Committees

D. Carlos Akkar*

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COMMENTS ON!

Abstract

Orange notes: for Ian & Dan.

Green notes: for me (but Ian & Dan should feel free to chime in!).

*Nuffield College and Department of Economics, Oxford. akkarcarlos@gmail.com

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1 Introduction

2 The Model

A committee of N *members*, $m_1, ..., m_N$, wish to decide whether to *enact* or *block* a policy. The benefit a member m_i obtains from enacting the policy depends on an unknown state of the world, $\omega \in \{\omega_0, \omega_1\}$. When the state is favourable, $\omega = \omega_1$, she obtains a payoff of $u_i \geq 0$ from enacting the policy. When the state is unfavourable, $\omega = \omega_0$, she incurs a payoff loss of 1 instead. Blocking the policy, in contrast, yields her a payoff of 0 in either state. There is also a *lobbyist* outside the committee. He prefers the policy to be enacted regardless of the state.

At the outset of the game, the lobbyist and committee members share the prior belief that $\omega = \omega_1$ with probability $p \in [0, 1]$. The lobbyist can then provide additional *public* information about the state. He does so by committing to perform and publicly disclose the outcome of an (Blackwell) experiment of his choosing. Formally, an experiment is comprised of a measurable space $(X, \mathcal{X})$ and, for each possible state ω_k, a probability measure P_k over it. Upon observing the outcome of the lobbyist's experiment, players use Bayes Rule to update their prior belief p that $\omega = \omega_1$ to an *interim belief* $r \in [0, 1]$.

I follow a *belief-based approach*[1] and model the lobbyist as directly choosing the distribution μ_l his experiment will induce over interim beliefs. The distribution μ_l must be *Bayes plausible*; i.e., $\mu_l \in \Delta_p([0, 1])$, where:

$$\Delta_p([0,1]) := \left\{ \mu \in \Delta([0,1]) : \int_0^1 r d\mu(r) = p \right\} \qquad \Delta([0,1]) := \underset{p \in [0,1]}{\cup} \Delta_p([0,1])$$

After the lobbyist reveals the outcome of his experiment, each committee member acquires additional information about the state. She does so by choosing an additional experiment whose outcome she observes. Committee members acquire this additional information *privately*: neither the experiment m_i chooses to perform nor its outcome are disclosed to anyone.

Following the outcome of her experiment, m_i updates her interim belief r to a *posterior belief* $q_i \in [0, 1]$ that $\omega = \omega_1$. Again, I model each member m_i as choosing the distribution $\mu_i(. \mid r) \in \Delta_r([0, 1])$ her experiment will induce over her posterior beliefs, given her interim belief r. Conditional on the true state ω, the outcomes of members' chosen experiments are independent.

meaningless to wonder about corr. between exp.s—info. acq. is private? introducing correlation only strengthens result, though.

Producing and providing public information is costless for the lobbyist. In contrast, acquiring private information is costly for committee members: m_i must pay a cost $C_i(\mu)$ to observe the outcome of an experiment which induces the distribution μ over her possible posterior beliefs. The

[1]See Kamenica and Gentzkow 2011 and Caplin and Dean 2013.

cost function $C_i : \Delta([0,1]) \to \mathbb{R}^+$ is *uniformly posterior separable*[2]; i.e., there is a convex function $c_i : [0,1] \to \mathbb{R}^+$ whose effective domain contains $(0,1)$, such that[3]:

is it ok that i assume $\infty - \infty = \infty$?

check if this truly squares with CDL

$$C_i(\mu) := \begin{cases} 0 & \text{for } \mu = \{\delta_0, \delta_1\} \\ \int c_i(q) d\mu(q) - c_i\left(\mathbb{E}_\mu[q]\right) & \text{otherwise} \end{cases}$$

Finally, each committee member casts a private vote into a *voting mechanism.* A voting mechanism is a tuple $\left(D, \{V_i\}_{i=1}^N, \{\mathcal{V}_i\}_{i=1}^N\right)$ where $V_i \ni v_i$ is a set of possible votes each member m_i may cast, $\mathcal{V}_i$ is the σ-algebra over V_i, and the *decision rule* $D : \bigtimes_{i=1}^N V_i \to [0,1]$ is a measurable mapping from the space of possible vote profiles to the probability that the policy is enacted—the *decision.* I further require that the committee's decision rule attain its maximum and minimum over its domain; i.e:

$$\exists\ \underline{\mathbf{v}}, \bar{\mathbf{v}} \in \bigtimes_{i=1}^N V_i \quad \text{such that for all } \mathbf{v} \in \bigtimes_{i=1}^N V_i \quad D(\underline{\mathbf{v}}) \leq D(\mathbf{v}) \leq D(\bar{\mathbf{v}})$$

For any given voting mechanism, I focus on the lobbyist-preferred perfect Bayesian equilibrium of this game. A perfect Bayesian equilibrium of this game consists of:

1. a voting strategy $\{\tau_i^*(. \mid q, r)\}_{(q,r)\in[0,1]^2}$ where $\tau_i^*(. \mid q, r) \in \Delta(V_i)$ for each member m_i,
2. an information strategy $\{\mu_i^*(. \mid r)\}_{r\in[0,1]}$ where $\mu_i^*(. \mid r) \in \Delta_r([0,1])$ for each member m_i, and
3. a strategy $\mu_l^* \in \Delta_p([0,1])$ for the lobbyist

such that under this fixed voting mechanism:

1. Given other members' strategies, member m_i's voting strategy maximises her expected payoff at any pair of interim and posterior beliefs $(r, q) \in [0,1]^2$; i.e.

$$\begin{aligned} & v_i \in \operatorname{supp} \tau_i^*(. \mid q, r) \\ \implies & v_i \in \underset{v \in V_i}{\operatorname{argmax}} \int_{[0,1]^{N-1}} U_i(r, q_i, \mathbf{q_{-i}}) \times \left\{ \int_{V_{-i}} D(v, \mathbf{v_{-i}}) \tau_{-i}^*(d\mathbf{v_{-i}} \mid r, \mathbf{q_{-i}}) \right\} \mu_{-\mathbf{i}}^*\left(d\mathbf{q_{-i}} \mid r, q_i\right) \end{aligned}$$

   where:

   worry: measurability; votes needn't be measurable in beliefs, eg. but: i am not claiming eqm shd ex-

   i. the product measure $\mu_{-\mathbf{i}}^*(\cdot \mid r, q_i)$ over the posterior beliefs of members $m_{j\neq i}$ is induced

[2] See, for instance, Caplin, Dean, and Leahy 2022.

[3] For notational convenience, I assume that $\infty - \infty = \infty$.

by those members information strategies, and is conditional on their interim belief r and m_i's posterior belief q_i[4],

ii. $(V_{-i}, \mathcal{V}_{-i}) := \left(\bigtimes_{j \neq i} V_j, \bigtimes_{j \neq i} \mathcal{V}_j \right)$ is the product space of votes $\mathbf{v}_{-i} \in V_{-i}$ members $m_{j \neq i}$ may submit,

iii. the product measure $\tau^*_{-i}(\cdot \mid r, \mathbf{q}_{-i}) := \bigtimes_{j \neq i} \tau^*_j(. \mid ; r, q_j)$ over the space $(V_{-i}, \mathcal{V}_{-i})$ is induced by the voting strategies of members $m_{j \neq i}$, and is conditional on their interim belief r and posterior beliefs $\mathbf{q_{-i}} \in V_{-i}$, and

iv. $U_i(r, q_i, \mathbf{q_{-i}}) := \mathbb{P}_{r,q_1,\dots q_N}(\omega_1) \times (u_i + 1) - 1$ is the payoff m_i expects from enactment given all players' information about the state, where:

$$\mathbb{P}_{r,q_1,\dots,q_N}(\omega_1) := \left(\frac{r}{1-r} \times \prod_{j=1}^{N} \frac{q_j/(1-q_j)}{r/(1-r)} \right) \times \left(1 + \frac{r}{1-r} \times \prod_{j=1}^{N} \frac{q_j/(1-q_j)}{r/(1-r)} \right)^{-1}$$

denotes the probability that $\omega = \omega_1$ given the same collection of information.

This is extremely long..?

2. Given others' strategies, member m_i's information strategy maximises her expected payoff at any interim belief r she may hold; i.e.

$$\mu^*_i(\cdot \mid r) \in \arg\max_{\mu \in \Delta_r[0,1]} \int \vartheta^*_i(r, q)\mu(dq) - C_i(\mu)$$

where $\vartheta^*_i(r, q)$ is the payoff m_i expects in the subgame where she holds the interim belief r and posterior belief q, given her ensuing voting strategy,

3. The lobbyist's information strategy μ^*_l maximises the probability that the policy is enacted given others' information and voting strategies.

can we ensure this exists? does it matter for me?

The lobbyist-preferred perfect Bayesian equilibrium (hereon, simply "equilibrium") is the perfect Bayesian equilibrium with the highest probability of enactment.

if multiple exist there, the one with lowest info costs

Dominant Voting Mechanisms

I call a voting mechanism *dominant* if it gives rise to an equilibrium that yields:

i. a (weakly) higher probability that the policy is blocked when $\omega = \omega_0$,

ii. a (weakly) higher probability that the policy is enacted when $\omega = \omega_1$, and

iii. a (weakly) lower expected cost of information acquisition for each committee member

[4]This measure is easily derived using Bayes' Rule, see Technical Appendix.

compared to any equilibrium under any other voting mechanism. A dominant voting mechanism—if it exists—yields (weakly) higher equilibrium payoffs for all committee members than any other mechanism.

This paper asks whether such a mechanism indeed exists.

3 Dictatorships

One of the simplest voting mechanisms the committee may adopt is a *dictatorship*, in which one member is delegated *exclusive* and *complete* control over the policy outcome.

Definition 1. A voting mechanism $(\overset{♛}{D}_i, \{V_j\}_{j=1}^N, \{\mathcal{V}_j\}_{j=1}^N)$ is an m_i-*dictatorship* if m_i's control over the policy outcome is:

1. *exclusive:* $\overset{♛}{D}_i(v_i, \mathbf{v}_{-i}) = \overset{♛}{D}_i(v_i, \mathbf{v}'_{-i})$ for all $v_i \in V_i$ and $\mathbf{v}_{-i}, \mathbf{v}'_{-i} \in V_{-i}$
2. *complete:* $\exists\ \underline{v}_i, \bar{v}_i \in V_i$ such that $\overset{♛}{D}_i(\underline{v}_i, \mathbf{v_{-i}}) = 0$ and $\overset{♛}{D}_i = (\bar{v}_i, \mathbf{v_{-i}}) = 1$ for any $\mathbf{v_{-i}} \in V_{-i}$.

i hope to make the point that none can be relaxed– relaxing exclusivity (override mechanisms) destroys result

Theorem 1 establishes that there is a committee member, denoted $\overset{♛}{m}$ and called the *most-demanding member*, whose dictatorship is a dominant voting mechanism. The rest of this section discusses Lemma 1, which lays the groundwork for Theorem 1 by characterising the equilibria dictatorships induce.

Lemma 1. In the equilibrium of an m_i-dictatorship:

1. m_i's voting strategy satisfies:

$$\mathbb{E}_{\tau_i^*(.|r,q)}\,\overset{♛}{D}_i = \begin{cases} 0 & \text{for } q < (1+u_i)^{-1} \\ 1 & \text{otherwise} \end{cases}$$

   at any interim belief $r \in [0,1]$.

2. m_i's information acquisition strategy $\{\mu_i^*(.\mid r)\}_{r\in[0,1]}$ is the unique one which satisfies:

$$\text{supp } \mu_i^*(.\mid r) \subseteq \left\{\min\{r, \underline{q}_i^*\}, \max\{r, \bar{q}_i{}^*\}\right\}$$

   where the threshold beliefs $\underline{q}_i^*$ and $\bar{q}_i{}^*$ satisfy $\underline{q}_i^* \leq (1+u_i)^{-1} \leq \bar{q}_i{}^*$.

3. The lobbyist's information strategy μ_l^* is the unique distribution satisfying:

$$\text{supp } \mu_l^* \subseteq \{0, \max\{p, \bar{q}_i{}^*\}\}$$

4. No member except m_i expends a positive cost to acquire information:

$$C_j\left(\mu_j^*(. \mid r)\right) = 0 \quad \text{for every } r \in [0,1]$$

In an m_i-dictatorship, m_i has exclusive control over the policy outcome, and thus exclusive influence over the lobbyist's incentives. She votes to ensure that the policy outcome maximises her expected payoff: the policy is enacted whenever she expects (weakly) positive payoff from enacting it, and it is blocked whenever she does not.

m_i's information strategy also takes a simple form, and is fully characterised by her two *thresholds of persuasion*, $\underline{q}_i^*$ and $\bar{q}_i^*$. m_i acquires additional information about the state if and only if her interim belief r falls between these thresholds. In turn, the information she acquires ensures precisely that her posterior belief equals one of these thresholds. Importantly, these thresholds of persuasion always bracket m_i's *threshold of indifference*, $(1+u_i)^{-1}$: the posterior belief which would leave her indifferent between enacting and blocking the policy. This reflects that m_i never acquires costly but "useless" information–a costly experiment whose outcome would always lead to the same vote. In contrast, m_i acquires no further information when her interim belief lies beyond these thresholds, $r \notin (\underline{q}_i^*, \bar{q_i}^*)$. Instead, she immediately takes the decision her interim belief favours. Her peers, having no influence over the outcome, never acquire costly information about the state.

explain why posterior separability helps later.

In turn, the lobbyist wishes to maximise the probability that the committee enacts the policy. In an m_i-dictatorship, this amounts to maximising the probability that m_i's posterior belief weakly exceeds her threshold of indifference, $(1+u_i)^{-1}$, so that she votes for enactment. Owing to m_i's simple information strategy, the lobbyist can restrict himself to interim beliefs beyond m_i's thresholds of persuasion, $r \notin \left(\underline{q}_i^*, \bar{q}_i^*\right)$. Interim beliefs between these thresholds merely prompt m_i to distribute her posterior beliefs back to her thresholds of persuasion, but those outside that interval prompt her to vote without acquiring further information [5].

This reduces the lobbyist's problem to a simple Bayesian Persuasion exercise a là Kamenica and Gentzkow 2011. When m_i's prior belief already exceeds her upper threshold of persuasion $\bar{q}_i^*$, the lobbyist provides no further information. m_i then almost surely enacts the policy, without acquiring any additional information herself. Otherwise, the lobbyist's information strategy either induces the interim belief 0, or $\bar{q}_i^*$. The former is more than enough to persuade m_i to block the policy. In fact, it removes any doubt that the state disfavours the policy, and as such is only induced when

[5] Matysková and Montes 2023 establish a more general version of this argument in a setting with a single "Sender" (replacing the lobbyist) and a single "Receiver" (replacing the dictator). They show that the Sender can restrict himself to interim beliefs where the Receiver acquires no further information, provided that the latter has a uniformly posterior separable cost of acquiring information.

$\omega = \omega_0$. Thus, the lobbyist ensures that m_i never blocks the policy when $\omega = \omega_1$. In contrast, the latter exactly equals m_i's upper threshold of persuasion; so when m_i enacts the policy, she never does so with more information than necessary to persuade her.

Proof, Lemma 1:

1. Since m_i has exclusive control, we can define the measurable function $\overset{♛}{f}_i : V_i \to [0,1]$ to be $\overset{♛}{f}_i(v_i) := \overset{♛}{D}_i(v_i, \mathbf{v_{-i}})$ for any arbitrary $\mathbf{v_{-i}} \in V_{-i}$. Then, $v_i \in \text{supp}$ only if:

$$\begin{aligned}
&v_i \in \arg\max_{v \in V_i} \int\limits_{[0,1]^{N-1}} U_i(r, q_i, \mathbf{q_{-i}}) \times \left\{ \int\limits_{V_{-i}} \overset{♛}{f}_i(v_i) \tau^*_{-i}(d\mathbf{v_{-i}} \mid r, \mathbf{q_{-i}}) \right\} \mu^*_{\mathbf{-i}}\left(d\mathbf{q_{-i}} \mid r, q_i\right) \\
\implies &v_i \in \arg\max_{v \in V_i} \overset{♛}{f}_i(v_i) \times \int\limits_{[0,1]^{N-1}} U_i(r, q_i, \mathbf{q_{-i}}) \mu^*_{\mathbf{-i}}\left(d\mathbf{q_{-i}} \mid r, q_i\right) \\
\implies &v_i \in \arg\max_{v \in V_i} \overset{♛}{f}_i(v_i) \times \left[q_i \times (1 + u_i) - 1\right]
\end{aligned}$$

where the last implication follows from the martingale property of posterior beliefs; i.e., $\mathbb{E}_{\mathbf{q_{-i}}} \mathbb{P}_{r, q_1, \ldots, q_N} = q_i$. Thus, $\tau^*_i(\cdot \mid r, q)$ is an equilibrium only if:

$$\mathbb{E}_{\tau^*_i(\cdot \mid r, q)} \overset{♛}{f}_i(.) = \begin{cases} 0 & q < (1 + u_i)^{-1} \\ 1 & q > (1 + u_i)^{-1} \end{cases}$$

When $q = (1 + u_i)^{-1}$, m_i is indifferent between enacting and blocking the policy, hence any vote. He must then submit the lobbyist-preferred vote; i.e., $\mathbb{E}_{\tau^*_i(\cdot \mid r, (1+u_i)^{-1})} \overset{♛}{f}_i(.) = 1$.

2. m_i only needs to decide whether to maximise or minimise the enactment probability of the policy. So, she can without loss of generality restrict to information strategies where $|\text{supp } \mu^*_i(\cdot \mid r)| \leq 2$ for all $r \in [0,1]$. Furthermore, for any interim belief, m_i can restrict herself to either acquiring no information, or acquiring information that has decision-making value; i.e., $(1 + u_i)^{-1} \in \text{conv}\left(\text{supp } \mu^*_i(\cdot \mid r)\right)$ for any $|\text{supp } \mu^*_i(\cdot \mid r)| = 2$. Lastly, note that Theorem 1 in Caplin, Dean, and Leahy 2022 implies that m_i's strategy must be *Locally Posterior Invariant* since C_i is uniformly posterior separable; i.e., for any $\tilde{r} \in \text{conv}\left(\text{supp } \mu^*_i(\cdot \mid r)\right)$, $\mu^*_i(\cdot \mid \tilde{r})$ is the unique distribution satisfying $\text{supp } \mu^*_i(\cdot \mid \tilde{r}) = \text{supp } \mu^*_i(\cdot \mid r)$.

add here that these two are outcome equivalent for the lobbyist, so also satisfy lobbyist-preferred

Letting $\left\{\underline{q}^*_i, \bar{q}^*_i\right\} := \text{supp } \mu^*_i(\cdot \mid (1 + u_i)^{-1})$ where $\underline{q}^*_i \leq \bar{q}^*_i$, we thus conclude:

   (a) for all $r \in \left[\underline{q}^*_i, \bar{q}^*_i\right]$, $\mu^*_i(\cdot \mid r)$ is the unique distribution such that $\text{supp}\mu^*_i(\cdot \mid r) = \left\{\underline{q}^*_i, \bar{q}^*_i\right\}$.

   (b) for all $r \notin \left[\underline{q}^*_i, \bar{q}^*_i\right]$, $\mu^*_{i;r} = \delta_r$.

which proves our claim.

3. Given members' voting and information strategies, let $\zeta_i^*(r)$ be the equilibrium enactment probability under the m_i-dictatorship, given the interim belief r. Denote the concave envelope of this function as $\hat{\zeta}_i{}^*(r)$. These two functions are given by:

$$\zeta_i^*(r) := \begin{cases} 0 & r \leq \underline{q}_i^* \\ \frac{r-\underline{q}_i^*}{\bar{q}_i^*-\underline{q}_i^*} & r \in \left[\underline{q}_i^*, \bar{q}_i^*\right] \\ 1 & r \geq \bar{q}_i^* \end{cases} \qquad \hat{\zeta}_i{}^*(r) := \begin{cases} \frac{r}{\bar{q}_i^*} & r \leq \bar{q}_i^* \\ 1 & r \geq \bar{q}_i^* \end{cases}$$

That $\hat{\zeta}_i{}^*(r)$ is indeed the concave envelope of $\zeta_i^*(r)$ can be easily verified: any concave function that coincides with ζ_i^* at $r = 0$ and $r = \bar{q}_i^*$ must weakly lie above $\hat{\zeta}_i{}^*(r)$ on the interval $[0, \bar{q}_i^*]$. The condition $\mathbb{E}_\mu \, \zeta_i^*(.) = \hat{\zeta}_i{}^*(p)$ is then sufficient for the optimality of μ for the lobbyist (Kamenica and Gentzkow 2011). It is easily seen that the distribution μ_I^* defined in Lemma 1 satisfies this condition.

verify that KG is correct citation.

$\square$

4 A Dominant Dictatorship

The dictator's upper threshold of persuasion, $\bar{q}_i{}^*$, fully describes the equilibrium outcome of an m_i-dictatorship. In this equilibrium, the lobbyist supplies m_i with any information she otherwise would have acquired, so m_i ends up not acquiring any. If m_i blocks the policy, this owes to information which fully reveals that the state disfavours the policy. If she enacts it, however, this owes to information that barely persuades her; her interim belief equals exactly her upper threshold of persuasion, $\bar{q}_i{}^*$.

Thus, the member with the highest upper threshold of persuasion extracts the most information from the lobbyist as a dictator. I call her the *most-demanding member* of the committee.

Definition 2. Member m_i is the *most-demanding member* of the committee, denoted $\overset{\text{♛}}{m}$, if $\bar{q}_i^* = \max\{\bar{q}_1^*, \bar{q}_2^*, ..., \bar{q}_N^*\}$.

What makes a member most-demanding: 1. low u_i, low cost of acquiring info. Derive expression for $\bar{q}_i^*$ in appendix.

the defn "dominant" must be expanded to "dominates"

Clearly, the dictatorship of the most-demanding member dominates any other member's. Dictatorships vary neither in the cost of information committee members bear—as they never bear any—nor in the probability that the policy is blocked despite the state favouring it—always 0. However, dictators vary in the amount of evidence that persuades them to enact the policy; so, in the probability that they enact the policy despite an unfavourable state. The most-demanding member is precisely the one who demands the strongest evidence before he enacts the policy. Thus, she has the lowest probability of erroneously enacting the policy.

In fact, the dictatorship of the most-demanding member dominates *any* voting mechanism the committee may adopt.

Theorem 1. The dictatorship of the most-demanding member is a dominant voting mechanism.

Theorem 1 rests on a simple insight. Explain

Theorem 1, Proof: Where m_i is the most-demanding member, I use $\overset{\text{♛}}{Q} := \bar{q}_i^*$ to simplify notation in the ensuing. I fix $\left(\{V_j\}_{j=1}^N, \{\mathcal{V}_j\}_{j=1}^N, D\right)$ to be an arbitrary voting mechanism, and let $\overset{\text{♛}}{D}$ denote the voting rule for the dictatorship of the most-demanding member.

I will use Claim 2 to establish the Theorem:

Claim 2. Any voting mechanism induces an equilibrium where committee members:

(a) acquire no information for interim beliefs $r \in \{0\} \cup [\overset{\text{♛}}{Q}, 1]$; i.e., $\mu_{1;r}^* = \ldots = \mu_{N;r}^* = \delta_r$ for such interim beliefs.

(b) vote to maximise the probability that the policy is executed for interim beliefs $r \geq \overset{\text{♛}}{Q}$, but to minimise it for $r = 0$; i.e.:

$$\mathbb{E}_{\tau_{1;r,r}^*,\ldots,\tau_{N;r,r}^*} D(\mathbf{v}) = \begin{cases} \max\limits_{\mathbf{v}\in V} D(\mathbf{v}) := \bar{D} & r \geq \overset{\text{♛}}{Q} \\ \min\limits_{\mathbf{v}\in V} D(\mathbf{v}) := \underline{D} & r = 0 \end{cases}$$

Claim 2, Proof: Assume that all members except m_i employ the asserted strategies. I will first show that the asserted strategies are a best response for m_i, in that case. I then show that, in the relevant subgames, there is no strategy profile that is (a) a mutual best response for all committee members, and (b) preferred by the lobbyist to those asserted above.

Now let $\pi_i(q_i; r)$ be the payoff m_i expects under this voting mechanism given (i) the interim belief r, (ii) her posterior belief q_i, (iii) other members' strategies, and (iv) that she votes optimally at each posterior belief. Since other committee members acquire no private information, we have:

$$\pi_i(q_i; r) = \max_{\tau\in\Delta(V_i)} [q_i \times (1 + u_i) - 1] \times \int\limits_{V_{-i}} \int\limits_{V_i} D(v, \mathbf{v}_{-i}) \tau(dv) \tau_{-i;r,r}^*(d\mathbf{v}_{-i})$$

For $q > (1+u_i)^{-1}$, $\pi_i(q;r)$ is strictly increasing in the probability that the policy is enacted. For $q < (1+u_i)^{-1}$, it is strictly decreasing in the same probability. Thus, when $q > (1+u_i)^{-1}$, m_i's optimal voting strategy must maximise the probability that the policy is enacted given others' voting strategies, but when $q < (1+u_i)^{-1}$, it must minimise it. When $q = (1+u_i)^{-1}$, $\pi_i(q_i;r) = 0$; so, any voting strategy is a best response. m_i's equilibrium strategy must then be lobbyist-preferred one, and maximise the probability that the policy is enacted. This verifies Claim 2's assertion on optimal voting strategies, and gives:

$$\pi_i(q;r) = \begin{cases} \bar{D} \times [q \times (1+u_i) - 1] & q \geq (1+u_i)^{-1} \\ \underline{D} \times [q \times (1+u_i) - 1] & q < (1+u_i)^{-1} \end{cases}$$

whenever $r \in \{0\} \cup [\overset{\text{♛}}{Q}, 1]$.

When $r = 0$, $\Delta_0([0,1]) = \delta_0$; so $\mu^*_{i;0} = \delta_0$. When $r \geq \overset{\text{♛}}{Q}$, the strategy $\mu^*_{i;r} = \delta_r$ delivers the highest probability that the policy is executed given members' ensuing voting strategies; so, if $\mu^*_{i;r} = \delta_r$ is a best response for m_i, it is also part of her equilibrium information strategy. So to conclude our proof, we wish to show:

$$\int_0^1 [\pi_i(q;r) - \pi_i(r;r)]\, d\mu(q) - C_i(\mu) \leq 0 \qquad \text{for all } \mu \in \Delta_r([0,1]) \tag{4.1}$$

whenever $r \geq \overset{\text{♛}}{Q}$.

To this end, define $\overset{\text{♛}}{\pi}_i(q_i)$ to be the payoff m_i expects under an m_i-dictatorship given her posterior belief q_i; i.e., $\overset{\text{♛}}{\pi}_i(q_i) := \max\{0, q_i \times (1+u_i) - 1\}$. Since $\bar{q}_i \geq \overset{\text{♛}}{Q}$, Lemma 1 implies that:

did i show this in the proof of the lemma?

$$\int_0^1 \left[\overset{\text{♛}}{\pi}_i(q) - \overset{\text{♛}}{\pi}_i(r)\right] d\mu(q) - C_i(\mu) \leq 0 \qquad \text{for all } \mu \in \Delta_r([0,1]) \tag{4.2}$$

whenever $r \geq \overset{\text{♛}}{Q}$. So, we are done once we show:

$$\int_0^1 \tilde{\pi}_i(q;r) d\mu(q) \leq 0 \qquad \text{for all } \mu \in \Delta_r([0,1]) \tag{4.3}$$

where $\tilde{\pi}_i(q,r) := [\pi_i(q,r) - \pi_i(r,r)] - [\overset{\text{♛}}{\pi}_i(q) - \overset{\text{♛}}{\pi}_i(r)]$.

To see this, first note that $\pi_i(q,r) - \overset{\text{♛}}{\pi}_i(q) \leq \pi_i\left((1+u_i)^{-1}, r\right) - \overset{\text{♛}}{\pi}_i\left((1+u_i)^{-1}\right) = 0$, so $\tilde{\pi}_i(q,r)$ is piecewise linear, decreasing below $q = (1+u_i)^{-1}$, and increasing above $q = (1+u_i)^{-1}$. Therefore,

$\tilde{\pi}_i(.,r)$ is a concave function for any $r \geq \check{Q}$. Combined with the fact that $\tilde{\pi}_i(r,r) = 0$, this gives:

$$\int_0^1 \tilde{\pi}_i(q;r)d\mu(q) \leq \int_0^1 \tilde{\pi}_i(q;r)d\delta_r(q) = 0 \qquad\qquad \text{for all } \mu \in \Delta_r\left([0,1]\right)$$

by Jensen's Inequality.

□

Claim 3. The dictatorship of the most-demanding member is a dominant voting mechanism.

Claim 3, Proof: In the equilibrium the dictatorship of the most-demanding member induces, no committee member acquires private information about the state. Any other voting mechanism must thus result in a weakly higher expected cost of information acquisition for each member.

To conclude the proof, it suffices to show that any fixed voting mechanism achieves:

(a) a lower probability that the policy is enacted when $\omega = \omega_1$, and

(b) a lower probability that the policy is blocked when $\omega = \omega_0$

than the dictatorship of the most-demanding member.

Recall (from Lemma 1) that, under this dictatorship, the lobbyist's equilibrium information strategy is the unique distribution $\check{\mu}_l$ such that supp $\check{\mu}_l = \left\{0, \min\{p, \check{Q}\}\right\}$. Therefore, the dictator never blocks the policy unless her interim belief is $r = 0$; i.e. $\omega = \omega_0$ is revealed. The policy is implemented whenever $\omega = \omega_1$.

Note that, due to Claim 2, the probability that the policy is executed following interim beliefs $r = 0$ and $r = \check{Q}$ are $\underline{D}$ and $\bar{D}$, respectively. Therefore, if the lobbyist employs the strategy $\check{\mu}_l$ described above, we get:

$$\mathbb{P}_{D,\check{\mu}_l}\left(\text{enact} \mid \omega = \omega_1\right) = \bar{D} \qquad \mathbb{P}_{D,\check{\mu}_l}\left(\text{enact} \mid \omega = \omega_0\right) = 1 - \mathbb{P}_{\check{\mu}_l}\left(r = 0 \mid \omega_0\right) \times (1 - \underline{D})$$

The lobbyist's equilibrium information strategy, μ_l^*, must weakly increase at least one of these probabilities. Since the probability that the policy is enacted cannot exceed $\bar{D}$ in either state, we conclude that:

$$\mathbb{P}_{D,\mu_l^*}\left(\text{enact} \mid \omega = \omega_1\right) \leq \bar{D} \leq 1$$
$$\mathbb{P}_{D,\mu_l^*}\left(\text{enact} \mid \omega = \omega_0\right) \geq 1 - \mathbb{P}_{\check{\mu}_l}\left(r = 0 \mid \omega_0\right) \times (1 - \underline{D}) \geq 1 - \mathbb{P}_{\check{\mu}_l}\left(r = 0 \mid \omega_0\right)$$

□

better to do this in two “steps” rather than “claim”s.

$\square$

5 Discussion

Scrapped Sections

6 Overrides and Dictatorships

Overrides are dominated by dictatorships. See the note in my compass lexecon notebook.

In general, how one member's vote influences the policy outcome will depend on the votes her peers submit. Certain mechanisms, however, may privilege a particular member to *override* the rest: allow her a vote that (almost surely) guarantees that the policy is enacted or blocked, regardless of her peers' votes. Such mechanisms will be central to Theorem 1, the main result of this paper. I call them *overrides*.

Definition 3. A voting mechanism $(\overset{♛}{D}_i, \{V_j\}_{j=1}^N, \{\mathcal{V}_j\}_{j=1}^N)$ is an m_i*-override* if for some $\underline{v}_i, \bar{v}_i \in V_i$:

$$\forall \mathbf{v_{-i}} \in V_{-i}: \qquad \overset{♛}{D}_i(\underline{v}_i, \mathbf{v_{-i}}) = 0 \quad \text{and} \quad \overset{♛}{D}_i(\bar{v}_i, \mathbf{v_{-i}}) = 1$$

A particularly simple override—indeed, one of the simplest voting mechanisms—is a *dictatorship*, which bestows the privileged member exclusive authority over the policy outcome.

Definition 4. An m_i-override $(\overset{♛}{D}_i, \{V_j\}_{j=1}^N, \{\mathcal{V}_j\}_{j=1}^N)$ is an m_i*-dictatorship* if:

$$\overset{♛}{D}_i\left(v_i, \mathbf{v_{-i}}\right) = \overset{♛}{D}_i\left(v_i, \mathbf{v'_{-i}}\right) \quad \text{for any } \mathbf{v_{-i}}, \mathbf{v'_{-i}} \in V_{-i} \text{ and } v_i \in V_i$$

Theorem 1 establishes that there is a committee member—denoted $\overset{♛}{m}$ and called the *most-demanding member*—such that every $\overset{♛}{m}$-override (and hence every $\overset{♛}{m}$-dictatorship) is a dominant voting mechanism. In the rest of this section, I lay the groundwork for Theorem 1: I characterise the equilibria override mechanisms induce, and introduce the most-demanding member of the committee.