Individual Accountability, Collective Decision-making

Daniel Gibbs*

October 18, 2021

Abstract

An influential theoretical literature studies a single executive's electoral incentives to knowingly pursue bad policies because they are popular. I develop a model to study pandering in a legislative setting where multiple politicians, each accountable to their own constituency, are responsible for policymaking by simple majority vote. I study equilibria in which an accountable coalition of politicians select policies that best serve the interests of voters. I find that electoral incentives for individual politicians to manipulate policy are weaker in larger coalitions if politicians can privately deliberate before selecting policy or if their votes are not made public. Under these non-transparent procedures, politicians share more responsibility for their policy choices in larger coalitions and have less to gain electorally from pandering. If deliberation or voting is public, this mechanism ceases to operate. My results suggest that larger coalitions may disincentivize pandering under open voting by providing voters with better information about the policy that is in their best interest. Analysis also suggests that closed deliberation and transparent voting is a particularly adaptable system for effective policymaking in the face of pandering incentives.

Keywords: pandering, legislatures, collective decision-making, career concerns

JEL Classification: D71, D72

*Postdoctoral Research Fellow, Department of Political Science, Washington University in St. Louis. Email gibbsd@wustl.edu. I thank Charles Cameron, Brandice Canes-Wrone, Jesse Crosson, Gleason Judd, Korhan Kocak, Matias Iaryczower, Andrew Mack, Nolan McCarty, Kris Ramsay, and Tom Romer for comments and suggestions.

"But one of the weightiest objections to a plurality in the executive...is that it tends to conceal faults and destroy responsibility....The circumstances which may have led to any national miscarriage or misfortune are sometimes so complicated that where there are a number of actors who may have had different degrees and kinds of agency, though we may clearly see upon the whole that there has been mismanagement, yet it may be impracticable to pronounce, to whose account the evil which may have been incurred is truly chargeable." *Alexander Hamilton, Federalist Paper 70*

"When occasions present themselves, in which the interests of the people are at variance with their inclinations, it is the duty of the persons whom they have appointed to be guardians of those interests." *Alexander Hamilton, Federalist Paper 71*

1 Introduction

In a representative democracy, voters elect politicians to solve public problems on their behalf. Accordingly, politicians want voters to perceive them as competent policymakers who can capably pursue policies that best serve their interests. As Alexander Hamilton observes in *Federalist 71*, however, voters may misunderstand which policies truly serve their interests. Voters and politicians may agree that certain policies tend to be the best response to certain types of problems and politicians may share the preferences of voters for solving public problems. Because politicians, as policy specialists, have more information about the correct response to a particular problem, fully rational voters may nonetheless interpret a policy success as a policy failure or a policy failure as a policy success. In such an environment, voters may incorrectly apportion blame and reward, punishing competent politicians with removal and rewarding incompetent politicians with reelection. Politicians therefore face an electoral incentive to *pander* to voters by selecting policies that voters incorrectly believe to be in their best interest. It is the responsibility of a representative, Hamilton argues, to act in the electorate's best interest even when this is at odds with their beliefs about what policies are in their true interests.

Incentives to pander and their potential to undermine effective problem solving are well understood in settings where an individual politician such as a governor or president is responsible for selecting policy (Canes-Wrone et al. 2001; Prat 2005; Ashworth and Shotts 2010; Fox and Van Weelden 2012). Often in a representative democracy, however, public policy decisions are not made by executives but by groups of elected politicians. Legislatures, committees, and majority party caucuses are responsible for many important policy decisions. Our understanding of pandering incentives and the prospects for effective problem solving in these settings is more limited.

In this paper I construct a formal model to examine politicians' incentives to act in the public interest in a collective choice setting. Each politician possesses private information about which policy is best for achieving a policy outcome that voters value. Politicians also have private information about their ability. Highly competent politicians possess better information about which policy is best than their low-ability colleagues. Policy is decided by a simple majority vote of all politicians.

I analyze a version of the model in which politicians deliberate with one another prior to making their policy decision and version in which they simply vote. The group of politicians serves the best interest of the public when the individual politicians cooperate with one another and use their information sincerely to select the best policy.

When the group uses all available information to best serve the interest of the public, voters endogenously assess their representative's individual competence based on publicly observable information about the policymaking process that varies across versions of the model and their understanding of how politicians act in private if parts of the legislative process are not transparent. I specifically vary whether politicians' votes for policy are transparent or not and, if politicians are allowed to deliberate, whether or not voters observe deliberation.

Electoral incentives to act against the true interests of voters depend on local electoral conditions. If effective problem solving requires a politician to help enact an unpopular policy, members in uncompetitive districts are able and willing to weather voter dissatisfaction. Politicians who represent competitive districts are tempted to manipulate the outcome of the collective decision for their own private electoral benefit. Depending on the procedures the legislature employs or the specific equilibrium, such members face incentives to either misrepresent their private information during closed deliberation to convince their colleagues to select a popular policy, vote for a popular policy against an alternative they believe is better for voters, or to falsely inflate their ability during public deliberation.

My primary focus is on how individual politicians' incentives to act in the public interest vary across decision-making units of different sizes. These individual incentives in turn determine whether the collective decisions of the group serve the public interest. The model allows me to rigorously examine a question at least as old as the American founding, namely, are small or large elected decision-making units better equipped to serve the public interest? In *Federalist 70*, Alexander Hamilton expresses concern that elected members of a large collective decision-making body face weaker incentives to act in the public interest than a single decision-maker because blame for an action deemed imprudent by the electorate can be placed on other members. Single executives, he argues, have stronger incentives to act in the public interest because it is easier for the electorate to identify the individual responsible for a mistake or success.

My results show that if politicians are allowed to privately deliberate or keep their votes hidden from public view, then what Hamilton identifies as a weakness of collective decision-making units can in fact be a strength if voters misunderstand which policies are truly in their best interest. The tendency of a collective decision-making body to "conceal faults and destroy responsibility" weakens politicians' incentives to promote popular policies when circumstances call for unpopular decisions. If politicians select policy collectively through private deliberation or vote behind closed doors, they share blame in voters' eyes for unpopular policies and credit for popular policies. As the number of politicians involved policymaking rises under these non-transparent procedures, collective policy decisions becomes increasingly less informative to voters about an individual politician's ability. This attenuates the electoral swing a politician can obtain by manipulating the group into choosing a popular policy. In this way, collective decision-making under non-transparent procedures align politicians' electoral incentives with the public interest. In addition to providing politicians with more information about which policy is in the best interest of voters, larger groups also provide stronger incentives for politicians to act on this information.

If deliberation or voting is public, this mechanism ceases to operate. If voters observe the votes of individual politicians, larger groups of politicians do not obscure the individual member's contribution. I identify a sufficient conditions under which an equilibrium in which politicians serve the public interest exists and study the effect of group size on these. My results suggest that larger coalitions may disincentivize pandering under open voting by providing voters with better information about the policy that is in their best interest. Further analysis is required, however to confirm this.

My analysis additionally suggests that closed deliberation and transparent voting is a particularly adaptable system for effective policymaking in the face of pandering incentives for groups of fixed sizes. I find that for any equilibrium that exists under either open deliberation or closed voting, an equilibrium exists under closed deliberation and open voting in which the governing coalition selects the best policy with the same probability.

2 Related Literature

The paper builds directly on a subset of the pandering literature in which politicians differ in ability but share the preferences of voters (Canes-Wrone et al. 2001; Prat 2005; Ashworth and Shotts 2010; Fox and Van Weelden 2012).[1] Like much of broader political agency literature

[1] A alternative setup in the pandering literature considers politicians who vary in terms of their preferences (Morelli and Van Weelden 2013; Maskin and Tirole 2004; Fox and Shotts 2009; Maskin and Tirole 2019; Acemoglu et al. 2013). In both approaches, the incumbent typically faces an exogenous or non-strategic challenger in an election. An exception is Kartik et al. (2015) which studies pandering in an electoral compe-

to which pandering models belong, these models focus on a single elected decision-maker.[2] Canes-Wrone et al. (2001) identify conditions under which a decision maker acts in the public interest when a combination of preexisting policy bias, asymmetric information, and career concerns tempt him to pander. Ashworth and Shotts (2010) extend this model to include an informed media that can abate the information asymmetry between voters and their representative. Prat (2005) and Fox and Van Weelden (2012) similarly consider how the information available to a principal affects the incentives of a career-minded agent by comparing transparent and non-transparent decision-making processes. Whether through transparency or an attentive media, the results of these models show that providing voters with more information can either exacerbate or mitigate individual incentives to pander based on underlying model parameters. In my model, a multiplicity of decision-makers in the presence of non-transparent decision-making procedures endogenously reduces the precision of the information available to voters about their representative.

A large body of theoretical research has explored whether larger or smaller groups tend to make better decisions in a common-value setting.[3] One of the classic propositions in positive political economy, Condorcet's jury theorem, posits that if each member is more likely than not to vote correctly, larger groups make more accurate decisions in expectation and the probability of reaching a correct decision approaches one in arbitrarily large groups. Previous studies have identified the conditions under which the asymptotic or non-asymptotic parts of the jury theorem hold with both sincere (Ben-Yashar and Paroush 2000; Berend and Sapir 2005) and strategic (Austen-Smith and Banks 1996; Duggan and Martinelli 2001; Fedderson and Pesendorfer 1998; Coughlan 2000) voting. Much of this research considers individual members of juries or expert committees whose payoffs are tied only to the correctness of the group's decision.[4]

tition setting where two strategic candidates commit to policy positions based on their private information prior to an election.

[2] Duggan and Martinelli (2017) and Ashworth (2012) review this literature.

[3] Austen-Smith and Fedderson (2009) review this literature.

[4] A recent exception is Midjord et al. (2017) where members also suffer disutility from voting against the correct decision.

A more recent literature on decision-making in committees considers members who value their reputation and want to be seen by a third-party observer as competent (Levy 2007; Meade and Stasavage 2008; Stasavage 2007; Mattozzi and Nakaguma 2019; Fehrler and Hughes 2018; Gersbach and Hahn 2008, 2012). In this setting, individual members may prefer a suboptimal collective choice if an alternative yields them a better reputation. This literature generally focuses on how transparency and decision-making rules rather than group size influence individual incentives to cooperate to produce accurate decisions. Exceptions include Hahn (2017b) and Persico (2004). Hahn (2017a) shows that smaller groups can be superior to larger groups when committee members deliberate sequentially and a third party observes their deliberation. Members fear that their arguments will not stand up to the scrutiny of their colleagues and are therefore reluctant to speak up in larger groups. In my model, if voters observe deliberation, politicians are similarly dissuaded from sharing their information. The effect does not depend on group size in the equilibria I consider, however, as deliberation in these equilibria requires politicians to fully reveal their information. Persico (2004) considers a model in which the abilities of the members of a committee depend on a costly investment in expertise. Smaller committees are found to strengthen incentives for members to acquire expertise. In my model, abilities are fixed. Incentives for politicians to aggregate information are key. Hahn (2017a) and Visser and Swank (2007) identify a mechanism more closely related that which reduces pandering incentives under closed deliberation and voting in my model although neither paper focuses on how the size of the group affects individual incentives to cooperate. In Hahn (2017a), it is more difficult for an outside observer to assess the individual competence of members of large groups than small groups. Hahn (2017a) uses this result to study the self-selection of low and high-ability members onto committees and abstracts away from individual incentives to participate in effective problem solving once on the committee.

Visser and Swank (2007) produce a result most similar to mine but with a different information structure. They show that as groups grow in size, the difference in individual reputation from selecting a popular policy and an unpopular policy declines as the size of the group increases. They obtain this result in a setup in which individual members communicate simultaneously before selecting policy and do not know their own competence. In my setup, members also communicate simultaneously before selecting policy but unlike in Visser and Swank (2007) members know their own competence. Politicians can therefore manipulate the group's decision by misrepresenting the quality of their information about which policy is best. I further analyze the role of deliberation by considering versions of the model in which politicians simply vote. Private deliberation allows decision-makers to report useful but imperfect information to their colleagues without fear of being identified by voters as low ability. Private deliberation also allows politicians to coordinate on a policy and show a united front when publicly voting. In the absence of private communication, larger groups do not conceal a politician's responsibility for policy. If voting and deliberation are open to voters, the mechanism that drives the main result breaks down. While private deliberation helps larger groups attenuate incentives to pander, deliberation is not necessary for group size to have this effect. If deliberation is prohibited and voting is closed, larger groups make policy decisions a weaker signal of an individual member's ability and thus reduce politicians' incentives to deviate from sincere voting.

As noted above, much of the pandering literature and political accountability literature more generally focuses on the interaction between a representative voter and a single decision maker. Relatively few models consider this relationship when a single elected decision-maker is not wholly responsible for policy. These come in two varieties, those that consider a single elected politician and one or more unelected participants in the policymaking process (Ujhelyi 2014; Fox and Jordan 2011) and those that consider multiple elected politicians. In the latter category Fox and Van Weelden (2010) and Buisseret (2016) both consider a setup in which a pair of elected politicians, a proposer and veto player, make policy jointly prior to an election. This paper provides an additional contribution to this second category. It is the first to explicitly study pandering in a legislative context using a setup familiar to the political accountability literature.

3 Setup

A group of $n \geq 3$ (odd) politicians must choose between one of two policies to respond to a public problem. Each politician represents a voter.[5] Politicians are of either high or low ability and voters want to elect high ability representatives. All politicians know their own ability and receive private signals about the best policy solution to a public problem. High-ability politicians receive higher quality signals than low-ability politicians. The group selects policy by simple majority vote.

I consider two versions of the model, one in which deliberation is allowed between politicians prior to voting and one in which politicians simply vote after receiving their private information. If deliberation is allowed, politicians communicate with one another about which policy they should select after receiving their private signals. After this communication stage the politicians vote on which policy to enact and the policy that receives the majority of votes is implemented. If deliberation is not permitted, politicians vote after obtaining their ability and signal. After voting, each politician then stands for reelection against a challenger whose expected ability is common knowledge.

I consider three different assumptions about what voters observe about the policymaking process prior to the election. Under *closed deliberation* and *closed voting*, voters only observe the policy that the group selects. Under *open voting*, voters observe how all politicians vote. Under open voting and *open deliberation*, voters observe both how all politicians vote and observe all the messages that politicians send during the communication stage. Voters do not observe whether the group selected the best policy prior to the election.[6] Under each assumption, voters receive their information, update their beliefs about their representative's

[5] I follow convention in the principal-agent literature and use "he/him/his" to refer to the politicians (agents) and "she/her/hers" for voters (principals).

[6] An earlier version of this paper included an analysis of a specific equilibrium (defined below as a "n-ADE") under closed deliberation in an extension in which voters observe the state with positive probability prior to the election. Details are available upon request.

ability, and then choose between the challenger and the incumbent. They elect the candidate who they believe is most likely to be of high ability.

3.1 Policy process

The group of politicians must choose between one of two policies, $y \in \{0, 1\}$. Policy is selected by a single simultaneous vote of all politicians. All politicians vote for one of the two policies, $v_i \in \{0, 1\}$. They may not abstain. The policy that receives a simple majority of votes is enacted. Let $v \in \{0, 1\}^n$ denote a profile of n politician votes.

3.2 Uncertainty about the state of the world

One state, $\omega = 0$, is known to be more likely. Formally, $Pr(\omega = 0) = \pi > 1/2$, which is common knowledge. Politicians are better informed about the state of the world than voters. At the start of the game, each politician receives a private, conditionally independent signal about the state, $s_i \in S = \{0, 1\}$. How informative this signal is to a politician depends on his ability, $\theta_i \in \Theta = \{H, L\}$. A *high-ability* politician learns the state with probability one: $Pr(s_i = \omega|\theta_i = H) = 1$. A *low-ability* politician receives an imperfect but privately informative signal:

$$Pr(s_i = \omega|\theta_i = L) = q > \pi$$

Because $q > \pi$, a low-ability politician's signal is sufficiently precise that his posterior belief about the most likely state corresponds to his signal.

The probability of observing a signal that matches the state is independent of the state. Each politician is of high ability with probability 1/2 which is common knowledge. I refer to the ability and signal pair (θ_i, s_i) as a politician's *type*. Politicians know their own type but not the type of any other politician. This can be interpreted as politicians possessing private non-verifiable information about their own or their staff's ability to effectively research a problem. This can be a product not only of their staff's experience or competence but also their resources and time constraints.

3.3 Deliberation

If deliberation is allowed, politicians communicate once and simultaneously by sending a message $m_i \in \Theta \times S$ about their type to their colleagues after learning their type.[7] Let $m \in (\Theta \times S)^n$ denote the profile of all n messages. Each politician observes m.

3.4 Voter information and beliefs

Voters do not know the type of any politician. Voters always observe y prior to the election. If deliberation is not permitted, politician voting is either open or closed. Voters only observe y if voting and deliberation are closed. If voting is open and deliberation is closed, voters observe the votes of all members, v, prior to the election. If deliberation is closed and voting is open, voters observe v but not the messages exchanged between members, m. Under open voting and open deliberation, voters observe v and m. Voters do not observe the state, ω, prior to the election. Let

$$I \in \{y, (y, v), (y, v, m)\}$$

denote the information that voters obtain prior to the election. Voter i's posterior beliefs that politician i is of high ability given I is denoted

$$\mu_i(I) \equiv Pr(\theta_i = H|I)$$

A profile of the n voters' beliefs at each possible realization of I are denoted μ.

[7]Simultaneous communication assumes that politicians prepare their speeches to their colleagues in advance and allows herding problems to be ignored (Visser and Swank 2007, 339).

3.5 Elections

Each politician stands for reelection against a challenger who is of high ability with probability k_i. All k_i are common knowledge. An incumbent politician wins the election if and only if the voter believes the incumbent is at least as likely to be of high ability than the challenger: $\mu_i(y) \geq k_i$.[8] Politicians are strictly reelection seeking. If they win the election, they earn a payoff of 1 and receive a payoff of 0 if they lose.

3.6 Sequence

The sequence of play is as follows:

1. Nature selects the state, ω, and politician types. Each member observes his type, (θ_i, s_i).

2. If deliberation is allowed, each politician sends a message, $m_i \in \Theta \times S$. Each politician observes the profile of all messages, m.

3. Politicians simultaneously cast their vote for policy, $v_i \in \{0, 1\}$. Policy is determined by simple majority.

4. Each voter observes I, and updates their beliefs about their representative, $\mu_i(I)$. Incumbent politician i wins reelection if and only if their voter believes they are more likely than the challenger to be of high ability, $\mu_i(I) \geq k_i$. Payoffs are realized and the game ends.

3.7 Strategies

If deliberation is allowed, a pure strategy for a politician consists of a messaging and voting strategy. A message strategy

$$\mathbf{m}_i : \Theta \times S \to \Theta \times S$$

[8] I do not explicitly model voters' payoffs or their voting strategy. They are passive players whose beliefs are directly tied to their representative's payoff.

is a mapping from a politician's type into a type he chooses to report to his colleagues. A voting strategy

$$\mathbf{v}_i : (\Theta \times S)^{n+1} \to \{0, 1\}$$

is a mapping from the set of all possible n message profiles and a politician's private information into a vote for one of the two policies.[9] If deliberation is not allowed, a pure strategy is simply a voting strategy that prescribes a vote for each of the four possible types a politician can be. I abuse notation slightly by denoting a politician's strategy if deliberation is not allowed with

$$\mathbf{v}_i : \Theta \times S \to \{0, 1\}$$

Profiles of the n politicians' strategies are denoted $\mathbf{v}$ and $\mathbf{m}$.

3.8 Politician beliefs

Politicians form beliefs about the state of the world prior to voting. If deliberation is allowed, politicians observe their type and the messages of all other politicians prior to voting. Politician i's posterior belief that $\omega = 0$ after the communication stage when deliberation is allowed is denoted

$$\eta_i(\theta_i, s_i, m) \equiv Pr(\omega = 0 | \theta_i, s_i, m)$$

I denote politician i's belief about the state given only his private information with

$$\eta_i(\theta_i, s_i) \equiv Pr(\omega = 0 | \theta_i, s_i)$$

If deliberation is not allowed, politician i's posterior belief about the state is $\eta_i(\theta_i, s_i)$. Profiles of the n politicians' beliefs are denoted η.

[9] For clarity, I use boldface type to distinguish a voting or messaging strategy from the voting or messaging actions that politicians take.

3.9 Ex Ante Uncertainty About Challenger Quality

The expected quality of each politician's challenger, k_i, are parameters known by all players at the start of the game. It will facilitate analysis of the model's implications to introduce ex ante uncertainty from an outside observer's perspective about the fixed k_i parameters. Where noted in the analysis below, I assume that the k_i are independent and identically distributed random variables on the unit interval. Let F denote this distribution.

4 Analysis

The solution concept is weak perfect Bayesian equilibrium.[10] If deliberation is permitted, an equilibrium is a profile of strategies and beliefs, $\langle \mathbf{v}, \mathbf{m}, \eta, \mu \rangle$, such that beliefs satisfy Bayes' rule wherever possible and politician strategies $\mathbf{v}_i$ and $\mathbf{m}_i$ are is sequentially rational given their beliefs and the strategies of the other politicians. An equilibrium if deliberation is not permitted, $\langle \mathbf{v}, \eta, \mu \rangle$, is defined analogously.

4.1 Equilibrium Definitions

I focus on two varieties of *accountable* equilibria. In each equilibrium, a *governing coalition* of g (odd) politicians selects policy on the basis of their private information. The other members of the group play strategies that are unresponsive to their information which allow the coalition members to select policy on their own. Members of the coalition are accountable in the sense that they work together to aggregate individual information in order to select the best possible policy and therefore also provide information to voters about their ability. I consider two classes of accountable equilibria. In an *accountable deliberation equilibrium (ADE)*, governing coalition members exchange all of their information during deliberation

[10]Weak perfect Bayesian equilibrium combines sequential rationality with the requirement that beliefs be updated according to Bayes' rule wherever possible. The more familiar concept of perfect Bayesian equilibrium requires that players observe each others' actions. In this game voters may not observe the messages that members send to their colleagues or their votes for policy.

and vote for the policy they believe is most likely to match the state. An ADE can exist only if deliberation is permitted. In an *accountable voting equilibrium (AVE)*, all coalition members vote for the policy they believe is best given their private information. If deliberation is allowed, coalition members do not share information during deliberation.

I additionally examine a third equilibrium, a *partial deliberation equilibrium (PDE)*, in which coalition members report only their signal during deliberation and vote for the policy that receives a simple majority of reported signals. In a PDE, individual coalition members may vote for policies that they believe are suboptimal. For instance if only one member of the coalition is of high ability and receives a signal that the state is $\omega = 1$, if a super-majority of the other low-ability coalition remembers receive incorrect signals, PDE requires the high-ability coalition member to vote with his colleagues for $y = 0$. Accordingly, I do not refer to the PDE as an *accountability equilibrium*. In the analysis below, I show that under certain conditions, the PDE allows coalition members under closed deliberation and open voting to implement AVE policy outcomes when a comparable AVE may not otherwise exist.

Each equilibrium features a governing coalition. Let C denote the set of members who belong to the governing coalition and let $g = |C|$ denote the (odd) number of politicians in C. In each equilibrium, politicians who do not belong to the coalition play strategies that are unresponsive to information and that allow policy to selected by a simple majority of coalition member votes. The simplest strategy profile that satisfies this sorts non-coalition members into two evenly sized disjoint groups, NC_0 and NC_1, in which all $i \in NC_0$ always vote $v_i = 0$ and all $i \in NC_1$ always vote $v_i = 1$. If deliberation is allowed, non-coalition members play strategies that do not reveal any information about their type. I define non-coalition members' strategies in each of the three classes of equilibrium I consider in Definition 1.

Definition 1 (Non-Coalition Member Strategies) *In every ADE, AVE, and PDE, for each $i \notin C$, either $i \in N_0$ or $i \in N_1$ where $N_0 \cap N_1 = \emptyset$ and $|N_0| = |N_1| = \frac{g+1}{2}$. For each $i \in N_y$, $\mathbf{v}_i(\theta_i, s_i, m) = y$ for all $(\theta_i, s_i, m) \in \Theta \times S \times M$. If deliberation is allowed,*

$\mathbf{m}_i(H,0) = \mathbf{m}_i(H,1) = \mathbf{m}_i(L,0) = \mathbf{m}_i(L,1)$ *for all* $i \notin C$.

Strategies for coalition members in an ADE are defined below. ADE requires that coalition members play a messaging strategy that fully reveals their type and a voting strategy that is sincere given their beliefs about the state.

Definition 2 (Coalition Member ADE Strategies) *In an ADE, for each* $i \in C$, $\mathbf{m}_i$ *is a bijection and* $\mathbf{v}_i(\theta_i, s_i, m) = 0$ *if and only if* $\eta(\theta_i, s_i, m) > 1/2$.

I characterize voter and politician beliefs in a ADE in the analysis below. AVE is defined both for games in which deliberation is allowed and prohibited. I explicitly define politician strategies in an AVE for games in which communication is allowed below. AVE voting strategies are defined analogously if deliberation is prohibited by removing m as an argument in coalition members' voting strategies and removing $\gtrdot$ from the strategy profile. If deliberation is allowed, politicians do not reveal information during the communication stage. Formally, they report the same signal for each of the four types they can be.

Definition 3 (Coalition Member AVE Strategies) *In an AVE, each governing coalition member,* $i \in C$, *plays a message strategy that satisfies* $\mathbf{m}_i(H,0) = \mathbf{m}_i(H,1) = \mathbf{m}_i(L,0) = \mathbf{m}_i(L,1)$. *Each coalition member's voting strategy satisfies* $\mathbf{v}_i(H,0,m) = \mathbf{v}_i(L,0,m) = 0$ *and* $\mathbf{v}_i(H,1,m) = \mathbf{v}_i(L,1,m) = 1$ *for all* $m \in M$.

Coalition member voting strategies in an AVE satisfy the property that $v_i = 0$ if and only if $\eta_i(\theta_i, s_i) > 0$. Because private signals are informative, $q > \pi$, coalition members in an AVE vote for the policy they believe is best if they vote their signal.

A PDE can exist only if deliberation is allowed. Each coalition member reports his signal but not his type. Each coalition member votes for the policy that receives a simple majority of corresponding signals during deliberation.

Definition 4 (Coalition Member PDE Strategies) *In a PDE, for each* $i \in C$, $\mathbf{m}_i(H,0) = \mathbf{m}_i(L,0) \neq \mathbf{m}_i(H,1) = \mathbf{m}_i(L,1)$. *For each* $i \in C$, $\mathbf{v}_i(\theta_i, s_i, m) = 0$ *if and only if a simple majority of coalition members communicate that their private signal is* $s_i = 0$.

I focus on how politicians' incentives to participate in governing coalitions vary with the size of the coalition and group as a whole. Recall that $g \geq 1$ (odd) denotes the size of a governing coalition. I refer to an ADE in which $|C| = g$ as a *g-ADE*, an AVE in which $|C| = g$ as a *g-AVE*, and a PDE in which $|C| = g$ as a g-PDE. Note that although policy is always accepted through a simple majority vote of all n politicians, the size of the governing coalition need not exceed a simple majority of politicians. In the equilibria I consider, politicians who do not belong to the coalition adopt strategies that allow the governing coalition to adopt policy on behalf of the entire group by a simple majority vote of coalition members.

4.2 Equilibrium Policymaking Quality

In a g-ADE, the group selects the optimal policy with ex ante probability

$$R_D(g) = (1 - \frac{1}{2^g}) + \frac{1}{2^g} B(\frac{g+1}{2}, g, q)$$

where

$$B(x, g, q) \equiv \sum_{i=x}^{g} \binom{g}{x} q^i (1-q)^{g-i}$$

denotes the binomial probability of at least x correct signals in a group of g low-ability members. To understand $R_D(g)$, first note that in an ADE, if any coalition member is a high-ability type, the group selects the correct policy with probability one. During communication, high-ability coalition members reveal the true state to their colleagues who then vote for the corresponding policy. If all members of the governing coalition are of low ability, coalition members correctly believe that the state which receives a simple majority of corresponding signals is more likely. This follows from $q > \pi$ and Bayes' rule. The probability that a coalition of low-ability politicians receives a simple majority of correct signals is the same in each state. The number of correct signals in a coalition of g low-ability politicians is a binomial random variable with success probability q and g trials. The probability that the group selects the optimal policy if all coalition members are of low ability is therefore equal $B(\frac{g+1}{2}, g, q)$ in both states.

The probability that the group selects the correct policy in g-ADE is strictly increasing in g (odd) and approaches one as g becomes arbitrarily large. Two simultaneous effects enhance the group's decision-making ability in a g-ADE as the accountable governing coalition grows. First, the addition of members to the coalition raises the probability that at least one member is of high ability. Second, the probability that a coalition of g low-ability politicians receives a simple majority of correct signals, $B(\frac{g+1}{2}, g, q)$, is strictly increasing in g and approaches 1 as g becomes arbitrarily large.[11]

In a g-AVE, the group selects the correct policy in a with ex ante probability

$$R_V(g) = \frac{1}{2^g}\sum_{i=\frac{g+1}{2}}^{g}\binom{g}{i} + \frac{1}{2^g}\sum_{i=0}^{\frac{g-1}{2}}\binom{g}{i}B(\frac{g+1}{2} - i, g-i, q)$$

$$= \frac{1}{2} + \frac{1}{2^g}\sum_{i=0}^{\frac{g-1}{2}}\binom{g}{i}(1 - B(\frac{g+1}{2}, g-i, 1-q))$$

The first term represents the probability that at least a simple majority of coalition members are of high ability. In an AVE, each member votes their signal. Because high-ability politicians receive a signal that perfectly matches the state, the group selects the correct policy with probability one if a simple majority of coalition members are of high ability. Because each politician is of high ability with probability 1/2 and g is odd, the probability that at least half of governing coalition members are of high ability is 1/2 for all g.

Each component of the sum in second term represents the probability that the coalition selects the correct policy if $i < \frac{g+1}{2}$ members of the coalition are of high ability. As the number of high-ability coalition members declines—and with it the number of votes that are guaranteed to correspond to the correct state—the number of low-ability coalition members who must receive a correct signal to ensure the optimal policy is selected rises. Equivalently, for a given number of high-ability coalition members, the coalition selects the incorrect policy

[11] This result is typically credited to Laplace. See Boland (1989) for a simple proof.

if and only if at least $\frac{g+1}{2}$ low-ability members receive incorrect signals. Like $R_D(g)$, $R_V(g)$ is increasing in g and approaches 1 for arbitrarily large g.[12]

In a g-PDE, the group selects the correct policy with ex ante probability $R_P(g) = R_V(g)$. If voting is open, a PDE allows coalition members to endogenously close voting and conduct policymaking as if they were in an AVE with no communication and closed voting. Members of the coalition "vote" in private via their partially informative signals and then implement the policy that receives a simple majority of corresponding signals.

It is straightforward to check that for a given $g \geq 3$, a g-ADE selects optimal policy with strictly a higher probability than a g-AVE or g-PDE.[13] The monotonicity and asymptotic convergence properties of $R_V(g)$, however, imply that if g' is sufficiently greater than g, then $R_V(g') > R_D(g)$.

Remark 1

$R_D(g)$ *is strictly increasing in* g *and* $\lim_{g\to\infty} R_D(g) = 1$.

$R_V(g)$ *is increasing in* g *and* $\lim_{g\to\infty} R_V(g) = 1$.

$R_P(g) = R_V(g)$.

$R_D(g) > R_V(g)$

$R_V(g') > R_D(g)$ *if* g' *is sufficiently greater than* g.

Although ADE and AVE are not necessarily optimal for selecting policy (either globally or subject to incentive compatibility conditions), they are optimal under certain conditions and intuitive to understand.[14] Focus on these equilibria facilitates analysis of politicians' incentives under tractable strategic conditions in which identifiable members of the governing coalition are expected to govern accountably by aggregating information to select policies

[12] Theorem 1 in Berend and Sapir (2005) establishes the non-monotonic result. The asymptotic part is implied by $q > 1/2$. Details are available in the proof of Remark 1 in the Appendix.

[13] If $g = 1$, the two equilibria select the best policy with the same probability, $\frac{1+q}{2}$.

[14] If deliberation is allowed, a g-ADE in which $g = n$ such that the entire group participates in the accountable governing coalition is optimal. That is, there no equilibrium matches policy to the state with a higher probability. For $g < n$, alternative equilibria that are not ADE may perform better at state matching than the ADE.

that are in the best interests of voters given the totality of their dispersed information. Analysis of best possible state-matching equilibria is an obvious avenue for further analysis of the model.[15]

4.3 ADE

An ADE is defined only if politicians are allowed to deliberate. Members of an accountable governing coalition in an ADE are expected to fully reveal their information during the deliberation stage and then vote for the policy that they believe is best. Given truthful revelation of information, all members of the governing coalition share the same belief about the true state of the world after deliberation if coalition members play their equilibrium message strategies. After deliberation, the coalition selects the policy that all coalition members believe is best in an ADE. Politicians who do not belong to the governing coalition in an ADE play the same voting strategy regardless of their ability, signal, and the messages they observe during deliberation. Voters therefore learn nothing new about politicians who are not members of C under closed and open deliberation and voting. They retain their prior beliefs about their representative in equilibrium. Off path, it is sufficient to prevent deviations by non-coalition members if voters retain their prior if their representative votes in an unexpected way and if coalition members ignore deviant messages during deliberation. Voter posterior beliefs about members of the governing coalition depend on whether deliberation is closed or open. I analyze ADE under closed deliberation first and then examine ADE under open deliberation.

[15] This requires an ordering of equilibria in terms of their probability of state matching in order to determine the optimal equilibrium subject to incentive-compatibility constraints. An equilibrium profile of strategies can be represented as a decision rule that maps from legislators' private information into a policy choice. While the literature on collective decision-making in the absence of electoral concerns has identified several properties of the ordering of decision rules in uncertain dichotomous choice environments (see Nitzan and Paroush (2017) for a recent review), I am not aware of a sufficiently complete ordering of these rules under the assumptions of asymmetric state probability and ex ante unknown politician abilities to facilitate analysis of the best incentive-compatible equilibrium .

4.3.1 ADE Under Closed Deliberation

If deliberation is closed, the chosen policy imparts information to voters about the information that their representative shared during deliberation. That is, their beliefs are formed by making an inference about their representatives' influence on policy during deliberation. Individual coalition members' votes therefore do not communicate any information to voters in addition to the group's collective policy choice. This follows from by Bayes' rule if coalition members play their equilibrium voting strategy. Under open voting, it is sufficient to prevent deviations from coalition members if voters essentially ignore the deviant vote and maintain the beliefs they form by Bayes' rule given $y = 0$ on the equilibrium path of play.

If a coalition member is of high ability, the group selects the correct policy in an ADE with probability one. Let $\lambda_g(I|\theta_i)$ denote the likelihood of I in a g-ADE given θ_i. Under closed deliberation, because the state is $\omega = 0$ with probability $\pi > 1/2$,

$$\lambda_g(y = 0|\theta_i = H) = \lambda_g(y = 0, v|\theta_i = H) = \pi$$

and

$$\lambda_g(y = 1|\theta_i = H) = \lambda_g(y = 1, v|\theta_i = H) = 1 - \pi$$

for all v if $i \in C$. If a coalition member is of low ability, then two events are possible. With probability $(1 - \frac{1}{2^{g-1}})$, at least one other coalition member is of high ability. In this case the group selects the optimal policy with probability one. With probability $\frac{1}{2^{g-1}}$, all coalition members are of low ability. As discussed above, if all members of C are of low ability, the group selects the correct policy with probability $B(\frac{g+1}{2}, g, q)$. The probability that an entirely low-ability coalition selects $y = 0$ is therefore the weighted probability that the group selects the correct policy if $\omega = 0$ and the wrong policy if $\omega = 1$. Similarly, a low-ability coalition chooses $y = 1$ if it selects the correct policy given $\omega = 1$ or the wrong policy given $\omega = 0$. It follows that under closed deliberation, for all $i \in C$,

$$\lambda_g(y = 0|\theta_i = L) = \lambda_g(y = 0, v|\theta_i = L)$$

$$= \pi(1 - \frac{1}{2^{g-1}}) + \frac{1}{2^{g-1}}[\pi B(\frac{g+1}{2}, g, q) + (1-\pi)(1 - B(\frac{g+1}{2}, g, q))]$$

and

$$\lambda_g(y = 1|\theta_i = L) = \lambda_g(y = 1, v|\theta_i = L)$$

$$= (1-\pi)(1 - \frac{1}{2^{g-1}}) + \frac{1}{2^{g-1}}[\pi(1 - B(\frac{g+1}{2}, g, q)) + (1-\pi)B(\frac{g+1}{2}, g, q)]$$

for all v.

It follows then that for all $i \in C$ in a g-ADE with closed deliberation,

$$\mu_i(0) = \mu_i(0, v) = \frac{\lambda_g(y = 0|\theta_i = H)}{\lambda_g(y = 0|\theta_i = H) + \lambda_g(y = 0|\theta_i = L)} =$$

$$a(0, g) \equiv [2 - \frac{1}{2^{g-1}} + \frac{1}{2^{g-1}}(B(\frac{g+1}{2}, g, q) + \frac{(1-\pi)}{\pi}(1 - B(\frac{g+1}{2}, g, q)))]^{-1}$$

and

$$\mu_i(1) = \mu_i(1, v) = \frac{\lambda_g(y = 1|\theta_i = H)}{\lambda_g(y = 1|\theta_i = H) + \lambda_g(y = 1|\theta_i = L)} =$$

$$a(1, g) \equiv [2 - \frac{1}{2^{g-1}} + \frac{1}{2^{g-1}}(B(\frac{g+1}{2}, g, q) + \frac{\pi}{(1-\pi)}(1 - B(\frac{g+1}{2}, g, q)))]^{-1}$$

Having characterized voter beliefs in a ADE under closed deliberation, I complete the characterization of equilibrium by defining politician beliefs in the communication stage. All message profiles except those in which at least one coalition member reports $(H, 0)$ and at least one other reports $(H, 1)$ are realized with positive probability in the communication stage of an ADE. If two members report to be high types but send conflicting signals, the other members know that at least one of them is lying. I show below voter posterior beliefs in an ADE on the equilibrium path imply that coalition members can only benefit from deviating by manipulating the group to select $y = 0$ instead of $y = 1$. I therefore assume that if coalition members observe conflicting high-ability messages during deliberation, they believe that the member who reports that they are $(H, 1)$ is telling the truth and thus believe that the state is $\omega = 1$ with probability one. To define this formally, let m_D denote the profile of messages sent by members of C, let M_D denote the set of all possible message profiles that can possibly be sent by members of C, and $M_D^* \subset M_D$ the set of message profiles that are sent by members of C with positive probability in equilibrium.

Definition 5 summarizes voter and politician beliefs in a g-ADE under closed deliberation. Definitions and 2 and 5 complete the formal definition of a g-ADE under closed deliberation.

Definition 5 (g-ADE Beliefs Under Closed Deliberation) *In a g-ADE under closed deliberation,*

- *for all $i \in C$ and $I \in \{y, (y, v)\}$, $\mu_i(0) = \mu_i(0, v) = a(0, g)$ and $\mu_i(1) = \mu_i(1, v) = a(1, g)$ for all v.*
- *for all $i \notin C$, $\mu_i(I) = 1/2$ for all I.*
- *for all $i \in N$,*

$$\eta_i(\theta_i, s_i, m) = \frac{Pr(s_i, \theta_i, m_D|\omega = 0)\pi}{Pr(s_i, \theta_i, m_D|\omega = 0)\pi + Pr(s_i, \theta_i, m_D|\omega = 1)(1 - \pi)}$$

if $m_D \in M_D^*$ and $\eta_i(\theta_i, s_i, m) = 0$ if $m_D \notin M_D^*$.

I now analyze the incentives of politicians to participate in a g-ADE and characterize necessary and sufficient conditions for a g-ADE to exist. It is straightforward to check that $a(1, g) < 1/2 < a(0, g)$ for all g. This is a consequence of $q > \pi > 1/2$ and the conditional independence of low-ability members' signal precision. Because $q > \pi$, low-ability coalitions select the policy that receives a simple majority of corresponding signals. The probability that it receives a simple majority of correct signals is conditionally independent given the state and less than one. It follows that a coalition of low-ability politicians chooses $y = 1$ with a higher probability than a coalition with a high-ability member. Voters therefore form more favorable beliefs about a coalition member if the group selects $y = 0$ than if it selects $y = 1$.[16] Endogenously, policy $y = 0$ is more *popular* with voters in an ADE than $y = 1$.

It follows that in a g-ADE, voter beliefs partition the space of challengers that any individual governing coalition member may face in an election into three electorally relevant regions. If a coalition member faces a challenger of expected quality $k_i \leq a((1, g)$, he wins the election even if the group selects the unpopular policy, $y = 1$. If a coalition member faces a challenger of expected quality $k_i > a(0, g)$, he loses the election even if the group selects the popular policy, $y = 0$. The electoral fortune of these safe legislators and doomed legislators does not depend on the policy that the group selects. They are therefore willing to cooperate with their fellow coalition members in selecting the policy that best serves voters. If a coalition member faces a challenger of expected quality $k_i \in (a(1, g), a(0, g)]$, he wins reelection if and only if the group selects the popular policy, $y = 0$. These members in *competitive districts* prefer that the group selects $y = 0$ even when the best information available to the group implies that $\omega = 1$ is more likely. Define

$$A_g \equiv [0, a(1, g)] \cup (a(0, g), 1]$$

for odd $g \geq 1$ and let

$$W_g \equiv \{i \in N : k_i \in A_g\}$$

denote the set of members $i \in N$ for whom $k_i \in A_g$ for each g. If $i \in W_g$, then politician i's district is not sufficiently competitive to deter participation in a governing coalition of size g. Coalition members in competitive districts, $i \notin W_g$, undermine the existence of a g-ADE. While a member in a competitive district cannot affect policy by voting unless $g = 1$, he

[16] If $q \leq \pi$, then $a(0, g) < a(1, g)$ as groups of all low-ability members privileged their prior and require a supermajority of $s_i = 1$ signals to believe $\omega = 1$ with greater probability than $\omega = 0$. Details available upon request.

can manipulate the group's decision by lying during deliberation. A low ability member who receives an $s_i = 1$ signal, for example, can raise the probability that the group selects $y = 0$ and therefore the probability that he is reelected by sending a false message that his type is $(H, 0)$ rather than the truth as equilibrium requires. If no other member is a high type, this lie ensures that the group selects the popular policy even if all other members receive an $s_i = 1$ signal. In this case his deception almost certainly results in the selection of the incorrect policy but ensures victory in an election that he is guaranteed to lose in equilibrium. In order for a g-ADE to exist, at least g politicians must represent districts that are sufficiently uncompetitive for the politician to be willing to participate in the selection of an unpopular policy. That is, a politician prefers to play the message strategy prescribed t members of the governing coalition if and only if $i \in W_g$. A g-ADE therefore exists only if at least g politicians are willing to join C. Formally, a g-ADE exists only if $|W_g| \geq g$.

Politicians who do not belong to the coalition win their bids for reelection if and only if $k_i \leq 1/2$. Deviation in the communication stage does nothing to influence policy as coalition members simply ignore the individual's message. Although a non-member of the coalition can manipulate policy by deviating in the voting stage if $g = 1$, he prefers his equilibrium strategy unless voters form more favorable beliefs about him following a deviation. Voter off-path beliefs in Definition 5 rule this out. Thus $|W_g| \geq g$ is a necessary and sufficient condition for a g-ADE to exist under closed deliberation.

Proposition 1 *Under closed deliberation, for both open and closed voting, a g-ADE exists if and only if $|W_g| \geq g$.*

Note that some non-coalition members may prefer to participate in a governing coalition. In particular, if $k_i \in (1/2, a(0, g)]$ and politician i does not belong to the governing coalition, he loses the election to the challenger in equilibrium. If he a member of the governing coalition, he defeats the challenger if the group selects $y = 0$. However, because he loses to the challenger as a member of the governing coalition if $y = 1$, it is not consistent with equilibrium to play accountable policymaking strategy necessary to participate in the coalition.

Having identified the necessary and sufficient conditions for a g-ADE to exist, I can now analyze how individual legislators' incentives to act in the public interest vary across accountable governing coalitions of different sizes. The endogenous beliefs of voters determine which politicians are willing to participate in C. The size of the governing coalition influences the set of politicians who are willing to join C through the effect of g on voter beliefs. Lemma 1 establishes how g affects voter posterior beliefs in an ADE under closed deliberation.

Lemma 1 (Properties of Voter Beliefs in ADE Under Closed Deliberation)

- *For all g, $a(1, g) < 1/2 < a(0, g)$.*
- *$a(0, g)$ is strictly decreasing in g*
- *$a(1, g)$ is strictly increasing in g*
- $\lim_{g\to\infty} a(0, g) = 1/2$
- $\lim_{g\to\infty} a(1, g) = 1/2$

Regardless of the size of the governing coalition, if at least one member is high ability, the correct policy is selected in a g-ADE with probability one. The size of the coalition therefore has no effect on the probability that it chooses $y = 0$ or $y = 1$ if at least one coalition member is of high ability. Formally, $\lambda_g(y = 0|\theta_i = H) = \pi$ and $\lambda_g(y = 1|\theta_i = H) = 1 - \pi$ for all g.

The size of the coalition affects $\lambda_g(y = 0|\theta_i = L)$ and $\lambda_g(y = 0|\theta_i = L)$ through two channels. First, the probability that at least one other coalition member is of high ability, $1 - \frac{1}{2^{n-1}}$, is strictly increasing. This raises the probability that the group selects $y = 0$ and lowers the probability that it selects $y = 1$, as a coalition with a high ability member always selects the correct policy. Second, the probability that a coalition of g low-ability members selects the correct policy, $B(\frac{g+1}{2}, g, q)$, is also increasing in g. As g rises, more information becomes available to the coalition's members and the group selects the correct policy with a higher probability. Because $y = 0$ is more likely to be the correct policy, a group of low-ability members selects $y = 0$ with a higher probability as g rises. For g arbitrarily large, the probability that a coalition of low-ability politicians selects the correct policy approaches 1. Thus $\lambda_g(y = 0|\theta_i = L)$ is strictly increasing as g rises and $\lim_{g\to\infty} \lambda_g(y = 0|\theta_i = L) = \pi$. Similarly, $\lambda_g(y = 1|\theta_i = L)$ is strictly decreasing in g with $\lim_{g\to\infty} \lambda_g(y = 0|\theta_i = L) = (1-\pi)$.

It follows that voters form more favorable beliefs about their representative when $y = 1$ and less favorable beliefs when $y = 0$ as g rises. That is, $a(1, g)$ is strictly increasing in g and $a(0, g)$ strictly decreasing in g. As the coalition becomes larger, its decisions become less informative about any one individual legislator's role in the determination of policy and therefore less informative about his ability. In a small group, an individual member's message is more likely to be consequential for the group's decision than in a large group. Compared to a larger group, if he is of low ability, there is a higher probability that the group makes an incorrect decision. There are few other potential high ability colleagues and his signal is more likely to be pivotal in a group of low ability politicians.

Because of this effect of coalition size on voter beliefs, the set of challengers k_i such that a politician is willing to participate in the governing coalition expands as g rises and converges to the set of all challengers as g becomes arbitrarily large. More formally, for all $g > g'$, $A_{g'} \subset A_g$ and $\lim_{g\to\infty} A_g = [0, 1]$. It follows that for each $k_i \neq 1/2$, an equilibrium governing coalition of size g' exists such that $k_i \in A_g$ for all $g \geq g'$. In this sense then, each individual politicians to manipulate public policy for private electoral interests are weaker in larger coalitions.

To analyze the effect of group size, n, on the existence of a g-ADE, suppose that ex ante, the expected challenger quality parameters k_i are independent and identically distributed according to F. For each g, the probability that member i is willing to participate in a governing coalition of size g, $i \in W_g$, is given by the probability that $k_i \in A_g$,

$$p_g \equiv 1 - \lim_{\varepsilon \nearrow a(0,g)} F(\varepsilon) + F(a(1,g))$$

Note that for all $g' > g$, $p_{g'} \geq p_g$. By Proposition 1, the probability that a g-ADE exists under closed deliberation is given by the probability that $|W_g| \geq g$. Let $\alpha(n, g, I)$ denote the probability that a g-ADE equilibrium exists if $|N| = n$ and voters observe I. Under closed deliberation, for both open and closed voting,

$$\alpha(n, g, I) = B(g, n, p_g).$$

Proposition 2 follows immediately from the properties of the cumulative binomial probability induced by F that at least g members face challengers $k_i \in A_g$.

Proposition 2 *For $I \in \{y, (y, v)\}$,*

- *$\alpha(n, g, I)$ is increasing in n for all $g \geq 1$.*
- *if $p_g > 0$, $\alpha(n, g, I)$ is strictly increasing in $n \geq g$ and* $\lim_{n\to\infty} \alpha(n, g, I) = 1$

Note that Proposition 2 applies to each fixed g as n increases. The probability that the best *possible* g-ADE equilibrium given n, a n-ADE, may be decreasing. That is, $\alpha(n, n, y) = p_n^n$, may be decreasing. As n rises, the set of k_i for which each individual member is willing to participate in an accountable coalition of the whole, A_n, expands. But while each individual member is willing to participate for a wider range of k_i, the number of members needed to form an accountable coalition of the whole also expands. Whether the positive effect of individual incentive compatibility or the negative effect of requiring a greater number of individuals to join the coalition depends on F. However, although the probability that best possible AVE exists may be decreasing in n, because $\alpha(n, g, y)$ is increasing in n for each fixed g, expanding the size of a coalition does not lower the probability that any g-ADE exists for each $g < n$.

To characterize the probability that *any* g-ADE exists under closed deliberation, let $\alpha(n, 0, I)$ denote the probability that no g-ADE exists for $I \in \{y, (y, v)\}$. With this notation, the probability that an ADE exists under closed deliberation if the number of politicians is n is given by

$$\alpha(n,0,I) = Pr(\bigwedge_{\substack{1 \le g \le n \\ g \text{ odd}}} |W_g| < g)$$

$$= \prod_{\substack{1 \le g \le n \\ g \text{ odd}}} Pr(|W_g| < g \mid \bigwedge_{\substack{1 \le i \le g-2 \\ i \text{ odd}}} |W_i| < i)$$

Because $A_{g'} \subset A_g$ for all $g' \geq g$, the existence of g-ADE and a g'-ADE are not independent events. Thus the monotonicity of $\alpha(n, g, I)$ in n for all $g \geq 1$ and $I \in \{y, (y, v)\}$ does not imply that $\alpha(n, 0, I)$ is decreasing. Fréchet inequalities imply that

$$\min\{0, 1 - \sum_{\substack{1 \le g \le n \\ g \text{ odd}}} Pr(|W_g| < g)\} \le \alpha(n,0,I) \le \min_{\substack{1 \le g \le n \\ g \text{ odd}}} Pr(|W_g| < g)$$

Thus

$$\min\{0, 1 - \sum_{\substack{1 \le g \le n \\ g \text{ odd}}} \alpha(n,g,I)\} \le \alpha(n,0,I) \le 1 - \max_{\substack{1 \le g \le n \\ g \text{ odd}}} \alpha(n,g,I)$$

By Lemma 1, both the upper bound and lower bound on the probability that an ADE exists are increasing in n. Moreover, Lemma 1 implies that unless F is a degenerate distribution with a single mass point on 1/2, a g' exists such that for all $g \geq g'$, $\alpha(n, g, I)$ is strictly increasing in n and approaches 1 as n becomes arbitrarily large. In such a case, the probability that an ADE exists converges to 1 as g approaches infinity and the lower bound on the probability that an ADE exists is strictly decreasing for $g \geq g'$.

Proposition 3 *If* $\sum_{g=1}^{\infty} p_g > 0$, $\lim_{n\to\infty} \alpha(n, 0, I) = 0$ *for* $I \in \{y, (y, v)\}$.

Regarding finite increases in n, Proposition that the probability that an ADE exists is strictly greater for $n = 3$ than $n = 1$.

Proposition 4 *Under closed deliberation, the probability that an ADE exists is greater for $n = 3$ than $n = 1$.*

If the "group" of politicians consists of a single executive, the only possible g-ADE is a 1-ADE. An ADE therefore exists with probability $1 - \alpha(1, 0, I) = p_1$ if $n = 1$. In a group of three politicians, a 1-ADE and a 3-ADE are possible. An ADE therefore exists with probability

$$1 - \alpha(3, 0, I) = Pr(|W_1| \geq 1) + Pr(|W_3| \geq 3) - Pr(|W_3| \,\big|\, |W_1| \geq 1)Pr(|W_1| \geq 1)$$

$$= 1 - (1 - p_1)^3 \sum_{i=0}^{2} b(i, 3, p_3 - p_1)$$

where $b(i, 3, p_3 - p_1)$ is the binomial probability that $|W_3 \setminus W_1| = i$. To understand this expression, note that a 1-ADE does not exist if and only if no politician is willing to govern alone–that is, if $|W_1| = 0$. It follows that if $n = 3$, a 1-ADE does not exist with probability $(1 - p_1)^3$. Because $W_1 \subset W_3$, if a 1-ADE does not exist, then a 3-ADE exists only if $|W_3 \setminus W_1| \geq 3$. For each individual politician, $Pr(i \in W_3 \setminus W_1) = Pr(k_i \in A_3 \setminus A_1 \geq 3|) = p_3 - p_1$. Thus if $n = 3$ and a 1-ADE does not exist, a 3-ADE exists unless $|W_3 \setminus W_1| = 3$. Note that $(1 - p_1) \leq (1 - p_1)^3$ and $\sum_{i=0}^{2} b(i, 3, p_3 - p_1) \leq 1$ imply that $\alpha(1, 0, I) \geq \alpha(3, 0, I)$ under closed deliberation. It follows that under closed deliberation, an ADE exists in a group with $n = 3$ members with a higher probability than a single executive.

4.4 ADE Under Open Deliberation

Under open deliberation, voters observe the messages that each member of the governing coalition sends. Voters therefore learn their representative's ability with certainty if their representative is a member of the governing coalition and plays his equilibrium strategy. If a member of the governing is a coalition is of low ability, then voters learn that he is of low ability type. The coalition member wins reelection if and only if $k_i = 0$. If $k_i > 0$, member i strictly prefers to falsely report that he is of high ability. Even if voters believe that their representative is a low type if their representative's message that $\theta_i = H$ conflicts with another coalition member's reported signal, because the false message is not guaranteed to conflict with another member's message, a low-ability coalition member strictly prefers to misrepresent his ability.[17] An ADE therefore exists under open deliberation if and only if at least one politician faces a challenger of expected ability $k_i = 0$. If such a politician exists, a 1-ADE exists.

Proposition 5 *Under open deliberation, an ADE exists if and only if $k_i = 0$ for some $i \in N$.*

For $k_i \sim F$, Proposition 5 implies that the probability that an ADE exists is positive if and only if $F(0) > 0$. If $F(0) > 0$, the probability that a g-ADE exists under open deliberation is given by

$$\alpha(g, n, (y, v, m)) = \sum_{i=g}^{n} \binom{n}{g} (F(0))^i (1 - F(0))^{n-i}$$

The probability that *any* ADE exists is $1 - (1 - F(0))^n$.

Corollary 1 *Under open deliberation, if $k_i \sim F$, an ADE exists with positive probability if and only if $F(0) > 0$. If $F(0) > 0$, the probability that an ADE exists is strictly increasing in n and approaches one as n approaches infinity.*

A politician with a challenger $k_i = 0$ can be interpreted as politician who is either uncontested or not up for reelection. In this interpretation, a g-ADE exists only if at least g politicians run unopposed and an ADE exists with positive probability if and only if politicians are expected to run unopposed or not face reelection.

[17] I provide a complete definition of beliefs in an ADE under open deliberation in the Appendix.

Note that in the ADE under closed deliberation, if $k_i = 0$, then politician i is willing to join any sized coalition. Formally, $k_i = 0$ implies $i \in W_g$ for all g. It follows that if a g-ADE exists under open deliberation, then a g-ADE exists under closed deliberation.

Proposition 6 *If a g-ADE exists under open deliberation, then a g-ADE exists under closed deliberation.*

Proposition 6 suggests that closed deliberation helps politicians avoid problems of pandering. By closing deliberation off from voters, low-ability politicians can contribute to effective policymaking by sharing their informative but imperfect information about the state. Under open communication, politicians have electoral incentives to falsely claim an unwarranted level of expertise unless they are not up for reelection or running unopposed.

4.5 AVE

In an AVE, coalition members simply vote for the policy they believe is best. Given $q > \pi$, this requires each coalition member to vote for the policy that corresponds to their private signal. If deliberation is permitted, coalition members do not reveal any information. More formally, all politicians report the same ability and signal regardless of their true type. Fellow politicians and voters therefore learn nothing about their representative's type from their messages and cannot infer any useful information about their representative's actions during the deliberation stage if deliberation is closed.[18] Because politicians' messages are uninformative, voter posterior beliefs about members of the governing coalition depend only on whether voting is closed or open. The possibility of deliberation does not influence their equilibrium beliefs. I analyze AVE under closed voting first and AVE under open voting second.

[18]If deliberation is allowed and voters observe messages, I assume that they do not interpret off-path messages as signals of a politician's type. They retain their prior beliefs about a deviant politician in the communication stage if they observe an unexpected message.

4.5.1 AVE Under Closed Voting

Under closed voting, voters observe the policy that the coalition selects and update their beliefs about their representative's type. Their beliefs depend on the likelihood that the group selects each policy given that their representative is of high ability. Let $\hat{\lambda}_g(y|\theta_i)$ denote the likelihood that the coalition selects y in a g-AVE under closed voting given coalition member i's type. With this notation, voter beliefs about $i \in C$ under closed voting given $I = y$ in a g-AVE are given by

$$\hat{\mu}_i(0) = \hat{a}(0,g) \equiv [1 + \frac{\hat{\lambda}_g(y=0|\theta_i = H)}{\hat{\lambda}_g(y=0|\theta_i = L)}]^{-1}$$

and

$$\hat{\mu}_i(1) = \hat{a}(1,g) \equiv [1 + \frac{\hat{\lambda}_g(y=1|\theta_i = H)}{\hat{\lambda}_g(y=1|\theta_i = L)}]^{-1}$$

If politicians do not belong to the governing coalition, their vote has no influence on policy in equilibrium. As in the ADE, voters retain their prior beliefs about non-coalition members for both policy choices. If deliberation is allowed and politicians observe unexpected messages, I assume that they do not interpret off-path messages as signals about the state. That is, they retain their posterior belief s about the state given their private ability and signal if they observe an unexpected message. Definitions 3 and 6 characterize politician strategies and voter beliefs in an AVE under closed voting.

Definition 6 (AVE Beliefs Under Closed Voting) *In a g-AVE under closed voting,*

- *for all $i \in C$, $\mu_i(0) = \hat{a}(0,g)$ and $\mu_i(1) = \hat{a}(1,g)$.*
- *for all $i \notin C$, $\mu_i(0) = \mu_i(1) = 1/2$.*
- *for all $i \in N$, $\eta_i(\theta_i, s_i, m) = \eta_i(\theta_i, s_i)$ for all m.*

I now show that $\hat{a}(0,g) > \hat{a}(1,g)$ for coalition members in an AVE. To characterize $\hat{\lambda}_g(y, \theta_i)$, let h_g denote the number of high-ability coalition members in a g-AVE. Whether deliberation is allowed or not,

$$\hat{\lambda}_g(y=0|\theta_i=H) = \frac{1}{2^{g-1}} \sum_{j=0}^{g-1} \binom{g-1}{j} Pr(y=0|h_g=j+1)$$

and

$$\hat{\lambda}_g(y=0|\theta_i=L) = \frac{1}{2^{g-1}} \sum_{j=0}^{g-1} \binom{g-1}{j} Pr(y=0|h_g=j)$$

where $Pr(y|h_g)$ refers to the probability that a governing coalition with h_g high-ability members selects y. If $h_g \geq \frac{g+1}{2}$ such that at least a simple majority of coalition members are of high ability, then at least a simple majority of coalition members vote for the correct policy. Each high-ability member receives a perfectly accurate signal and votes with their signal in an AVE. Because the state is $\omega = 0$ with probability π, $Pr(y=0|h_g) = \pi$ if $h_g \geq \frac{g+1}{2}$. If coalition member i is of high ability, then $h_g = 1+j$ if $j \in \{0, 1, .., g-1$ of the other $g-1$ members are of high ability. If member i is low ability, then $h_g = j$. It follows that

$$\hat{\lambda}_g(y=0|\theta_i=H) - \hat{\lambda}_g(y=0|\theta_i=L) =$$

$$\frac{1}{2^{g-1}} \sum_{j=0}^{\frac{g-1}{2}} \binom{g-1}{j} [Pr(y=0|h_g=j+1) - Pr(y=0|h_g=j)] \tag{1}$$

If less than a majority of coalition members are of high ability, then some number of correct signals and corresponding votes from low-ability members are needed for the coalition to select the correct policy. Specifically, each of the h_g high-ability members is guaranteed to vote for the correct policy. Low-ability members must therefore supply at least $\frac{g+1}{2} - h_g$ correct votes to match policy to the state. Equivalently, the coalition selects the correct policy unless $\frac{g+1}{2}$ of the $g - h_g$ low-ability members receive incorrect signals. For a given h_g, the wrong policy is selected with probability

$$B(\frac{g+1}{2}, g-h_g, 1-q)$$

Because the accuracy of low-ability members' signals are the same in each state, the probability that the coalition selects the correct policy is the same in each state. The probability that the coalition selects $y = 0$ given h_g is therefore a weighted sum of the probability that it selects correctly if $y = 0$ and incorrectly if $y = 1$,

$$Pr(y = 0|h_g) = \pi(1 - B(\frac{g+1}{2}, g - h_g, 1 - q)) + (1 - \pi)B(\frac{g+1}{2}, g - h_g, 1 - q)$$

It is a property of the binomial distribution that for a fixed success probability, the probability of at least a fixed number of successes is increasing in the number of trials. Thus for each $j \in \{0, 1, .., \frac{g-1}{2}\}$, $B(\frac{g+1}{2}, g - j - 1, 1 - q) > B(\frac{g+1}{2}, g - j, 1 - q)$. This implies that (1) is positive for all g. Thus $\hat{a}(0, g) > 1/2$ for all g-AVE under closed voting. An analogous argument shows that $\hat{a}(1, g) < 1/2$. Voters therefore form more favorable beliefs about a coalition member if the group selects $y = 0$ than if it selects $y = 1$ in a g-AVE under closed voting.

As in the ADE, in a g-AVE a coalition member who faces a challenger of expected ability $k_i \in (\hat{a}(1, g), \hat{a}(0, g)]$ wins reelection if and only if the group selects the popular policy, $y = 0$. Such a politician therefore strictly prefers the group to select $y = 0$, regardless of his private signal. Because the politician does not know they types of any other members prior to voting, he correctly believes that his vote will be pivotal with positive probability. The coalition member therefore strictly prefers to vote for $y = 0$ if he receives a $s_i = 1$ signal. A coalition member's strategy is thus consistent with a g-AVE equilibrium if and only if

$$k_i \in \hat{A}_g \equiv [0, \hat{a}(1, g),] \cup (a(0, g), 1]$$

Let

$$\hat{W}_g \equiv \{i \in N : k_i \in \hat{A}_g\}$$

Proposition 7 *Under closed voting, a g-AVE exists if and only if $|\hat{W}_g| \geq g$.*

In the Appendix I show that $\hat{a}(0, g)$ and $\hat{a}(1, g)$ both approach 1/2 as g becomes arbitrarily large. In large coalitions, an individual member's vote is less likely to be pivotal and therefore less likely to influence the outcome of the group's decision. The coalition's policy decision therefore becomes a poor signal of an individual member's ability for large g.

Lemma 2 (Properties of Voter Beliefs in *g*-AVE Under Closed Voting)

$\hat{a}(1, g) < 1/2 < \hat{a}(0, g)$ *for all* g

$\lim_{g\to\infty} \hat{a}(1, g) = \lim_{g\to\infty} \hat{a}(0, g) = 1/2$

It follows that for each $k_i \neq 1/2$, a g exists such that $k_i \in \hat{A}_{g'}$ for all $g' > g$. Unlike voter beliefs in ADE, it is unclear analytically whether voter beliefs in the AVE monotonically converge as g rises, although numerical examination suggests they do as well.

For $k_i \sim F$, define $\hat{p}_g$ as the probability that $k_i \in \hat{A}_g$ and $\hat{\alpha}(g, n, y)$ as the probability that a g-AVE exists under closed voting in a group of size n. Like the g-ADE under closed deliberation, for each g, if $\hat{p}_g > 0$, the probability that a g-AVE exists under closed voting, $\hat{\alpha}(g, n, y)$, is strictly increasing in $n \geq g$ and approaches one as n goes to infinity.

Proposition 8 *Whether deliberation is allowed or not, under closed voting,*

- $\hat{\alpha}(g, n, y)$ *is increasing in* n *for all* g.
- *if* $\hat{p}_g > 0$, $\hat{\alpha}(g, n, y)$ *is strictly increasing in* $n \geq g$ *and* $\lim_{n\to\infty} \hat{\alpha}(g, n, y) = 1$.

Given the result in Proposition 8, an analogous argument to that which established the limit probability than an ADE exists in Proposition 1 implies that unless all $k_i = 1/2$ with probability one, the probability that any AVE exists under closed voting is increasing in n and approaches 1 for arbitrarily large n.

Corollary 2 *If* $\sum_{g=1}^{\infty} \hat{p}_g > 0$, $\lim_{n\to\infty} \hat{\alpha}(n, 0, y) = 0$.

It is natural to consider whether for a given g, existence of a g-AVE under closed voting implies the existence of a g-ADE under closed deliberation or vise versa. Remark 1 establishes that for the same sized governing coalition, the coalition selects policy correctly in a g-ADE with a higher probability than in a g-AVE. If larger coalitions are feasible in equilibrium in a g-AVE than a g-ADE—that is if $|\hat{W}_g| \geq g$ implies $|W_g| \geq g$ but not the other way around—Remark 1 implies that an AVE may exist that outperforms the largest ADE that exists. Whether this is possible or not remains an open question. If feasible AVE do outperform feasible ADE, the institutional implications are not obvious. Because ADE exist only if deliberation is permitted, prohibiting deliberation eliminates every ADE while keeping all AVE. Trivially, the best AVE and best ADE exist only if deliberation is allowed. Whether it is better in this setting to give politicians access to a larger set of incentive-compatible policymaking processes or restrict these options will depend on one's perspective on equilibrium selection and a more thorough understanding of the difference in policymaking performance between the best AVE and best ADE (if a difference exists at all) under various configurations of the model's parameters.

4.5.2 AVE Under Open Voting

In an AVE under open voting, each coalition member's individual vote and the votes of the other coalition members provide information to voters about their ability. Because politicians who are not members of the coalition vote uninformatively, voters learn nothing about a member of the coalition from the votes of non-members. As in the closed voting case, if deliberation is allowed, politicians do not exchange information and voters therefore learn nothing from politicians' messages. Thus voter posterior beliefs about a coalition member's ability depend only on the member's vote and the votes of the other coalition members. To identify voter beliefs about coalition member i in a g-AVE under open voting, let z denote the total number of votes cast by the other $g-1$ coalition members for policy $y = 0$. Let $\tilde{\lambda}_g(v_i, z|\theta_i)$ denote the likelihood of v_i and z given coalition member i's ability under open voting. For each $z \in \{0, 1, ..., g-1\}$,

$$\tilde{\lambda}(v_i = 0, z|\theta_i = H) = \frac{\pi}{2^{g-1}} \sum_{j=0}^{g-1} \binom{g-1}{j} b(z-j, g-1-j, q)$$

where j indexes the number of the other $g-1$ coalition members who are high ability and $b(z-j, g-1-j, q)$ is the binomial probability that $z-j$ out of $g-1-j$ low types receive a correct signal. If i is of high ability, he votes $v_i = 0$ if and only if the state is $\omega = 0$. Thus if $\theta_i = H$ and $v_i = 0$, votes cast by other members against $y = 0$ must be incorrect votes made by low-ability members. For low values of z, an improbably low number of other members must be of low-ability for the vote profile to be consistent with $\theta_i = H$. For each z given $\theta_i = L$,

$$\tilde{\lambda}_g(v_i = 0, z|\theta_i = L) =$$

$$\pi q \sum_{j=0}^{g-1} \frac{1}{2^{g-1}} \binom{g-1}{j} b(z-j, g-1-j, q) + (1-\pi)(1-q) \sum_{i=0}^{g-1} \frac{1}{2^{g-1}} \binom{g-1}{j} b(z, g-1-j, 1-q)$$

If a low-ability coalition member votes $v_i = 0$, then he either voted correctly given $\omega = 0$ or incorrectly given $\omega = 1$. For low values of z, it is more likely that low-ability member voted incorrectly given $\omega = 1$ that correctly given $\omega = 0$. Given these likelihoods, voter i's belief about coalition member i given $v_i = 0$ and z is

$$\mu_i(v_i = 0, z) = \tilde{a}(0, z, g) \equiv [1 + q + \frac{(1-\pi)}{\pi}(1-q)^{2z-g+2}]^{-1}$$

Likelihoods for $v_i = 1$ are similarly constructed and stated in the Appendix. Applying Bayes' rule given $v_i = 1$ and z with these likelihoods yields voter posterior beliefs

$$\mu_i(v_i = 1, z) = \tilde{a}(1, z, g) \equiv [1 + q + \frac{\pi}{(1-\pi)}(1-q)^{g-2z}]^{-1}$$

Comparing $\tilde{a}(1, z, g)$ and $\tilde{a}(0, z, g)$ for an arbitrary z and g reveals that $\tilde{a}(0, z, g) >$

$\tilde{a}(1, z, g)$ if and only if $z \geq \frac{g-1}{2}$. If exactly one half of the other members vote each way, the voter interprets $v_i = 0$ as evidence that the coalition member is more likely to be of high ability than low ability. The follows from $q > \pi > 1/2$. It is straightforward to check that $\tilde{a}(0, z, g)$ is strictly increasing in z, $\tilde{a}(1, z, g)$ is strictly decreasing in z. As the number of other members who vote for $y = 0$ rises, $v_i = 0$ becomes stronger evidence that coalition member i is of high ability. Moreover,

$$\tilde{a}(0, g-1, g) > \tilde{a}(1, 0, g) > \tilde{a}(0, g-2, g) > ... > \tilde{a}(1, g-2, g) > \tilde{a}(0, 0, g) > \tilde{a}(1, g-1, g)$$

In order for coalition members to be willing to vote for the policy that corresponds to their signal, they must believe that their probability of reelection is better if they follow their signal than if they vote for the other policy. Given the ordering of $\tilde{a}(v_i, z, g)$, it is clear that if $k_i > \tilde{a}(0, g-1, g)$, the coalition member cannot benefit from voting against his signal. His challenger is of sufficiently high expected ability that electoral defeat is inevitable, regardless of how he votes. Similarly, if $k_i \leq \tilde{a}(1, g-1, g)$, the coalition member wins reelection no matter how he votes.

If $k_i \in [\tilde{a}(0, z, g), \tilde{a}(1, g-1-z, g))$, on the other hand, the coalition member loses reelection unless he votes for $y = 0$ and all other coalition members vote for $y = 0$ too. The member therefore strictly prefers to vote for $y = 0$ if he receives a $s_i = 1$ signal. For similar intervals such that $k_i \in [\tilde{a}(0, j, g), \tilde{a}(1, g-1-j, g))$ for $j \in \{0, 1, ..., g-1\}$, pandering by voting against one's signal may be electorally beneficial. If a politician facing such a challenger votes $v_i = 0$, he wins reelection if at least j other members vote for $y = 0$ too. If he votes for $v_i = 1$, he wins his election only if $j + 1$ other members vote $v_i = 1$.

If $k_i \in [\tilde{a}(1, 0, g), \tilde{a}(0, g-2, g))$, politician i wins reelection if and only if the vote is unanimous, regardless of which policy receives unanimous votes. The probability of a unanimous vote is equivalent in both states. The coalition member therefore is best off voting for the policy that corresponds state that he believes is more likely. Because private signals are informative, it is optimal for the coalition member to play his equilibrium strategy and follow his signal. Similarly, for any interval such that $k_i \in [\tilde{a}(1, g-j, g), \tilde{a}(0, j, g))$. Whichever policy the politician votes for, he wins reelection if at least $j+1$ other members vote the same. The probability of each vote margin is the same in each state. It therefore optimal for the politician to vote for the state he believes is more likely by voting with his signal. Proposition 9 summarizes these sufficient conditions for a g-AVE.

Proposition 9 *Under open voting, a g-AVE exists if the number of k_i such that*

$$k_i \in [0, \tilde{a}(0, g-1, g)) \cup [\tilde{a}(1, g-1, g), 1] \bigcup_{0 \leq z \leq g-2} [\tilde{a}(1, z, g), \tilde{a}(0, g-2-z, g))$$

is greater than or equal to g.

Unlike voter beliefs in the AVE with closed voting and the ADE, the best and worst beliefs that voters form about coalition members with positive probability in a g-AVE under open voting, $\tilde{a}(0, g-1, g)$, and $\tilde{a}(1, g-1, g)$, do not converge to $1/2$ as g approaches infinity. Rather, the best possible belief, $\tilde{a}(0, g-1, g)$, is strictly increasing and approaches $\frac{1}{1+q}$ as g becomes arbitrarily large. The worst possible belief, $\tilde{a}(1, g-1, g)$, is strictly decreasing and approaches 0 as g approaches infinity. Note that these limiting beliefs are equivalent to the beliefs that voters would for by Bayes' rule if they were to observe the state after observing their representative's sincere vote. For these extreme values of z in a large coalition, unanimity of all other members effectively reveals the state to the voter.

Proposition 10 *The best possible belief about a coalition member that a voter can have in a g-AVE with open voting, $\tilde{a}(0, g-1, g)$, is strictly increasing in g with $\lim_{g\to\infty} \tilde{a}(0, g-1, g) = \frac{1}{1+q}$.*

The worst possible belief about a coalition member that a voter can have in a g-AVE with open voting, $\tilde{a}(1, g-1, g)$, is strictly decreasing in g with $\lim_{g\to\infty} \tilde{a}(1, g-1, g) = 0$.

Without a necessary condition for the existence of a g-AVE under open voting, it is difficult to identify whether increasing coalition size attenuates or exacerbates individual incentives to pander. The finite part of Proposition 10 does suggest, however, that the main result that politicians in larger groups face weaker incentives to pander may not robust to open voting. Under open voting, politicians who can be trusted not to pander in smaller coalitions may be tempted to pander in larger coalitions. The asymptotic part of Proposition 10, on the other hand, suggests that in large coalitions, open voting reduces incentives to pander through a different mechanism than in the ADE and AVE with closed voting. In an ADE under closed deliberation and an AVE under closed voting, the number of politicians involved in policymaking obscures the each individual's ability as voters must infer their representatives contribution to a collective decision. The more politicians who are involved, the less likely one's representative's information is to be to the group's decision. The policy decision therefore becomes a less precise signal of the quality of an individual politician's information. If voting is observed, however, and politicians vote responsively to their information, voters observe an obviously much more precise signal about their representative's information. As the size of the group expands, this signal is not obscured. Rather, voters have access to more information with which to judge their representative's ability. The votes of other coalition members help voters form a more precise belief about the state and thus infer more accurately whether their representative voted for the right or wrong policy. Open voting may therefore prevent pandering by disciplining politicians in large coalitions rather than by obscuring their responsibility—if the number of coalition members who vote on the basis of their private information is large, politicians who attempt to pander may increasingly fear getting caught. Examining the AVE under open voting more thoroughlyis an obvious avenue for further analysis of the model.

4.6 Partial Deliberation

Insofar as open voting may hinder the ability of politicians to make good policy in the face of pandering incentives, analysis of the PDE suggests that closed deliberation can compensate for this. If politicians are allowed to deliberate privately prior to open voting, politicians can form a governing coalition in a g-PDE that selects the correct policy with the same probability as a g-AVE under identical conditions as those that are necessary and sufficient for a g-AVE under closed voting.

In a g-PDE under open voting and closed deliberation, members of the governing coalition reveal only their signal during deliberation. Each coalition member then votes for the policy that receives a simple majority of signals. Despite the openness of coalition voting, voters do not learn any information about their representative's ability from his individual vote. Voters condition their beliefs about their representative only on the policy that the group selects by unanimous coalition vote. Voter beliefs in a PDE are therefore equivalent to their beliefs in a AVE under closed voting (Definition 6). Given these beliefs, coalition members face identical incentives to manipulate policy in the PDE as in the AVE under closed voting. The only difference is that in the PDE coalition members can manipulate policy by misreporting their signal during communication rather than by voting against their signal.

Proposition 11 *Under closed deliberation and open voting, a g-PDE exists if and only if $|\hat{W}_g| \geq g$.*

Because the g-PDE exists under identical conditions as the AVE under closed voting, it inherits the properties of the AVE under closed voting described in Proposition 8 and Corollary 2. In particular, the probability that each g-PDE exists is increasing in n and the probability that a PDE exists approaches 1 as n approaches infinity unless all $k_i = 1/2$ with probability one.

The PDE is only meaningfully distinct from an AVE under closed deliberation and open voting. Under closed deliberation and closed voting, the PDE exists under the same necessary and sufficient conditions as the AVE under closed voting. Under open deliberation and open voting, voter posterior beliefs in a g-PDE are identical to those in a PDE. The PDE therefore exists under the same necessary and sufficient conditions as the AVE under open deliberation and open voting. Under both deliberative alternatives to closed deliberation and open voting, all that distinguishes a PDE from an AVE is the mechanism through which coalition members may manipulate policy. In a PDE, politicians pander by lying about their signal in the communication stage rather than voting insincerely in the voting stage.

Analysis of PDE reveals the most flexible institutional arrangement is closed deliberation and open voting in the sense that if any of the equilibria analyzed in this paper exist under an alternative set of institutional assumptions, an equilibrium that selects the correct policy with the same probability exists under identical necessary and sufficient conditions under closed deliberation and open voting.

5 Conclusion

In *Federalist 70*, Alexander Hamilton expressed fear that members of a large collective decision-making body would have weaker incentives to act in the public interest than a single decision-maker because blame for an action deemed imprudent by the electorate could be placed on other members. In this paper I have shown that under certain conditions, what Hamilton recognized as a weakness of collective decision-making units can in fact be a strength. If voters are less informed about what policies are in their interest than those who they appoint to make decisions on their behalf, they may improperly punish those responsible for unpopular policies and improperly reward those responsible for popular policies. In this setting, the sharing of blame enables members of large deliberative bodies with non-transparent procedures to bear the electoral consequences of unpopular policies where executives or members of small legislatures cannot.

References

Acemoglu, D., G. Egorov, and K. Sonin (2013). A political theory of populism. *The Quarterly Journal of Economics 128*(2), 771–805.

Ashworth, S. (2012). Electoral Accountability: Recent Theoretical and Empirical Work. *Annual Review of Political Science 15*(1), 183–201.

Ashworth, S. and K. W. Shotts (2010). Does Informative Media Commentary Reduce Politicians' Incentives to Pander? *Journal of Public Economics 94*, 838–847.

Austen-Smith, D. and J. Banks (1996). Information aggregation, rationality, and the Condorcet jury theorem. *American Political Science Review 90*, 34–45.

Austen-Smith, D. and T. Fedderson (2009). Information aggregation and communication in committees. *Philisophical Transactions of the Royal Society B, Biological Sciences 364*(1518), 763–769.

Ben-Yashar, R. and J. Paroush (2000). A nonasymptotic Condorcet jury theorem. *Social Choice and Welfare 17*, 189–199.

Berend, D. and L. Sapir (2005). Monotonicity in the Condorcet jury theorem. *Social Choice and Welfare 24*, 83–92.

Boland, P. (1989). Majority Systems and the Condorcet Jury Theorem. *Journal of the Royal Statistical Society 38*(3), 181–189.

Buisseret, P. (2016). Together or Apart? On Joint Versus Separate Electoral Accountability. *Journal of Politics 78*(2), 542–556.

Canes-Wrone, B., M. Herron, and K. W. Shotts (2001). Leadership and Pandering: A Theory of Executive Policymaking. *American Journal of Political Science 45*(3), 532–550.

Coughlan, P. (2000). In Defense of Unanimous Jury Verdicts: Mistrials, Communication, and Strategic Voting. *American Political Science Review 94*(2), 375–393.

Duggan, J. and C. Martinelli (2001). A Bayesian Model of Voting in Juries. *Games and Economic Behavior 37*(2), 259–294.

Duggan, J. and C. Martinelli (2017). The Political Economy of Dynamic Elections: Accountability, Commitment, and Responsiveness. *Journal of Economic Literature 55*(3), 916–984.

Fedderson, T. and W. Pesendorfer (1998). Convicting the Innocent: The Inferiority of Unanimous Jury Verdicts Under Strategic Voting. *American Political Science Review 92*(1), 23–35.

Fehrler, S. and N. Hughes (2018). How Transparency Kills Information Aggregation: Theory and Experiment. *American Economic Journal: Microeconomics 10*(1), 181–209.

Fox, J. and S. Jordan (2011). Delegation and Accountability. *Journal of Politics 73*(3), 831–844.

Fox, J. and K. W. Shotts (2009). Delegates of Trustees? A Theory of Political Accountability. *Journal of Politics 71*(4), 1225–1237.

Fox, J. and R. Van Weelden (2010). Partisanship and the Effectiveness of Oversight. *Journal of Public Economics 94*, 674–687.

Fox, J. and R. Van Weelden (2012). Costly Transparency. *Journal of Public Economics 96*, 142–150.

Gersbach, H. and V. Hahn (2008). Should the Individual Voting Records of Central Bankers be Published? *Social Choice and Welfare 30*(4), 655–683.

Gersbach, H. and V. Hahn (2012). Information Acquisition and Transparency in Committees. *International Journal of Game Theory 41*(2), 427–453.

Hahn, V. (2017a). Committee Design with Endogenous Participation. *Games and Economic Behavior 102*, 388–408.

Hahn, V. (2017b). On the Drawbacks of Large Committees. *International Journal of Game Theory 46*, 563–582.

Kartik, N., F. Squintani, and K. Tinn (2015). Information revelation and pandering in elections.

Levy, G. (2007). Decision Making in Committees: Transparency, Reputation, and Voting Rules. *American Economic Review 97*(1), 150–168.

Maskin, E. and J. Tirole (2004). The Politician and Judge: Accountability in Government. *American Economic Review 94*(4), 1034–1054.

Maskin, E. and J. Tirole (2019). Pandering and Pork-barrel Politics. *Journal of Public Economics 176*, 79–93.

Mattozzi, A. and M. Y. Nakaguma (2019). Public versus Secret Voting in Committees.

Meade, E. E. and D. Stasavage (2008). Publicity of Debate and the Incentive to Dissent: Evidence from the US Federal Reserve. *Economic Journal 118*(528), 695–717.

Midjord, R., T. R. Barraquer, and J. Valasek (2017). Voting in large committees with disesteem payoffs: A 'state of the art' model. *Games and Economic Behavior 104*, 430–443.

Morelli, M. and R. Van Weelden (2013). Ideology and Information in Policymaking. *Journal of Theoretical Politics 25*(3), 412–439.

Nitzan, S. and J. Paroush (2017). Collective decision making and jury theorems. *The Oxford Handbook of Law and Economics 1*.

Persico, N. (2004). Committee design with endogenous information. *The Review of Economic Studies 71*(1), 165–191.

Prat, A. (2005). The Wrong Kind of Transparency. *American Economic Review 95*(3), 862–877.

Stasavage, D. (2007). Polarization and Publicity: Rethinking the Benefits of Deliberative Democracy. *Journal of Politics 69*(1), 59–72.

Ujhelyi, G. (2014). Civil Service Reform. *Journal of Public Economics 86*(4), 1089–1105.

Visser, B. and O. Swank (2007). On Committees of Experts. *The Quarterly Journal of Economics 122*(1), 337–372.