.

From Lemma 3, it follows that if either ($C.34$) or ($C.35$) are satisfied, then ($C.36$) must necessarily hold. Moreover, note that, after some algebra, the conditions on competent members can be re-expressed more compactly as:

$$\gamma \geq \alpha + \Lambda^{\lambda}_{1,bias} \tag{C.37}$$

and/or

$$\gamma \geq \alpha + \Lambda^{\lambda}_{2,bias}, \tag{C.38}$$

where we define:

$$\Lambda^{\lambda}_{1,bias} \equiv \frac{\phi(\widetilde{r}^{\omega=B,\lambda}_{bias}(B) - \widetilde{r}^{\omega=B,\lambda}_{bias}(A))}{\rho^{\omega=B}_{bias}(A) - \rho^{\omega=B}_{bias}(B)} \geq 0$$

$$\Lambda^{\lambda}_{2,bias} \equiv \frac{\phi(\widetilde{r}^{\omega=A,\lambda}_{bias}(A) - \widetilde{r}^{\omega=A,\lambda}_{bias}(B))}{\rho^{\omega=A}_{bias}(A) - \rho^{\omega=A}_{bias}(B)} \geq 0$$

Therefore, the condition for the existence of a biased equilibrium can be written as:

$$\gamma \geq \underline{\gamma}^{\lambda}_{bias}(\alpha, \phi, \sigma, n), \tag{C.39}$$

where

$$\underline{\gamma}^{\lambda}_{bias}(\alpha, \phi, \sigma, n) \equiv \min\{\alpha + \Lambda^{\lambda}_{1,bias}, \alpha + \Lambda^{\lambda}_{2,bias}\} \tag{C.40}$$

Note that $\underline{\gamma}^{\lambda}_{bias}(\alpha, \phi, \sigma, n) > \alpha$, since $\Lambda^{\lambda}_{1,bias}, \Lambda^{\lambda}_{2,bias} > 0$. We also have that:

$$\underline{\gamma}^{\mathtt{s}}_{bias}(\alpha, \phi, \sigma, n) < \underline{\gamma}^{\mathtt{p}}_{bias}(\alpha, \phi, \sigma, n),$$

since $\Lambda^{\mathtt{p}}_{1,bias} > \Lambda^{\mathtt{s}}_{1,bias}$ and $\Lambda^{\mathtt{p}}_{2,biast} > \Lambda^{\mathtt{s}}_{2,bias}$, which follow, respectively, from the facts that:

$$\widetilde{r}^{\omega=B,\mathtt{p}}_{bias}(B) - \widetilde{r}^{\omega=B,\mathtt{p}}_{bias}(A) > \widetilde{r}^{\omega=B,\mathtt{s}}_{bias}(B) - \widetilde{r}^{\omega=B,\mathtt{s}}_{bias}(A)$$

and

$$\widetilde{r}^{\omega=A,\mathtt{p}}_{bias}(A) - \widetilde{r}^{\omega=A,\mathtt{p}}_{bias}(B) > \widetilde{r}^{\omega=A,\mathtt{s}}_{bias}(A) - \widetilde{r}^{\omega=A,\mathtt{s}}_{bias}(B),$$

by Lemma 2. ∎

C.8 Proposition 5

We start by deriving the conditions for the existence of a fully competent equilibrium under symmetry. Assuming that all competent members vote correctly and all incompetent members abstain, we have:

$$\rho^{\omega=A}_{full}(A) - \rho^{\omega=A}_{full}(\emptyset) = \rho^{\omega=B}_{full}(\emptyset) - \rho^{\omega=B}_{full}(B) = \frac{1}{2}(1-\sigma)^{n-1}$$

$$\rho^{\omega=A}_{full}(\emptyset) - \rho^{\omega=A}_{full}(B) = \rho^{\omega=B}_{full}(A) - \rho^{\omega=B}_{full}(\emptyset) = \frac{1}{2}(1-\sigma)^{n-1} + \frac{1}{2}(n-1)(1-\sigma)^{n-2}\sigma$$

Moreover, note that in this case:

$$\widetilde{r}_{full}^{\omega=A,\mathtt{p}}(A) = \widetilde{r}_{full}^{\omega=B,\mathtt{p}}(B) = 1$$

$$\widetilde{r}_{full}^{\omega=A,\mathtt{p}}(\emptyset) = \widetilde{r}_{full}^{\omega=B,\mathtt{p}}(\emptyset) = 0$$

$$\widetilde{r}_{full}^{\omega=A,\mathtt{s}}(A) = \widetilde{r}_{full}^{\omega=B,\mathtt{s}}(B) = \frac{1}{n}\left(1 + \mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})\right)$$

$$\widetilde{r}_{full}^{\omega=A,\mathtt{s}}(\emptyset) = \widetilde{r}_{full}^{\omega=B,\mathtt{p}}(\emptyset) = \frac{1}{n}\mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})$$

Therefore, from $(C.20)$ and $(C.21)$, it follows that:

$$\overline{\gamma}_{full}^{\lambda}(\alpha,\phi,\sigma,n) \equiv \frac{(n-1)\,\sigma}{2+(n-3)\,\sigma}\alpha - \frac{1}{\left(1+\frac{n-3}{2}\sigma\right)(1-\sigma)^{n-2}}\left(1-\frac{n-1}{n}\mathbb{I}_{\{\lambda=\mathtt{s}\}}\right)\phi \tag{C.41}$$

Next, we proceed to derive the conditions for the existence of a partially competent equilibrium under symmetry. Assuming that all competent members vote correctly and all incompetent members vote for their biases, we have:

$$\rho_{part}^{\omega}(A) - \rho_{part}^{\omega}(B) = \binom{n-1}{(n-1)/2}\left(\sigma + \frac{1}{2}(1-\sigma)\right)^{\frac{n-1}{2}}\left(\frac{1}{2}(1-\sigma)\right)^{\frac{n-1}{2}}$$

$$\rho_{part}^{\omega}(A) - \rho_{part}^{\omega}(\emptyset) = \rho_{part}^{\omega}(\emptyset) - \rho_{part}^{\omega}(B) = \frac{1}{2}\binom{n-1}{(n-1)/2}\left(\sigma + \frac{1}{2}(1-\sigma)\right)^{\frac{n-1}{2}}\left(\frac{1}{2}(1-\sigma)\right)^{\frac{n-1}{2}},$$

for $\omega \in \{A, B\}$, where the term $\sigma + \frac{1}{2}(1-\sigma)$ represents the proportion of committee members that are expected to vote for the correct alternative in equilibrium. Note, also, that:

$$\widetilde{r}_{part}^{\omega=B,\mathtt{p}}(B) = \widetilde{r}_{part}^{\omega=A,\mathtt{p}}(A) = \frac{\sigma}{\sigma + \frac{1}{2}(1-\sigma)}$$

$$\widetilde{r}_{part}^{\omega=A,\mathtt{p}}(B) = \widetilde{r}_{part}^{\omega=B,\mathtt{p}}(A) = \widetilde{r}_{part}^{\omega=A,\mathtt{p}}(\emptyset) = \widetilde{r}_{part}^{\omega=B,\mathtt{p}}(\emptyset) = 0$$

$$\widetilde{r}_{part}^{\omega=B,\mathtt{s}}(B) = \widetilde{r}_{part}^{\omega=A,\mathtt{s}}(A) = \frac{1}{n}\frac{\sigma}{\sigma + \frac{1}{2}(1-\sigma)}\left(1 + \mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})\right)$$

$$\widetilde{r}_{part}^{\omega=A,\mathtt{s}}(B) = \widetilde{r}_{part}^{\omega=B,\mathtt{s}}(A) = \widetilde{r}_{part}^{\omega=A,\mathtt{s}}(\emptyset) = \widetilde{r}_{part}^{\omega=B,\mathtt{s}}(\emptyset) = \frac{1}{n}\frac{\sigma}{\sigma + \frac{1}{2}(1-\sigma)}\mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})$$

Therefore, from equations $(C.30)$ and $(C.31)$, it follows that:

$$\underline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n) < 0 \tag{C.42}$$

and

$$\overline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n) = \alpha + \frac{2^n\sigma}{\binom{n-1}{(n-1)/2}(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}}\left(1-\frac{n-1}{n}\mathbb{I}_{\{\lambda=\mathtt{s}\}}\right)\phi, \tag{C.43}$$

where the first expression follows from the fact that $\alpha\Gamma_{1,part}^{\lambda}-\Gamma_{2,part}^{\lambda}=\alpha\Gamma_{3,part}^{\lambda}-\Gamma_{4,part}^{\lambda}<0$, since $\Gamma_{1,part}^{\lambda}=\Gamma_{3,part}^{\lambda}=0$ and $\Gamma_{2,part}^{\lambda},\Gamma_{4,part}^{\lambda}>0$.

Finally, let us derive the conditions for the existence of a biased equilibrium. Assuming that all members vote in accordance with their biases, we have:

$$\rho_{bias}^{\omega}(A)-\rho_{bias}^{\omega}(B)=\binom{n-1}{(n-1)/2}\left(\frac{1}{2}\right)^{\frac{n-1}{2}}\left(\frac{1}{2}\right)^{\frac{n-1}{2}},$$

for $\omega\in\{A,B\}$. Observe that, in this case, the proportion of members expected to vote for each of the alternatives is exactly $\frac{1}{2}$. Note, also, that:

$$\widetilde{r}_{bias}^{\omega=A,\mathtt{p}}(A)=\widetilde{r}_{bias}^{\omega=B,\mathtt{p}}(B)=\sigma$$

$$\widetilde{r}_{bias}^{\omega=A,\mathtt{p}}(B)=\widetilde{r}_{bias}^{\omega=B,\mathtt{p}}(A)=0$$

$$\widetilde{r}_{bias}^{\omega=A,\mathtt{s}}(A)=\widetilde{r}_{bias}^{\omega=B,\mathtt{s}}(B)=\frac{\sigma}{n}\left(1+\mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})\right)$$

$$\widetilde{r}_{bias}^{\omega=A,\mathtt{s}}(B)=\widetilde{r}_{bias}^{\omega=B,\mathtt{s}}(A)=\frac{\sigma}{n}\left(\mathbb{E}(\ \textstyle\sum_{j\neq i}\ \mathbb{I}_{\{v_j=\omega\}})\right)$$

Therefore, from equation $(C.40)$, it follows that:

$$\underline{\gamma}_{bias}^{\lambda}(\alpha,\phi,\sigma,n)=\alpha+\frac{2^{n-1}\sigma}{\binom{n-1}{(n-1)/2}}\left(1-\frac{n-1}{n}\mathbb{I}_{\{\lambda=\mathtt{s}\}}\right)\phi \tag{C.44}$$

Finally, note that:

$$0\leq\frac{(n-1)\,\sigma}{2+(n-3)\,\sigma}\leq 1,$$

since $n\geq 3$ and $\sigma\in(0,1)$; and

$$\frac{2^{n}\sigma}{\binom{n-1}{(n-1)/2}(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}}>\frac{2^{n-1}\sigma}{\binom{n-1}{(n-1)/2}},$$

since $2>(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}$.[9] Therefore, comparing equations $(C.41)$, $(C.43)$ and $(C.44)$, we have:

$$\overline{\gamma}_{full}^{\lambda}(\alpha,\phi,\sigma,n)<\underline{\gamma}_{bias}^{\lambda}(\alpha,\phi,\sigma,n)<\overline{\gamma}_{part}^{\lambda}(\alpha,\phi,\sigma,n)$$

Furthermore, form the inspection of these expressions, it is immediate to see that:

$$\overline{\gamma}_{full}^{\mathtt{p}}(\alpha,\phi,\sigma,n)<\overline{\gamma}_{full}^{\mathtt{s}}(\alpha,\phi,\sigma,n)$$

$$\overline{\gamma}_{part}^{\mathtt{p}}(\alpha,\phi,\sigma,n)>\overline{\gamma}_{part}^{\mathtt{s}}(\alpha,\phi,\sigma,n)$$

[9] Note that $2>(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}\leftrightarrow 2>(1+\sigma)(1+\sigma)^{\frac{n-1}{2}}(1-\sigma)^{\frac{n-1}{2}}\leftrightarrow 2^{\frac{2}{n-1}}>(1+\sigma)^{\frac{2}{n-1}}\left(1-\sigma^2\right)$. Observe that the last inequality always holds for any $n\geq 3$ and $\sigma\in(0,1)$, since $2^{\frac{2}{n-1}}>(1+\sigma)^{\frac{2}{n-1}}$ and $1-\sigma^2<1$.

and

$$\underline{\gamma}^{\mathsf{p}}_{bias}\left(\alpha,\phi,\sigma,n\right) > \underline{\gamma}^{\mathsf{s}}_{bias}\left(\alpha,\phi,\sigma,n\right) \quad \blacksquare$$

C.9 Proposition 6

Note that if $\overline{\gamma}^{\mathsf{s}}_{part}\left(\alpha,\phi,\sigma,n\right) < \gamma < \overline{\gamma}^{\mathsf{p}}_{part}\left(\alpha,\phi,\sigma,n\right)$, then a partially competent equilibrium can be sustained under public but not under secret voting. Furthermore, for this range of parameters, a biased equilibrium always exists under secret voting, but may or may not exist under public voting. Therefore, the probability of a correct decision under public voting is at least as large as under secret voting, i.e.:

$$\Pi^{\mathsf{p}} = \min\left\{\sum_{i=(n+1)/2}^{n}\binom{n}{i}\left(\sigma+\tfrac{1}{2}\left(1-\sigma\right)\right)^{i}\left(\tfrac{1}{2}\left(1-\sigma\right)\right)^{n-i}, \tfrac{1}{2}\right\} \geq \Pi^{\mathsf{s}} = \tfrac{1}{2}$$

Next, observe that if $\overline{\gamma}^{\mathsf{p}}_{full}\left(\alpha,\phi,\sigma,n\right) < \gamma < \overline{\gamma}^{\mathsf{s}}_{full}\left(\alpha,\phi,\sigma,n\right)$, then a fully competent equilibrium can be sustained under secret but not under public voting. Note that for this range of parameters, a partially competent equilibrium always exists under both secret and public voting. Thus, the probability of a correct decision under secret voting is at least as large as under public voting, i.e.:

$$\Pi^{\mathsf{s}} \min\left\{1-\tfrac{1}{2}\left(1-\sigma\right)^{n}, \sum_{i=(n+1)/2}^{n}\binom{n}{i}\left(\sigma+\tfrac{1}{2}\left(1-\sigma\right)\right)^{i}\left(\tfrac{1}{2}\left(1-\sigma\right)\right)^{n-i}\right\}$$

$$\geq \Pi^{\mathsf{p}} = \sum_{i=(n+1)/2}^{n}\binom{n}{i}\left(\sigma+\tfrac{1}{2}\left(1-\sigma\right)\right)^{i}\left(\tfrac{1}{2}\left(1-\sigma\right)\right)^{n-i} \quad \blacksquare$$

C.10 Proposition 7

Note, first, that:

$$\overline{\gamma}^{\mathsf{p}}_{part} - \overline{\gamma}^{\mathsf{s}}_{part} = \left(\frac{n-1}{n}\right)\frac{2^{n}\sigma}{\binom{n-1}{(n-1)/2}\left(1+\sigma\right)^{\frac{n+1}{2}}\left(1-\sigma\right)^{\frac{n-1}{2}}}\phi$$

Thus, it follows that:

$$\frac{\partial\{\overline{\gamma}^{\mathsf{p}}_{part}-\overline{\gamma}^{\mathsf{s}}_{part}\}}{\partial\phi} = \frac{2^{n}(n-1)\sigma}{n\binom{n-1}{(n-1)/2}(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}} > 0$$

Furthermore, we have:

$$\frac{\partial\{\overline{\gamma}^{\mathsf{p}}_{part}-\overline{\gamma}^{\mathsf{s}}_{part}\}}{\partial\sigma} = \frac{2^{n}(n-1)\phi}{n\binom{n-1}{(n-1)/2}}\frac{(1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}}{\left((1+\sigma)^{\frac{n+1}{2}}(1-\sigma)^{\frac{n-1}{2}}\right)^{2}}\left[1-\sigma\left(\frac{n+1}{2}\frac{1}{1+\sigma}-\frac{n-1}{2}\frac{1}{1-\sigma}\right)\right] > 0 \ ,$$

since $1-\sigma\left(\frac{n+1}{2}\frac{1}{1+\sigma}-\frac{n-1}{2}\frac{1}{1-\sigma}\right) > 0$.[10]

[10] Note that this inequality can be re-written as $\left(1+\sigma\right)\left(1-\sigma\right) > \sigma\left(1-\sigma n\right)$, so that $\sigma^{2}\left(n-1\right)+\left(1-\sigma\right) > 0$, which always holds.

Next, note that:

$$\overline{\gamma}_{full}^{\mathsf{s}}-\overline{\gamma}_{full}^{\mathsf{p}}=\left(\frac{n-1}{n}\right)\frac{1}{\left(1+\frac{n-3}{2}\sigma\right)(1-\sigma)^{n-2}}\phi$$

Thus, it follows that:

$$\frac{\partial\{\overline{\gamma}_{full}^{\mathsf{s}}-\overline{\gamma}_{full}^{\mathsf{p}}\}}{\partial\phi}=\left(\frac{n-1}{n}\right)\frac{1}{\left(1+\frac{n-3}{2}\sigma\right)(1-\sigma)^{n-2}}>0$$

Moreover, we have:

$$\frac{\partial\{\overline{\gamma}_{full}^{\mathsf{s}}-\overline{\gamma}_{full}^{\mathsf{p}}\}}{\partial\sigma}=-\frac{n-1}{n\left(\left(1+\frac{n-3}{2}\sigma\right)(1-\sigma)^{n-2}\right)^2}\left[\frac{n-3}{2}(1-\sigma)-\left(1+\frac{n-3}{2}\sigma\right)(n-2)\right](1-\sigma)^{n-3}>0,$$

since $\frac{n-3}{2}(1-\sigma)-\left(1+\frac{n-3}{2}\sigma\right)(n-2)=\frac{-n+1}{2}-\frac{n-3}{2}\sigma-(n-2)\frac{n-3}{2}\sigma<0.$ ∎

C.11 Proposition 8

Preliminaries. Under the assumption that career concerns are proportional to $r_i^{\omega,\lambda}\equiv\Pr(\tau_i=c|\omega,\mathcal{I}^\lambda)$, the expected career concern reward of a committee member under public and secret voting are given, respectively, by:

$$\widetilde{r}^{\omega,\mathsf{p}}(v_i)=\sum_{m\in\{A,\emptyset,B\}}\Pr(t=\mathsf{c}|v=m,\omega).\mathbb{I}_{\{v_i=m\}}\tag{C.45}$$

and

$$\widetilde{r}^{\omega,\mathsf{s}}(v_i)=\frac{1}{n}\sum_{m\in\{A,\emptyset,B\}}\Pr(t=\mathsf{c}|v=m,\omega).(\mathbb{I}_{\{v_i=m\}}+\mathbb{E}(\sum_{j\neq i}\mathbb{I}_{\{v_j=m\}})),\tag{C.46}$$

where, as before, the conditional probabilities $\Pr(t=\mathsf{c}|v=m,\omega)$, for $m\in\{A,\emptyset,B\}$, are computed based on the external evaluator's beliefs.

Moreover, note that for any $k,l\in\{A,\emptyset,B\}$, with $k\neq l$, we have that:

$$\widetilde{r}^{\omega,\mathsf{p}}(k)-\widetilde{r}^{\omega,\mathsf{p}}(l)=\Pr(t=\mathsf{c}|v=k,\omega)-\Pr(t=\mathsf{c}|v=l,\omega)$$

and

$$\widetilde{r}^{\omega,\mathsf{s}}(k)-\widetilde{r}^{\omega,\mathsf{s}}(l)=\frac{1}{n}\left(\Pr(t=\mathsf{c}|v=k,\omega)-\Pr(t=\mathsf{c}|v=l,\omega)\right)$$

Therefore, conditional on the evaluator's beliefs, the difference $\widetilde{r}^{\omega,\lambda}(k)-\widetilde{r}^{\omega,\lambda}(l)$ must always have the same sign under both voting rules, $\lambda\in\{\mathtt{p},\mathtt{s}\}$. Finally, note that the absolute difference between the career concern rewards associated with strategies k and l are always larger under public voting, i.e.:

$$|\widetilde{r}^{\omega,\mathsf{p}}(k)-\widetilde{r}^{\omega,\mathsf{p}}(l)|\geq|\widetilde{r}^{\omega,\mathsf{s}}(k)-\widetilde{r}^{\omega,\mathsf{s}}(l)|\tag{C.47}$$

This is the sense in which the "dilution effect" is still active in this version of the model.

Proof. Consider the behavior of a competent member whose bias is equal to the state of the world,

$\beta_i = \omega$. The expected payoff of such an agent is given by:

$$U^{\beta_i=A,\lambda}(v_i, s_i = A) = \phi \widetilde{r}^{\omega=A,\lambda}(v_i) + \rho^{\omega=A}(v_i)\,(\alpha+\gamma) \tag{C.48}$$

and

$$U^{\beta_i=B,\lambda}(v_i, s_i = B) = \phi \widetilde{r}^{\omega=B,\lambda}(v_i) + \left(1-\rho^{\omega=B}(v_i)\right)(\alpha+\gamma)\,, \tag{C.49}$$

depending on whether he is biased towards A or B, respectively.

Observe that necessary conditions for at least one type of competent member to prefer to vote against the state of the world when his bias is equal to the state are given by:

$$U^{\beta_i=A,\lambda}(v_i = B, s_i = A) \geq U^{\beta_i=A,\lambda}(v_i = A, s_i = A)$$

or

$$U^{\beta_i=B,\lambda}(v_i = A, s_i = B) \geq U^{\beta_i=B,\lambda}(v_i = B, s_i = B)$$

After some manipulations, we can rewrite the above conditions as:

$$\alpha+\gamma \leq \frac{\phi(\widetilde{r}^{\omega=A,\lambda}(B) - \widetilde{r}^{\omega=A,\lambda}(A))}{\rho^{\omega=A}(A) - \rho^{\omega=A}(B)} \tag{C.50}$$

or

$$\alpha+\gamma \leq \frac{\phi(\widetilde{r}^{\omega=B,\lambda}(A) - \widetilde{r}^{\omega=B,\lambda}(B))}{\rho^{\omega=B}(A) - \rho^{\omega=B}(B)} \tag{C.51}$$

Note that since the parameters α and γ are both assumed to be strictly positive, we must have that either $\widetilde{r}^{\omega=A,\lambda}(B) > \widetilde{r}^{\omega=A,\lambda}(A)$ or $\widetilde{r}^{\omega=B,\lambda}(A) > \widetilde{r}^{\omega=B,\lambda}(B)$ for at least one of the above conditions to hold.

Similarly, necessary conditions for at least one type of competent member to prefer to abstain when his bias is equal to the state are:

$$U^{\beta_i=A,\lambda}(v_i = \emptyset, s_i = A) \geq U^{\beta_i=A,\lambda}(v_i = A, s_i = A)$$

or

$$U^{\beta_i=B,\lambda}(v_i = \emptyset, s_i = B) \geq U^{\beta_i=B,\lambda}(v_i = B, s_i = B)$$

We can rewrite the above conditions as:

$$\alpha+\gamma \leq \frac{\phi(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(A))}{\rho^{\omega=A}(A) - \rho^{\omega=A}(\emptyset)} \tag{C.52}$$

or

$$\alpha+\gamma \leq \frac{\phi\left(\widetilde{r}^{\omega=B,\lambda}(\emptyset) - \widetilde{r}^{\omega=B,\lambda}(B)\right)}{\rho^{\omega=B}(\emptyset) - \rho^{\omega=B}(B)} \tag{C.53}$$

Again, since the parameters α and γ are both strictly positive, we must have that either $\widetilde{r}^{\omega=A,\lambda}(\emptyset) > \widetilde{r}^{\omega=A,\lambda}(A)$ or $\widetilde{r}^{\omega=B,\lambda}(\emptyset) > \widetilde{r}^{\omega=B,\lambda}(B)$ for at least one of the above conditions to hold. ∎

C.12 Proposition 9

Note that from equations $(C.50)$ and $(C.51)$ in the proof of Proposition 8, a necessary condition for a competent member with bias equal to the state of the world to vote against the state of the world is:

$$\alpha+\gamma \leq \max\left\{\frac{\phi(\widetilde{r}^{\omega=A,\lambda}(B)-\widetilde{r}^{\omega=A,\lambda}(A))}{\rho^{\omega=A}(A)-\rho^{\omega=A}(B)}, \frac{\phi(\widetilde{r}^{\omega=B,\lambda}(A)-\widetilde{r}^{\omega=B,\lambda}(B))}{\rho^{\omega=B}(A)-\rho^{\omega=B}(B)}\right\}, \tag{C.54}$$

whereas from equations $(C.52)$ and $(C.53)$, a necessary condition for agents of this type to abstain is given by:

$$\alpha+\gamma \leq \max\left\{\frac{\phi(\widetilde{r}^{\omega=A,\lambda}(\emptyset)-\widetilde{r}^{\omega=A,\lambda}(A))}{\rho^{\omega=A}(A)-\rho^{\omega=A}(\emptyset)}, \frac{\phi\left(\widetilde{r}^{\omega=B,\lambda}(\emptyset)-\widetilde{r}^{\omega=B,\lambda}(B)\right)}{\rho^{\omega=B}(\emptyset)-\rho^{\omega=B}(B)}\right\} \blacksquare \tag{C.55}$$

C.13 Proposition 10

An equilibrium where a competent member biased against the state of the world abstains can be sustained only if:

$$U^{\beta_i=A,\lambda}(v_i=\emptyset, s_i=B) \geq \max\{U^{\beta_i=A,\lambda}(v_i=B, s_i=B), U^{\beta_i=A,\lambda}(v_i=A, s_i=B)\}$$

or

$$U^{\beta_i=B,\lambda}(v_i=\emptyset, s_i=A) \geq \max\{U^{\beta_i=B,\lambda}(v_i=A, s_i=A), U^{\beta_i=B,\lambda}(v_i=B, s_i=A)\}$$

After some algebra, we can rewrite the above conditions as:

$$-\frac{\phi\left(\widetilde{r}^{\omega=B,\lambda}(\emptyset)-\widetilde{r}^{\omega=B,\lambda}(B)\right)}{\rho^{\omega=B}(\emptyset)-\rho^{\omega=B}(B)} \leq \gamma-\alpha \leq \frac{\phi(\widetilde{r}^{\omega=B,\lambda}(\emptyset)-\widetilde{r}^{\omega=B,\lambda}(A))}{\rho^{\omega=B}(A)-\rho^{\omega=B}(\emptyset)} \tag{C.56}$$

or

$$-\frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(\emptyset)-\widetilde{r}^{\omega=A,\lambda}(A)\right)}{\rho^{\omega=A}(A)-\rho^{\omega=A}(\emptyset)} \leq \gamma-\alpha \leq \frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(\emptyset)-\widetilde{r}^{\omega=A,\lambda}(B)\right)}{\rho^{\omega=A}(\emptyset)-\rho^{\omega=A}(B)} \tag{A.57}$$

Thus, the difference in absolute terms between the parameters α and γ cannot be too large. In fact, note that if α is much larger than γ, then the agent would have an incentive to vote for the correct alternative, whereas if γ is much larger than α, then the agent would have an incentive to vote in accordance with his bias. This proves part (i) of the proposition.

Next, suppose, for concreteness, that the state of the world is A and assume that a competent member biased towards B abstains in equilibrium, so that we must have:

$$U^{\beta_i=B,\lambda}(v_i=\emptyset, s_i=A) \geq U^{\beta_i=B,\lambda}(v_i=B, s_i=A) \tag{C.58}$$

Note that the above expression can be written as:

$$\phi\widetilde{r}^{\omega=A,\lambda}(\emptyset)+\rho^{\omega=A}(\emptyset)\alpha+\left(1-\rho^{\omega=A}(\emptyset)\right)\gamma \geq \phi\widetilde{r}^{\omega=A,\lambda}(B)+\rho^{\omega=A}(B)\alpha+\left(1-\rho^{\omega=A}(B)\right)\gamma$$

and re-arranging we get:

$$\phi(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(B)) + \left(\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)\right)\alpha \geq \left(\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)\right)\gamma$$

Observe that since the righ-hand side is positive, it must be the case that:

$$\phi(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(B)) + \left(\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)\right)\alpha \geq -\left(\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)\right)\gamma$$

Finally, the above inequality can be re-expressed as:

$$\phi\widetilde{r}^{\omega=A,\lambda}(\emptyset) + \rho^{\omega=A}(\emptyset)(\alpha+\gamma) \geq \phi\widetilde{r}^{\omega=A,\lambda}(B) + \rho^{\omega=A}(B)(\alpha+\gamma),$$

so that:

$$U^{\beta_i=A,\lambda}(v_i=\emptyset, s_i=A) > U^{\beta_i=A,\lambda}(v_i=B, s_i=A) \tag{C.59}$$

Therefore, a competent member biased towards A would never have the incentive to vote against the state of the world in this case. A similar argument applies to when the state of the world is B. This proves part (ii) of the proposition.

Next, suppose that beliefs are monotone, i.e. $\widetilde{r}^{\omega,\lambda}(v_i=\omega) \geq \widetilde{r}^{\omega,\lambda}(v_i \neq \omega)$ for $\omega \in \{A, B\}$. Note that, in this case, conditions $(C.56)$ and $(A.57)$ can rewritten as:

$$\alpha + \underbrace{\frac{\phi\left(\widetilde{r}^{\omega=B,\lambda}(B) - \widetilde{r}^{\omega=B,\lambda}(\emptyset)\right)}{\rho^{\omega=B}(\emptyset) - \rho^{\omega=B}(B)}}_{\geq 0} \leq \gamma \leq \alpha + \frac{\phi(\widetilde{r}^{\omega=B,\lambda}(\emptyset) - \widetilde{r}^{\omega=B,\lambda}(A))}{\rho^{\omega=B}(A) - \rho^{\omega=B}(\emptyset)} \tag{C.60}$$

or

$$\alpha + \underbrace{\frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(A) - \widetilde{r}^{\omega=A,\lambda}(\emptyset)\right)}{\rho^{\omega=A}(A) - \rho^{\omega=A}(\emptyset)}}_{\geq 0} \leq \gamma \leq \alpha + \frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(B)\right)}{\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)}, \tag{C.61}$$

Therefore, the equilibrium can only exist if either $\frac{\phi(\widetilde{r}^{\omega=B,\lambda}(\emptyset) - \widetilde{r}^{\omega=B,\lambda}(A))}{\rho^{\omega=B}(A) - \rho^{\omega=B}(\emptyset)} \geq 0$ or $\frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(B)\right)}{\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)} \geq 0$, that is a necessary (but not sufficient) condition for the equilibrium to exist is:

$$\widetilde{r}^{\omega=B,\lambda}(\emptyset) \geq \widetilde{r}^{\omega=B,\lambda}(A)$$

or

$$\widetilde{r}^{\omega=A,\lambda}(\emptyset) \geq \widetilde{r}^{\omega=A,\lambda}(B)$$

Assuming that the equilibrium exists, it must be the case (necessary condition) that:

$$\underline{\gamma}^{\lambda}_{abst}(\alpha, \phi, \sigma, n) \leq \gamma \leq \overline{\gamma}^{\lambda}_{abst}(\alpha, \phi, \sigma, n), \tag{C.62}$$

where the thresholds $\underline{\gamma}^{\lambda}_{abst}$ and $\overline{\gamma}^{\lambda}_{abst}$ can be defined as:

$$\underline{\gamma}^{\lambda}_{abst}(\alpha,\phi,\sigma,n) \equiv \min\left\{\alpha + \frac{\phi\left(\widetilde{r}^{\omega=B,\lambda}(B) - \widetilde{r}^{\omega=B,\lambda}(\emptyset)\right)}{\rho^{\omega=B}(\emptyset) - \rho^{\omega=B}(B)}, \alpha + \frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(A) - \widetilde{r}^{\omega=A,\lambda}(\emptyset)\right)}{\rho^{\omega=A}(A) - \rho^{\omega=A}(\emptyset)}\right\}$$

and

$$\overline{\gamma}^{\lambda}_{abst}(\alpha,\phi,\sigma,n) \equiv \max\left\{\alpha + \frac{\phi(\widetilde{r}^{\omega=B,\lambda}(\emptyset) - \widetilde{r}^{\omega=B,\lambda}(A))}{\rho^{\omega=B}(A) - \rho^{\omega=B}(\emptyset)}, \alpha + \frac{\phi\left(\widetilde{r}^{\omega=A,\lambda}(\emptyset) - \widetilde{r}^{\omega=A,\lambda}(B)\right)}{\rho^{\omega=A}(\emptyset) - \rho^{\omega=A}(B)}\right\},$$

where $\underline{\gamma}^{\lambda}_{abst}(\alpha,\phi,\sigma,n)$ and $\overline{\gamma}^{\lambda}_{abst}(\alpha,\phi,\sigma,n)$ are both larger than α. Furthermore, if the equilibrium exists, there must be at least one state of the world $\omega \in \{A, B\}$ such that:

$$\widetilde{r}^{\omega,\lambda}_{abst}(v_i = \emptyset) \geq \widetilde{r}^{\omega,\lambda}_{abst}(v_i = \sim \omega),$$

where $\sim \omega$ denotes a vote against the state of the world, for otherwise conditions $(C.60)$ and $(C.61)$ would certainly not hold. Thus, from the "dilution effect" (see inequality $(C.47)$ in Proposition 8), it follows that:

$$\widetilde{r}^{\omega,\mathtt{p}}_{abst}(v_i = \omega) - \widetilde{r}^{\omega,\mathtt{p}}_{abst}(v_i = \emptyset) \geq \widetilde{r}^{\omega,\mathtt{s}}_{abst}(v_i = \omega) - \widetilde{r}^{\omega,\mathtt{s}}_{abst}(v_i = \emptyset)$$

and

$$\widetilde{r}^{\omega,\mathtt{p}}_{abst}(v_i = \emptyset) - \widetilde{r}^{\omega,\mathtt{p}}_{abst}(v_i = \sim \omega) \geq \widetilde{r}^{\omega,\mathtt{s}}_{abst}(v_i = \emptyset) - \widetilde{r}^{\omega,\mathtt{s}}_{abst}(v_i = \sim \omega)$$

Therefore, we have:

$$\underline{\gamma}^{\mathtt{s}}_{abst}(\alpha,\phi,\sigma,n) \leq \underline{\gamma}^{\mathtt{p}}_{abst}(\alpha,\phi,\sigma,n)$$

and

$$\overline{\gamma}^{\mathtt{s}}_{abst}(\alpha,\phi,\sigma,n) \leq \overline{\gamma}^{\mathtt{p}}_{abst}(\alpha,\phi,\sigma,n),$$

which proves part (iii) of the proposition. ∎

Appendix D. Model for Lab Experiment

Consider a committee of three members, $n = 3$, with uniform prior, $q = \frac{1}{2}$, and symmetric distribution of both bias, $p = \frac{1}{2}$, and competence types, $\sigma = \frac{1}{2}$. Assume that the career concern reward associated with a correct vote is exogenous and given by R^{λ} for $\lambda \in \{\mathtt{p},\mathtt{s}\}$.

D.1 Fully Competent Equilibrium

Suppose that all committee members act in accordance with a fully competent equilibrium and consider the behavior of a competent member biased against the state of the world. Note that for agents of this type the expected utility of voting in accordance with the state of the world is:

$$U^{\beta,\lambda}_{full}\left(v_i = s_i, s_i \neq \beta\right) = \alpha + R^{\lambda},$$

while the expected utility of voting in accordance with his or her bias is:

$$U_{full}^{\beta,\lambda}\left(v_i=\beta,s_i\neq\beta\right)=\frac{1}{2}\alpha+\frac{1}{2}\gamma$$

Therefore, the condition for a competent member to always prefer to vote correctly in equilibrium is:

$$\alpha+R^{\lambda}\geq\frac{1}{2}\alpha+\frac{1}{2}\gamma\ \Rightarrow\ \gamma\leq\alpha+2R^{\lambda} \tag{D.1}$$

Now, consider the behavior of an incompetent member. Observe that for agents of this type the expected utility of abstaining is:

$$U_{full}^{\beta,\lambda}\left(v_i=\emptyset,s_i=\emptyset\right)=\frac{7}{8}\alpha+\frac{1}{2}\gamma,$$

while the expected utility of voting in accordance with his or her bias is:

$$U_{full}^{\beta,\lambda}\left(v_i=\beta,s_i=\emptyset\right)=\frac{3}{4}\alpha+\frac{3}{4}\gamma+\frac{1}{2}R^{\lambda}$$

Thus, the condition for an incompetent member to always prefer to abstain in equilibrium is:

$$\frac{7}{8}\alpha+\frac{1}{2}\gamma\geq\frac{3}{4}\alpha+\frac{3}{4}\gamma+\frac{1}{2}R^{\lambda}\ \Rightarrow\ \gamma\leq\frac{1}{2}\alpha-2R^{\lambda} \tag{D.2}$$

Finally, note that the condition on incompetent members $(D.2)$ is always harder to satisfy than condition on competent members $(D.1)$, so that a fully competent equilibrium can be sustained if, and only if:

$$\gamma\leq\frac{1}{2}\alpha-2R^{\lambda} \tag{D.3}$$

D.2 Partially Competent Equilibrium

Next, suppose that all committee members act in accordance with a partially competent equilibrium and consider the behavior of a competent member biased against the state of the world. Note that for agents of this type the expected utility of voting in accordance with the state of the world is:

$$U_{part}^{\beta,\lambda}\left(v_i=s_i,s_i\neq\beta\right)=\frac{15}{16}\alpha+\frac{1}{16}\gamma+R^{\lambda},$$

while the expected utility of voting in accordance with his or her bias is:

$$U_{part}^{\beta,\lambda}\left(v_i=\beta,s_i\neq\beta\right)=\frac{9}{16}\alpha+\frac{7}{16}\gamma$$

Therefore, the condition for a competent member to always prefer to vote correctly in equilibrium is:

$$\frac{15}{16}\alpha+\frac{1}{16}\gamma+R^{\lambda}\geq\frac{9}{16}\alpha+\frac{7}{16}\gamma\ \Rightarrow\ \gamma\leq\alpha+\frac{8}{3}R^{\lambda} \tag{D.4}$$

Now, consider the behavior of an incompetent member. Observe that for agents of this type the expected utility of abstaining is:

$$U^{\beta,\lambda}_{part}\left(v_i = \emptyset, s_i = \emptyset\right) = \frac{3}{4}\alpha + \frac{1}{2}\gamma,$$

while the expected utility of voting in accordance with his or her bias is:

$$U^{\beta,\lambda}_{part}\left(v_i = \beta, s_i = \emptyset\right) = \frac{3}{4}\alpha + \frac{11}{16}\gamma + \frac{1}{2}R^{\lambda}$$

Thus, the condition for an incompetent member to prefer to vote in accordance with his bias rather than to abstain is given by:

$$\frac{3}{4}\alpha + \frac{11}{16}\gamma + \frac{1}{2}R^{\lambda} \geq \frac{3}{4}\alpha + \frac{1}{2}\gamma \;\Rightarrow\; \frac{3}{16}\gamma + \frac{1}{2}R^{\lambda} \geq 0 \tag{D.5}$$

Note that this condition is always satisfied, so that we can guarantee that incompetent members do not have any incentive to deviate from the equilibrium.

Therefore, it follows that a partially competent equilibrium can be sustained if, and only if:

$$\gamma \leq \alpha + \frac{8}{3}R^{\lambda} \tag{D.6}$$

D.3 Biased Equilibrium

Finally, suppose that all committee members act in accordance with a biased equilibrium and consider the behavior of a competent member biased against the state of the world. Note that for agents of this type the expected utility of voting in accordance with the state of the world is:

$$U^{\beta,\lambda}_{bias}\left(v_i = s_i, s_i \neq \beta\right) = \frac{3}{4}\alpha + \frac{1}{4}\gamma + R^{\lambda},$$

while the expected utility of voting in accordance with his or her bias is:

$$U^{\beta,\lambda}_{bias}\left(v_i = \beta, s_i \neq \beta\right) = \frac{1}{4}\alpha + \frac{3}{4}\gamma$$

Therefore, the condition for a competent member to always prefer to vote for his or her bias in equilibrium is:

$$\frac{3}{4}\alpha + \frac{1}{4}\gamma + R^{\lambda} \leq \frac{1}{4}\alpha + \frac{3}{4}\gamma \;\Rightarrow\; \gamma \geq \alpha + 2R^{\lambda} \tag{D.7}$$

Next, consider the behavior of an incompetent member. Observe that for agents of this type the expected utility of abstaining is:

$$U^{\beta,\lambda}_{bias}\left(v_i = \emptyset, s_i = \emptyset\right) = \frac{1}{2}\alpha + \frac{1}{2}\gamma,$$

while the expected utility of voting in accordance with his bias is:

$$U_{bias}^{\beta,\lambda}\left(v_i=\beta, s_i=\emptyset\right)=\frac{1}{2}\alpha+\frac{3}{4}\gamma+\frac{1}{2}R^{\lambda}$$

Thus, the condition for an incompetent member to prefer to vote in accordance with his bias rather than to abstain is given by:

$$\frac{1}{2}\alpha+\frac{3}{4}\gamma+\frac{1}{2}R^{\lambda}\geq\frac{1}{2}\alpha+\frac{1}{2}\gamma \;\Rightarrow\; \frac{1}{4}\gamma+\frac{1}{2}R^{\lambda}\geq 0 \tag{D.8}$$

Note that this condition is always satisfied, so that, consistently with Lemma 3, incompetent members do not have any incentive to deviate from the equilibrium in this case.

Therefore, it follows that a biased equilibrium can be sustained if, and only if:

$$\gamma\geq\alpha+2R^{\lambda} \;\blacksquare \tag{D.9}$$

Appendix E. Experiment Instructions

This section presents the English version of the experiment instructions for treatments Low/Secret and Low/Public.[11] See Figures E.1 and E.2 for a depiction of the two main screens of the experiment.

Instructions

Thank you for your participation! The goal of this study is to investigates how people make decisions in group. You will be paid 2 euros for your presence. Your total earnings will depend partly on your decisions, partly on the decisions of other participants, and partly on chance. Your gains will be calculated in points and will be converted in euros at the rate of 1 euro per 80 points. You will be paid in cash at the end of the experiment.

During the experiment, you are not allowed to communicate with anyone. Please turn off your cell phone. If you have any question, please raise your hand.

This study is divided in 2 parts. We will begin by reading the instructions for the first part. Please, pay careful attention. After the instructions are read, there will be a short comprehension quiz.

First Part

This part consists of 32 rounds. The first two rounds are practice rounds and will not be paid. All other rounds are paid.

[11] The full set of instructions in Italian is available upon request.

Groups. We begin every round by randomly dividing you into groups of three people. Every group receives one color: Blue or Yellow. In each round, your group's color may be Blue or Yellow with equal probability. The color of your group may be different from the colors of other groups and may change from one round to another. The computer will randomly choose your group's color in every round. Some people observe their group's color, while others do not.

Votes. In each round, your group will choose one color by voting. Each member of the group may vote for Blue, vote for Yellow or abstain. Whichever color receives more votes is the group's choice. Ties are broken randomly by the computer. Examples:

i. If the number of votes for Blue is 2, the number of votes for Yellow is 1 and the number of abstentions is 0, then Blue is the group's choice;

ii. If the number of votes for Blue is 0, the number of votes for Yellow is 2 and the number of abstentions is 1, then Yellow is the group's choice;

iii. If the number of votes for Blue is 1, the number of votes for Yellow is 1 and the number of abstentions is 1, then we have a tie and the group's choice will be Blue or Yellow with equal probability;

iv. If all members of the group abstain, then we have a tie and the group's choice will be Blue or Yellow with equal probability.

Messages. Before voting, each of you will receive a message that may reveal the color of your group. There are three types of message.

1. The message says: "*The color of your group is Blue.*" In this case, you know for sure that your group's color is Blue.
2. The message says: "*The color of your group is Yellow.*" In this case, you know for sure that your group's color is Yellow.
3. The message says: "*The color of your group is Blue or Yellow with equal probability.*" In this case, the message does not provide any additional information with respect to what was already known.

Messages 1 and 2 are informative messages, while the third one is an uninformative message. In every round, half of the people in this room will receive an uninformative message, while the other half will receive an informative message and, therefore, will know exactly what is the color of their groups. For every group, there are four possible cases.

1. All members of the group know the group's color;
2. Two members of the group know the group's color while one member does not know;

3. One member of the group knows the group's color while two members do not know;
4. No member of the group knows the group's color.

Why does your vote matter? Your payoff in a given round depends on the choice made by your group, which is the color that receives the largest number of votes. If your group chooses the alternative that matches your group's color, then all members of the group receive 10 points; otherwise, everyone receives zero points.

Roles. Your payoff also involves an additional component that depends on your "role". In every round, the computer will randomly assign a role to each of you, which can be either Blue or Yellow. In every round, half of the people in this room will receive the Blue role and the other half will receive the Yellow role. Your role in a given round does not depend on the role of other members of your group nor on your role in previous rounds. For a given group, the number of members with the Blue role can be 3, 2, 1 or none. Your role is not known by anyone except you. If your group's choice is equal to your role, then you receive 1 extra point; otherwise, you receive no extra point.

Examples. Suppose that your role is Blue. The following table summarizes all possible payoffs in this case:

	Group's Color	Group's Choice	Group's Choice = Group's Color		Group's Choice = Role	Total Payoff
i	Blue	Blue	10	+	1	11
ii	Yellow	Yellow	10	+	0	10
iii	Yellow	Blue	0	+	1	1
iv	Blue	Yellow	0	+	0	0

The first line corresponds to the case where your group's color is Blue and your group's choice is Blue. In this case, your total payoff is 11 points: 10 points because your group's choice is equal to your group's color plus 1 extra point because your group's choice is equal to your role. In the second line, we have, instead, the case where your group's color is Yellow and your group's choice is Yellow. In this case, your total payoff is 10 points because your group's choice is equal to your group's color but not equal to your role. Next, in the third line, your group's color is Yellow and your group's choice is Blue. In this case, your total payoff is 1 point because your group's choice is equal to your role, but not equal to your group's color. Finally, in the fourth line, your payoff is zero, because your group's choice is neither equal to your group's color nor to your role.

Similarly, suppose that your role is Yellow. The following table summarizes all possible payoffs in this case:

	Group's Color	Group's Choice	Group's Choice = Group's Color		Group's Choice = Role	Total Payoff
i	Yellow	Yellow	10	+	1	11
ii	Blue	Blue	10	+	0	10
iii	Blue	Yellow	0	+	1	1
iv	Yellow	Blue	0	+	0	0

The first line corresponds to the case where your group's color is Yellow and your group's choice is Yellow. In this case, your total payoff is 11 points: 10 points because your group's choice is equal to your group's color plus 1 extra point because your group's choice is equal to your role. In the second line, we have, instead, the case where your group's color is Blue and your group's choice is Blue. In this case, your total payoff is 10 points because your group's choice is equal to your group's color but not equal to your role. Next, in the third line, your group's color is Blue and your group's choice is Yellow. In this case, your total payoff is 1 point because your group's choice is equal to your role, but not equal to your group's color. Finally, in the fourth line, your payoff is zero, because your group's choice is neither equal to your group's color nor to your role.

Summary. To conclude, please remember the following information.

- At the beginning of each round, you will see a screen with information about your message and your role.
- In every round, the number of members of your group who know the group's color can be 3, 2, 1 or none.
- In every round, the number of members of your group with the Blue role can be 3, 2, 1 or none.
- You can vote for Blue, vote for Yellow or abstain. Remember that the group's choice is taken by majority and that ties are broken randomly by the computer.
- After every round, you will be able to see what were your group's color and choice in that round. You will also receive information about your payoff and how many members of your group voted for Blue, voted Yellow and abstained.
- Your payoff in every round is determined by the sum of two components:

If your group's choice is equal to your group's color, then all members of the group earn 10 points. Otherwise, everyone gets zero points.

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If your group's choice is equal to your role, then you earn 1 extra point. Otherwise, you get zero extra points.

- Remember that the decision of each group is independent of the decisions of other groups and that new groups are formed randomly in every round.

Second Part

The second part of the experiment is almost exactly the same as the first part, with a single difference. In the first part, your payoff depended on your group's choice, your group's color and your role. In this part of the experiment, your payoff will depend on your group's choice, your group's color, your role and on *how you vote*. In particular, if you vote for your group's color, you will now earn 9 extra points. Otherwise, if you vote for a color that is different than your group's color or if you abstain, you will earn zero extra points. For example, if you vote for Yellow and your group's color is Yellow, then you receive 9 extra points independently of what your group chooses. Remember that you still earn 10 points if your group's choice is equal to your group's color and 1 extra point if your group's choice is equal to your role.

Examples. Suppose that your role is Blue and that you voted for Blue. The following table summarizes all possible payoffs in this case:

	Group's Color	Group's Choice	Group's Choice = Group's Color		Group's Choice = Role		Vote = Group's Color	Total Payoff
i	Blue	Blue	10	+	1	+	9	20
ii	Yellow	Yellow	10	+	0	+	0	10
iii	Yellow	Blue	0	+	1	+	0	1
iv	Blue	Yellow	0	+	0	+	9	9

The first line corresponds to the case where your group's color is Blue and your group's choice is Blue. In this case, your total payoff is 20 points. You earn 10 points because your group's choice is equal to your group's color plus 1 extra point because your group's choice is equal to your role. These two components of your payoff are exactly the same as in the first part of the experiment, but now you also earn 9 extra points because you voted for your group's color. In the second line, we have, instead, the case where your group's color is Yellow and your group's choice is Yellow. In this case, your total payoff is 10 points because your group's choice is equal to your group's color, but not equal to your role, and you did not vote for your group's color. Next, in the third line, your group's color is Yellow and your group's choice is Blue. In this case, your total payoff is 1 point because your group's choice is equal to your role, but not equal to your group's color, and you did not vote for your group's color. Finally, in the fourth line, your payoff is 9, because you voted for your group's color, but your group's choice is neither equal to your group's color nor to your role.

Similarly, suppose that your role is Blue and that you voted for Yellow. The following table summarizes all possible payoffs in this case:

	Group's Color	Group's Choice	Group's Choice = Group's Color		Group's Choice = Role		Vote = Group's Color	Total Payoff
i	Blue	Blue	10	+	1	+	0	11
ii	Yellow	Yellow	10	+	0	+	9	19
iii	Yellow	Blue	0	+	1	+	9	10
iv	Blue	Yellow	0	+	0	+	0	0

The first line corresponds to the case where your group's color is Blue and your group's choice is Blue. In this case, your total payoff is 11 points, because your group's choice is equal to your group's color and to your role, but you did not vote for your group's color. In the second line, we have, instead, the case where your group's color is Yellow and your group's choice is Yellow. In this case, your total payoff is 19 points; $10 + 0$ points because your group's choice is equal to your group's color, but not equal to your role, plus 9 extra points because you voted for your group's color. Next, in the third line, your group's color is Yellow and your group's choice is Blue. In this case, your total payoff is 10 point because your group's choice is equal to your role, but not equal to your group's color, and you voted for your group's color. Finally, in the fourth line, your payoff is zero, because you did not vote for your group's color and your group's choice is neither equal to your group's color nor to your role.

Finally, suppose that your role is Blue and that you abstained. The following table summarizes all possible payoffs in this case:

	Group's Color	Group's Choice	Group's Choice = Group's Color		Group's Choice = Role		Vote = Group's Color	Total Payoff
i	Blue	Blue	10	+	1	+	0	11
ii	Yellow	Yellow	10	+	0	+	0	10
iii	Yellow	Blue	0	+	1	+	0	1
iv	Blue	Yellow	0	+	0	+	0	0

The first line corresponds to the case where your group's color is Blue and your group's choice is Blue. In this case, your total payoff is 11 points, because your group's choice is equal to your group's color and to your role, but you did not vote for your group's color. In the second line, we have, instead, the case where your group's color is Yellow and your group's choice is Yellow. In this case, your total payoff is 10 points, because your group's choice is equal to your group's color, but not equal to your role, and you did not vote for your group's color. Next, in the third line, your group's color is Yellow and your group's choice is Blue. In this case, your total payoff is 1 point because your group's choice is equal to your role, but not equal to your group's color, and you did not vote for your group's color. Finally, in the fourth line, your payoff is zero, because you did not vote for your group's color and your group's choice is neither equal to your group's color nor to your role.

In a similar way, you can calculate your payoffs in case your role is Yellow.

Summary. To conclude, please remember the following information.

- At the beginning of each round, you will see a screen with information about your message and your role.
- In every round, the number of members of your group who know the group's color can be 3, 2, 1 or none.
- In every round, the number of members of your group with the Blue role can be 3, 2, 1 or none.
- You can vote for Blue, vote for Yellow or abstain. Remember that the group's choice is taken by majority and that ties are broken randomly by the computer.
- After every round, you will be able to see what were your group's color and choice in that round. You will also receive information about your payoff and how many members of your group voted for Blue, voted Yellow and abstained.
- Your payoff in every round is determined by the sum of three components:

If your group's choice is equal to your group's color, then all members of the group earn 10 points. Otherwise, everyone gets zero points.

+

If your group's choice is equal to your role, then you earn 1 extra point. Otherwise, you get zero extra points.

+

If your vote is equal to your group's color, then you earn 9 extra points. Otherwise, you get zero extra points.

- Remember that the decision of each group is independent of the decisions of other groups and that new groups are formed randomly in every round.

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Online Appendix: Tables

Treatment	Periods	Obs	Uninformed Voters		
			Abstention (%)	Bias (%)	Against-Bias (%)
Low/Secret	1 – 10	360	39.17	50.56	10.28
	11 – 20	360	45.00	44.72	10.28
	21 – 30	360	48.33	43.33	8.33
Low/Public	1 – 10	360	19.44	65.28	15.28
	11 – 20	360	16.67	66.94	16.39
	21 – 30	360	20.83	62.22	16.94
High/Secret	1 – 10	360	11.11	85.83	3.06
	11 – 20	360	10.00	87.22	2.78
	21 – 30	360	6.94	90.83	2.22
High/Public	1 – 10	360	6.39	86.39	7.22
	11 – 20	360	6.11	82.50	11.39
	21 – 30	360	5.00	83.89	11.11

Table B.1. Learning Effects: Uninformed Subjects

Treatment	Periods	Obs	Informed Voters with Signal ≠ Bias		
			Signal (%)	Bias (%)	Abstention (%)
Low/Secret	1 – 10	180	94.44	1.67	3.89
	11 – 20	171	96.49	0.58	2.92
	21 – 30	169	97.04	2.37	0.59
Low/Public	1 – 10	178	96.07	3.93	0.00
	11 – 20	168	97.62	2.38	0.00
	21 – 30	178	99.44	0.56	0.00
High/Secret	1 – 10	170	25.88	61.18	12.94
	11 – 20	172	23.26	64.53	12.21
	21 – 30	175	16.57	64.57	18.86
High/Public	1 – 10	186	80.11	17.20	2.69
	11 – 20	192	81.25	14.06	4.69
	21 – 30	200	92.00	5.00	3.00

Table B.2. Learning Effects: Informed Subjects

Sequence	Treatment	Obs	Uninformed Voters		
			Abstention (%)	Bias (%)	Against-Bias (%)
Low/Secret – Low/Public	Low/Secret	810	47.65	43.46	8.89
	Low/Public	810	22.59	61.85	15.56
Low/Public – Low/Secret	Low/Secret	270	33.70	54.44	11.85
	Low/Public	270	8.15	73.70	18.15
High/Secret – High/Public	High/Secret	720	11.39	85.69	2.92
	High/Public	720	5.28	83.33	11.39
High/Public – High/Secret	High/Secret	360	5.28	92.50	2.22
	High/Public	360	6.94	86.11	6.94

Table B.3. Sequencing Effects: Uninformed Subjects

Sequence	Treatment	Obs	Informed Voters with Signal ≠ Bias		
			Signal (%)	Bias (%)	Abstention (%)
Low/Secret – Low/Public	Low/Secret	394	95.69	1.27	3.05
	Low/Public	390	97.69	2.31	0.00
Low/Public – Low/Secret	Low/Secret	126	96.83	2.38	0.79
	Low/Public	134	97.76	2.24	0.00
High/Secret – High/Public	High/Secret	341	13.49	70.38	16.13
	High/Public	395	82.28	14.43	3.29
High/Public – High/Secret	High/Secret	176	38.07	50.00	11.93
	High/Public	183	89.62	6.56	3.83

Table B.4. Sequencing Effects: Informed Subjects

Online Appendix: Figures

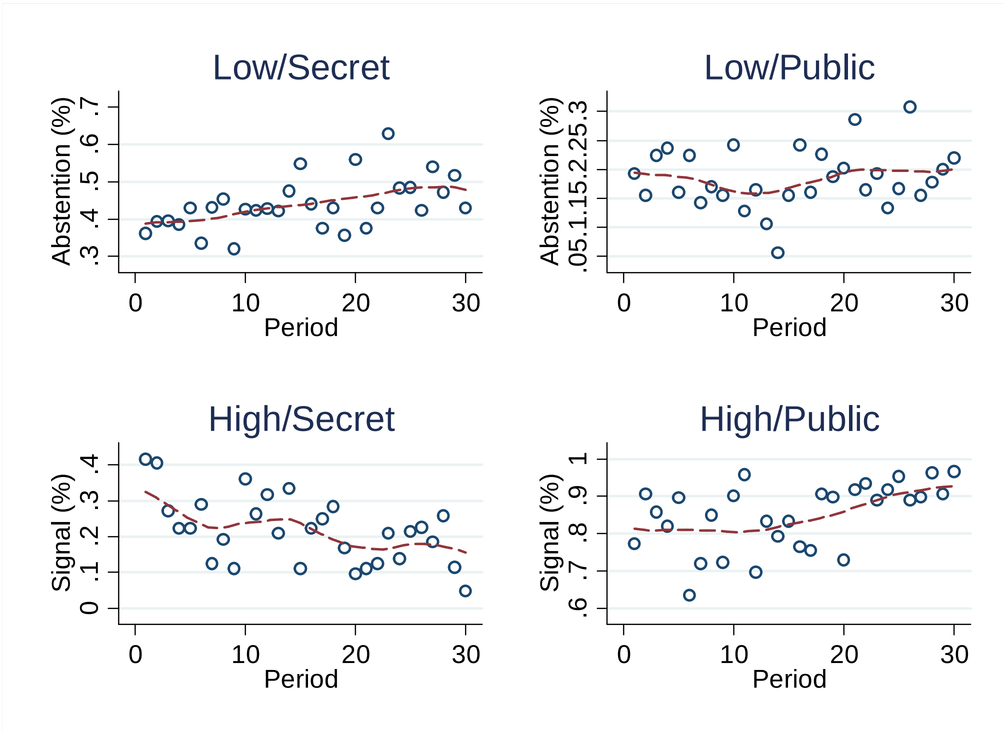

Figure B.1. Learning Across Treatments

Figure E.1. Voting Screen

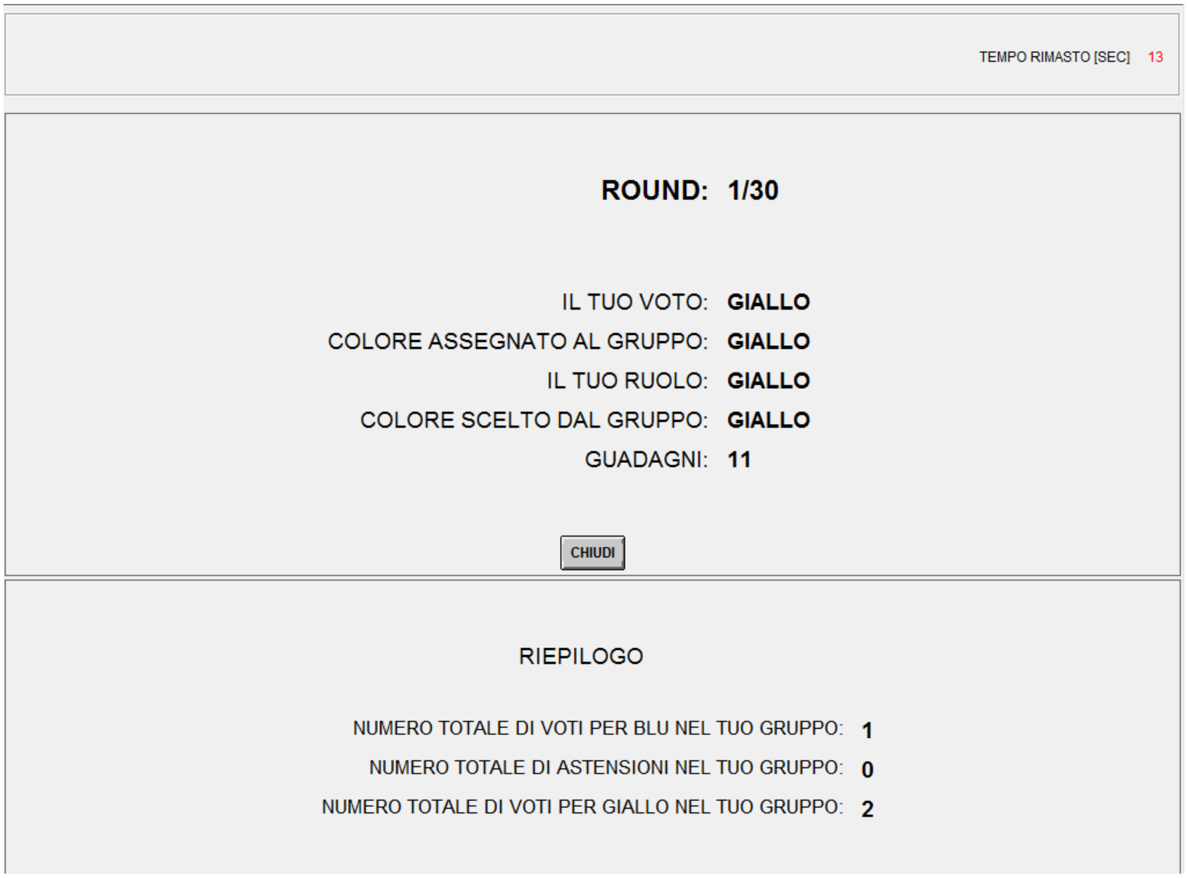

Figure E.2. Feedback Screen