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ELECTIONS AND DIVISIVENESS: THEORY AND EVIDENCE

ELLIOTT ASH, MASSIMO MORELLI, AND RICHARD VAN WEELDEN

Abstract. We analyze the effort allocation choices of incumbent politicians when voters are uncertain about politician preferences. There is a pervasive incentive to "posture" by over-providing effort to pursue divisive policies, even if all voters would strictly prefer to have a consensus policy implemented. As such, the desire of politicians to convince voters that their preferences are aligned with the majority of the electorate can lead them to choose strictly pareto dominated effort allocations. Transparency over the politicians' effort choices can either mitigate or re-enforce the distortions depending on the strength of politicians' office motivation and the capacity for the holder of the office in question to effect change. When re-election concerns are paramount transparency about effort choices can be bad for both incentivizing politicians to exert effort on socially efficient tasks and for allowing voters to select congruent politicians. We take our theoretical results to the data with an empirical analysis of how U.S. Congressmen allocate time across issues. Consistent with the theory, we find evidence of political posturing due to elections (among U.S. Senators) and due to higher transparency (among U.S. House Members).

Keywords: Posturing, Reputation, Transparency, Effort Allocation, Multi-task.

JEL: D72, D78, D82.

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> *"Most citizens want a secure country, a healthy economy, safe neighborhoods, good schools, affordable health care, and good roads, parks, and other infrastructure. These issues do get discussed, of course, but a disproportionate amount of attention goes to issues like abortion, gun control, the Pledge of Allegiance, medical marijuana, and other narrow issues that simply do not motivate the great majority of Americans."*

Fiorina et al. (2006, p. 202).

> *"Can't we wait on the things that we're going to yell at each other about and start on the things that we agree on?"*

Austan Goolsbee, *Meet the Press*, August 7, 2011.

1. Introduction

As demonstrated by the above quotes, there is a widespread perception that the political process involves excessive amounts of time devoted to narrow and divisive issues. If this is true, it raises the question of why politicians exert so much time on these issues. Moreover, it is sometimes argued that the emphasis on divisive issues could be a response to electoral pressures (e.g., Hillygus and Shields 2014). This suggests that, far from pulling candidates towards the center, concern for re-election may distract politicians from dealing with important issues that lack a substantial dimension of ideological conflict. In this paper we seek to understand why, and to what extent, electoral pressures drive the focus on divisive issues.

We provide a positive theory of incumbent politicians' allocation of effort and resources across policy issues — issues that differ in terms of importance as well as in terms of how divisive they are in public opinion. We show that when voters are uncertain about politicians' preferences, and politician preferences affect their policy choices in the future, politicians have an incentive to over-provide effort on divisive issues, at the expense of common-values ones, in order to signal that they hold preferences that make them more electable. This is true even if those issues are comparatively less important. We then exploit variation in the time to re-election for U.S. Senators to demonstrate empirically that, consistent with our theory, Senators focus more time on divisive issues when elections are more imminent.

To address our motivating question, we need a new theory of how electoral pressures can induce distortions in policymaking. By and large the previous literature on electoral pressures has focused on the incentives for politicians to "pander" (e.g., Canes-Wrone et al. 2001, Maskin and Tirole 2004),[1] whereby politicians, who may have better information than voters about the effects of different policies, distort this information in an effort to signal competence or congruence with the electorate. These models cannot address the question that motivates the current paper: which policy issues do politicians focus on. To address that question, we need a model that allows politicians to divide effort across issues that differ in terms of importance and divisiveness. Moreover, a model about issue selection has an advantage over pandering models in terms of the empirical testability of its predictions. Predictions related to pandering incentives are difficult to test empirically because they concern the private information of policymakers, something which is, by definition, unobservable. In contrast, the allocation of resources across issues can plausibly be observed by looking at time spent addressing different issues. Here we do so by looking at floor speeches made by U.S. Senators and Members of the House of Representatives.

The literature on politicians' choice of which issues to focus on is relatively small and mainly focuses on salience concerns with fixed candidate policies. Colomer and Llavador (2011), Aragones et al. (2015), and Dragu and Fan (2014) all focus on politicians' attempts in campaigns to add salience to issues on which their party has an advantage.[2] More generally, there is a large literature in economics and political science stemming from Holmstrom and Milgrom (1991), on how agents allocate effort across tasks.[3] This literature focuses mainly on signaling competence rather than preferences and, to our knowledge, none of the multi-task papers consider the allocation of effort between divisive and common-values issues.

In our model, an incumbent politician decides how to allocate effort across two issues, a common-values issue and a divisive issue. Like voters, politicians vary in their policy preferences on the divisive issue but share the same preferences on the common-values one. The voters observe the incumbent's actions, draw inferences about her type, then vote on whether to re-elect her or not. In the baseline model, politicians are more likely to be re-elected if they are seen to have preferences aligned with the median voter, though we extend the model to allow

[1]See also Canes-Wrone and Shotts (2007), Fox (2007), Fox and Stephenson (2014), Acemoglu et al. (2013), and Morelli and Van Weelden (2013) among others.
[2]Dragu and Fan (2014) predict that in two party elections only the minority party has an incentive to increase the salience of issues with a high heterogeneity and variance of opinions (and sometimes even when the party does not have an expected advantage), something quite distinct from our incumbents' incentive to focus on divisive issues.
[3]See Caillaud and Tirole (2002), Ashworth (2005), and Ashworth and Bueno de Mesquita (2006), among others.

for the possibility that politicians may be more accountable to core supporters or the primary electorate.

Voter uncertainty about politician preferences on divisive issues, coupled with the potential for policy disagreements in a future period, motivates politicians to focus effort on divisive issues rather than common-values ones. We refer to this excessive exertion of effort on divisive issues at the expense of common-values issues as *posturing*. Politicians posture because more highly divided preferences on an issue means greater uncertainty about her preferences, increasing the electoral value of signaling. We show that *even when* there exist very important common-values issues that everybody agrees should be solved first, incumbent politicians *over-provide* effort on divisive issues to signal their preferences. Hence, posturing may involve first-period effort allocations that are strictly pareto dominated.[4] With a sufficiently strong re-election motive, we get a pooling equilibrium in which all politicians posture by focusing on the divisive issue. A pooling equilibrium not only induces distortions in the politician's behavior; it also impedes the ability of voters to screen politicians and retain those with more aligned policy preferences.

In the first part of the paper we assume that voters can observe the effort allocation chosen by the incumbent politician. In the second part we ask what happens when voters cannot observe politicians' effort allocation, but only the policy consequences that result. In some cases it is more difficult than others to observe the effort exerted. Further, the degree of transparency in policymaking can be influenced by institutional and legal factors: from the level of detail publicly released in budgets about how resources are allocated across departments, to the access cameras and cable news organizations have to congressional, committee and cabinet deliberations, to the ongoing legal battles about the disclosure of the emails of White House staffers.

Although the degree of transparency can influence the political process in many ways, our analysis focuses on the allocation of effort between common-values and divisive issues. We show that, far from guaranteeing that politicians focus on socially efficient policies, increased transparency can increase the electoral benefit from socially inefficient posturing.[5] While the incentive to posture still exists when politician effort choices are non-transparent, increased

[4]As has been discussed in the previous literature, electoral pressures can have both positive and negative effects on politician behavior, and there is often a friction between incentivizing politicians to implement desirable policies today and selecting candidates who will implement desirable policies in the future (e.g., Fearon 1999).

[5]Dan Rostenkowski, the longtime chairman of the House Ways and Means committee, shared this concern, arguing that "as much as people criticize the back room, the dark room, or the cigar or smoke-filled room, you get things done when you're not acting." (Koeneman 2013)

transparency may not only increase posturing, but also decrease the amount voters learn about policymakers in the process. The intuition is that, as posturing is more advantageous when effort choices are more transparent, greater transparency increases the likelihood that the equilibrium involves pooling with maximal posturing. So, for appropriate parameters, transparency can be harmful *both* for policymaking in the current period and for selecting congruent politicians in the future.

We conclude the paper with an empirical study of our posturing theory. Based on our model, we should expect incumbent politicians to exert more effort on divisive issues when (1) electoral pressures are stronger, and (2) when there is greater transparency about the politician's actions. To identify stronger electoral incentives, we use the staggered election cycle in the U.S. Senate. To identify higher transparency, we use the instrument for news coverage of U.S. House Members developed by Snyder and Stromberg (2010). We proxy for effort exerted across issues with the amount of speech dedicated to different issues on the House/Senate floor, using a measure of divisive speech based on Gentzkow and Shapiro (2010) and Jensen et. al (2012). Consistent with our posturing theory, we find that both greater electoral pressures and increased transparency increase divisiveness, with more conclusive evidence in support of the first hypothesis than the second. Senators engage in more divisive speech when elections are more imminent and House Members engage in more divisive speech when there is higher news transparency. These results contribute to an emerging literature in empirical political economy on how preferences and institutions interact to determine politician behavior (e.g., Levitt 1996, List and Sturm, 2006).

In sum, we provide a rationale for why electoral pressures and transparency can incentivize politicians to focus excessive effort on divisive issues and then present empirical evidence in support of that rationale. However, our empirical results should be of broader interest than as a test of our model of divisive politics. To the extent that an increased focus on divisive issues is socially harmful—as our theoretical model, and other scholars (e.g., Fiorina et al. 2006), argue—our results provide important empirical verification for the argument that electoral pressures can induce distortions in policymaking. While a large theoretical literature has explored the risks of socially harmful pandering, and the ways in which increased transparency can exacerbate these distortions (see Ashworth 2012 for an overview), there has been little empirical work to document these theoretical findings. Our results provide an important first step in understanding how electoral pressures can induce distortions from an empirical perspective.

Our results also speak to the debate on the causes of electoral polarization. While there is extensive evidence documenting the significant and increased polarization between the parties (McCarty et al. 2006), it is less clear whether this polarization reflects deep divisions in the broader electorate. While some authors (Fiorina et al. 2006, Lee 2009, Bafumi and Herron 2010) argue that political disagreements are excessive given the degree of ideological heterogeneity in the electorate, others (Abramowitz 2010, Jacoby 2014) document substantial disagreements among voters as well. We find that the electoral process can be a force to magnify policy disagreements. However, the electoral process only magnifies, it does not create, polarization: the excessive focus on divisive issues only arises because politicians feel compelled to signal their preferences on divisive issues that voters do care about.

The paper is organized as follows: in section 2 we present the model, section 3 analyzes the equilibrium, first when politicians' effort is observable then when only outcomes are. Section 4 extends the model to allow for the possibility that politicians may signal to their constituency rather than the broader electorate. Section 5 reports the empirics and section 6 concludes. An online appendix includes the proofs of the theoretical results and additional detail on the empirical specification.

2. Model

We consider a two-period model in which a politician takes action to influence policy in each period, with an election between periods. In each period the politician has to decide how to allocate effort, or other scarce resources such as money or personnel, between two issues, A and B. That is, the politician allocates effort $w^A \in [0,1]$ to issue A and $w^B \in [-1,1]$ to issue B, and faces the constraint $w^A + |w^B| \leq W$, where $W \in (0,2)$. We normalize the status quo policy to be 0 in each dimension, and assume that if effort w^A is exerted on issue A the policy will be $p^A = 1$ with probability w^A and 0 with probability $1 - w^A$. Similarly devoting effort $w^B \geq 0$ ($w^B < 0$) to issue B results in policy $p^B = 1$ ($p^B = -1$) with probability $|w^B|$ and $p^B = 0$ with probability $1 - |w^B|$. The politician has to decide both how to divide her time across issues A and B (w^A and $|w^B|$) as well as whether to spend the time she devotes to B on increasing ($w^B > 0$) or decreasing ($w^B < 0$) the policy in that dimension.[6]

[6]We could allow politicians to have the option to decrease the policy in the A dimension as well, but this would be uninteresting as all voters and politicians have a common interest in p^A not decreasing. Moreover, while we assume that the mapping between effort and policy change is the same for both issues this is not necessary. We

When W is small, the politician knows that no matter which policy she pursues it is unlikely to have an effect; when $W \approx 2$, she is able to change the policy in both dimensions with high probability if she so chooses; for intermediate values of W the politician faces a tradeoff where she can influence policy but finds it difficult to get everything she wants implemented. Thus W is related to the power of the office in question. For example, the Prime Minister in a unicameral parliamentary system, as the head of both the executive and legislative branch, is likely to have a higher W than the U.S. President. Similarly, within the same institutional system, a Congressman, Senator, or Member of Parliament would no doubt have a lower W than the President or Prime Minister.

In addition to caring about policy, voters receive some additional payoff from having a politician who is high valence—someone who is an able administrator or who they like personally. We assume that the distribution of valence among politicians is normally distributed with mean 0 and variance σ^2, where $\sigma > 0$. The politician's valence is unknown to both the politician and voters initially, but is revealed to everyone when the politician is in office and constant across periods. As the incumbent does not know her own valence when choosing how to allocate effort in the initial period, and voters learn the incumbent's (time invariant) valence regardless of her action, the valence component serves only to ensure that voters are (generically) not indifferent between re-electing the incumbent and not. This ensures that the probability of re-election will vary continuously with the voters' beliefs about the politician's type. We focus on the case where σ is small so the primary concern of the voters is with how politicians allocate their effort.

In each period, $t \in \{1, 2\}$, the stage game utility of voter i is

$$-\gamma|\theta_t - p_t^A| - (1-\gamma)|x_i^B - p_t^B| + v_t^j,$$

where p_t^A and p_t^B are the policies implemented in period t, v_t^j is the valence of politician j who is in office in period t, and θ_t and x_i^B are the preferred policies in each dimension for voter i. So $\theta_t \in \{0, 1\}$ reflects whether all voters prefer policy $p^A = 1$ or $p^A = 0$ in period t. Conversely, the voters may be type $x^B = -1$ or $x^B = 1$ reflecting their preferred policy in dimension B. To keep the analysis simple we assume that preferences in the B dimension are deterministic, although this is not necessary for our analysis. We assume that a strict majority of voters, $m \in (\frac{1}{2}, 1)$, are type $x_i^B = 1$ and so prefer higher policies in the B dimension. The assumption that $m \geq 1/2$

could allow this to be asymmetric — for example, assuming the probabilities of policy change are $\alpha^A w^A$ and $\alpha^B |w^B|$ respectively — and the results would still hold just with additional parameters and algebra.

is without loss of generality, so the meaningful assumption is that the electorate is not perfectly divided on issue B ($m \neq 1/2$) — something we would expect to hold generically.

We assume that $\theta_1 = 1$ so that, in the current period, it is in the interest of all voters to have the A issue addressed, and the probability that $\theta_2 = 1$ is $q \in (0,1)$. This means that, with some probability, the voters will be content with the status quo policy on A in the second period. As our analysis focuses on the behavior of politicians in the first period we assume that $\theta_1 = 1$ so voters would benefit from (appropriately directed) effort on two different tasks, making the politician's multi-task problem non-trivial. In the second period, it is important that the politician's type matters for voters' payoffs. We ensure this by assuming that $q < 1$ and so different types will prefer different effort allocations with positive probability in the second period. Finally, we assume that $\gamma \in (\frac{1}{2}, 1)$ so that all voters care more about issue A than issue B. The assumption that $\gamma > \frac{1}{2}$ is not necessary for our results, but corresponds to the case where all players prefer A to be done first, and so biases against effort focused on B. When $\gamma < 1/2$, politicians still focus first on the B issue, and this effort allocation is optimal for a majority of voters. We focus on the case in which $\gamma > \frac{1}{2}$ in order to provide a theory of why politicians may not address common-values issues *even if* they are more important.

We assume that politicians are drawn from a (possibly proper) subset of the voters themselves, and so, like the voters, the preferences of the politicians are homogenous on the A dimension and heterogenous on the B dimension. We assume that fraction $m^P \in (\frac{1}{2}, 1)$ of the politicians are type $x^B = 1$ and that $1 - m^P$ are type $x^B = -1$. We refer to a politician of type $x^B = 1$ as a majority-type politician, since her policy preferences are aligned with the majority of voters, and a politician of type $x^B = -1$ as a minority type. If $m^P = m$ then the distribution of politician preferences is the same as that of the voters, and, although we allow for this possibility, we do not assume it.[7]

In addition to having preferences over policy, the politician receives a positive benefit ϕ from being in office. So the stage game utility of politician j if (p_t^A, p_t^B) is implemented is

$$\phi - \gamma|\theta_t - p_t^A| - (1-\gamma)|x_j^B - p_t^B|,$$

[7]We do assume that a majority of politicians hold the same policy preferences as the majority of voters. This plays no role in the mechanism we consider, but, if $m^P < 1/2$, then, because majority type politicians would have more to lose from not securing re-election, it is possible, for some parameters, to support other equilibria in which there is additional costly signaling to convince the voters that the re-election motive is strong.

if they are in office, and, if politician $k \neq j$ is in office,

$$-\gamma|\theta_t - p_t^A| - (1-\gamma)|x_j^B - p_t^B| + v_t^k.$$

If out of office then a politician is identical to a voter with the same policy preferences, but in office she receives a benefit ϕ from holding office regardless of her own valence. The parameter ϕ could include monetary and non monetary rewards from being elected, or could be a reduced form of the continuation value of remaining in office, and so would be affected by institutional factors such as the salary in office and whether there are term limits. For simplicity we assume that effort is not costly for the elected politician — the incentives to exert costly effort by incumbent politicians have been studied in the previous literature.

Voters form beliefs about the type of the politician. As there are only two types we define

$$\mu \equiv Pr(x_j^B = 1),$$

to be the voters' beliefs that the incumbent politician is the majority type. The game is repeated with discount factor $\delta \in (0,1)$. The timing is as follows.

(1) In period 1 a politician is randomly selected to be in office for that period. The politician knows her own type, but voters only know the type distribution.
(2) The politician decides how to allocate effort (w^A and w^B). Two subcases:
   (a) The voters observe the effort decision — transparency case;
   (b) Voters do not observe the effort decision — no transparency case.
(3) The incumbent's valence v^j is realized and publicly observed. The politician's valence is constant across periods.
(4) The policies are determined, with all players receiving their utilities for period 1.
(5) Voters observe outcomes and update beliefs about the politician, then vote whether to re-elect her or not. The election is determined by majority rule and if the politician is not re-elected a random replacement is drawn.
(6) θ_2 is realized, and the politician decides how to allocate effort in period 2.
(7) The policy is realized with all players receiving their payoff for period 2.

Notice that we specify the game so that, regardless of the outcome in the period 1, the status quo policy in each dimension in period 2 is the same as in period 1 (i.e., $p^y = 0$ for $y \in \{A, B\}$). This could be because the policy will revert if the politician does not exert effort defending the new policy from legal challenges or because new policy issues arise each period and preferences are correlated across the issues in different periods. The assumption of reversion to the status quo in the second period simplifies the algebra but does not drive our results. Regardless of the status quo in the second period, politicians of different types will disagree on the optimal effort allocation with positive probability in the second period,[8] so the type of the politician is relevant to voters. Hence signaling incentives exist in the first period, the period our analysis focuses on.

Finally, note that we have assumed the election takes place by majority rule and abstracted from parties or the selection of candidates. However, in Section 4 we extend the basic framework to allow for parties and primaries, in which case incumbent politicians may want to signal congruence with their party rather than the broader electorate.

3. Analysis

3.1. **Politician Second Period Behavior and the Voters' Re-election Decision.**

We look for Perfect Bayesian Equilibria, restricting attention to those in which all voters always hold the same beliefs about the politician's type. We begin by solving for politician behavior in period 2, at which point the politician is unaccountable to voters. Consequently, regardless of the observability of the politician's effort choice, the politician will choose the effort allocation that maximizes her policy payoff. As $\gamma > 1/2$, all politicians, as well as all voters, care more about issue A than issue B. Hence, the politician focuses first on addressing issue A, if any change is desired on that issue ($\theta_2 = 1$). The politician will then spend any left over effort on the B dimension, with the majority type exerting effort to implement $p^B = 1$ and the minority type to implement $p^B = -1$. We then have the following lemma.

Lemma 1. ***Politician Action in the Second Period***
In period $t = 2$,

(1) *a politician of the majority type will choose $w^A = \min\{W, 1\}$ and $w^B = W - w^A$ when $\theta_2 = 1$, and $w^B = \min\{W, 1\}$ and $w^A = 0$ when $\theta_2 = 0$.*
(2) *a politician of the minority type will choose $w^A = \min\{W, 1\}$ and $w^B = w^A - W$ when $\theta_2 = 1$ and $w^B = -\min\{W, 1\}$ and $w^A = 0$ when $\theta_2 = 0$.*

[8] When $\theta_2 = 0$ majority-type politicians are incentivized to exert effort to increase the policy in the B dimension, and minority types to decrease it. Regardless of the status quo policy in the second period at least one of those alternatives is feasible and so majority-type voters receive a higher expected payoff from majority-type politicians.

Note that, as $q \in (0,1)$, the second period behavior of different politician types differs with positive probability regardless of W. This makes the policy preferences of the politician relevant to the voters. We next consider the decision faced by the voters. Voters who are of the majority (minority) type will support the incumbent if she is sufficiently likely to be of the majority (minority) type relative to a random replacement. How high a probability voters must place on the politician being their desired type depends on her valence. We assume that all voters vote for the candidate they prefer, and that the politician is re-elected if and only if she receives at least half the votes. Note that this means that the politician will be re-elected if and only if majority type voters support her re-election. As the next lemma shows, the probability the incumbent is re-elected is strictly increasing in μ, the voters' belief that she is the majority type, with the incumbent re-elected with probability greater (less) than 1/2 if she is more (less) likely to be the majority type than a randomly drawn replacement.

Lemma 2. ***Voter Behavior***
The probability the incumbent is re-elected is strictly increasing in μ, *with* $Pr(re-elect|\mu) = m^P) = 1/2$.

Having determined how the politician's re-election probability depends on the beliefs induced by her action, we turn to analyzing the first period effort choice. We first analyze the model with transparent effort, then in the case in which only the outcome is observable.

3.2. **Equilibrium with Observable Effort Choices.** We first analyze the case with transparent effort—when voters observe (w^A, w^B) as well as (p^A, p^B). As this is a signaling game it will admit many equilibria, especially when re-election concerns are paramount (ϕ is high), depending on voters' off-path beliefs. However, applying criterion D1 from Cho and Kreps (1987) generates a unique equilibrium prediction—the equilibrium is unique up to the beliefs at certain off-path information sets. While other equilibria are potentially interesting, we focus on the unique D1 equilibrium. Criterion D1 simply says that, if the voters see an out of equilibrium effort allocation, they should believe it was taken by the type of politician who would have an incentive to choose that allocation for the least restrictive set of beliefs. A formal definition is included in the Appendix. We henceforth refer to an equilibrium satisfying D1 as simply an equilibrium.

We now solve for equilibrium behavior. As the majority type receives positive utility from increasing p^B, while the minority type receives a negative payoff from doing so, the majority type has a greater incentive than the minority type to choose $w^B > 0$. There is one caveat to this however. As politicians care about the policy implemented after leaving office, a politician has a greater incentive to secure re-election if her replacement is less likely to be the same type. So, if ϕ is very low and m^P is close to one, a majority politician receives little benefit from re-election, and so has less incentive to posture even though it is comparatively less costly. However, when ϕ is not too small—greater than some non-negative level $\hat{\phi}$—the benefits from re-election are large enough that the majority type has a greater incentive to posture.

Consider first the case in which ϕ is low (but greater than $\hat{\phi}$), so politicians are more concerned with the policy implemented in the current period than with securing re-election. Consequently, in equilibrium, both types focus the bulk of their energies on ensuring that A is implemented. Notice, however, that the equilibrium must involve the majority type separating themselves by placing strictly positive effort on B. As the majority type has a strictly greater incentive to choose B than the minority type, criterion D1 requires that if w^B is greater than the equilibrium level, even by an arbitrarily small amount, the voters infer that the incumbent is the majority type, leading to a discrete jump in her re-election probability. Hence, for ϕ low, the equilibrium is a separating equilibrium, with minority types focusing on A and majority types exerting just enough effort on B to reveal themselves to be the majority type.

Now consider the case in which ϕ is high, and so the primary concern of politicians is to secure re-election. Then, although the majority type still has an incentive to try to separate by putting additional effort on issue B, the minority type is no longer willing to reduce her re-election probability by focusing effort on her preferred policy and revealing herself to be the minority type. As the minority type always has an incentive to mimic the majority type, and the majority type always has an incentive to try to separate by increasing w^B, the only possible equilibrium is a pooling equilibrium in which all politicians put maximal effort on issue B in the initial period.

Finally note that, by Lemma 2, emphasizing B in a separating equilibrium results in re-election with a higher probability than emphasizing B in a pooling equilibrium. For intermediate levels of office-motivation, then, it is not possible to have an equilibrium that is either separating, as the minority type would have an incentive to mimic the majority type, or pooling, as the minority type would not be incentivized to posture. For this range of parameters the equilibrium is partial-pooling, with the majority type emphasizing issue B, and the minority type randomizing between focusing on A and losing election with high probability, and focusing on B and being re-elected with greater probability.

As the above discussion suggests, we have the following characterization of the unique equilibrium.

Proposition 1. ***Characterization of Equilibrium***
There exists $\hat{\phi}(W) \geq 0$ such that, when $\phi > \hat{\phi}(W)$, there is a unique equilibrium up to the beliefs at off-path information sets. Further, there exist $\bar{\phi}(\sigma, W)$ and $\phi^*(\sigma, W)$ with $\hat{\phi}(W) \leq \bar{\phi}(\sigma, W) \leq \phi^*(\sigma, W)$ such that, in the first period,

(1) *if $\phi \in (\hat{\phi}(\sigma, W), \bar{\phi}(\sigma, W)]$ the majority type chooses $w^B > 0$ and $w^A = W - w^B$ and the minority type chooses $w^A = \min\{W, 1\}, w^B = w^A - W$.*
(2) *if $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$ the majority type chooses $w^B = \min\{W, 1\}, w^A = W - w^B$ and the minority type randomizes with a non-degenerate probability between $w^B = \min\{W, 1\}, w^A = W - w^B$ and $w^A = \min\{W, 1\}, w^B = w^A - W$.*
(3) *if $\phi \geq \phi^*(\sigma, W)$ all politicians choose $w^B = \min\{W, 1\}$ and $w^A = W - w^B$.*

Moreover, there exists $\bar{W} \in (1, 2]$ such that $0 \leq \hat{\phi}(W) < \bar{\phi}(\sigma, W) < \phi^*(\sigma, W)$ for all $W \in (0, \bar{W})$. Finally, there exists $\bar{\gamma} > 1/2$ such that $\bar{W} = 2$ when $\gamma < \bar{\gamma}$.

Proposition 1 characterizes the equilibrium behavior and the resulting inefficiencies. As $\gamma > 1/2$, *all* voters and politicians agree that issue A is more important and would receive a greater utility benefit from effort spent on A than B. So, in the first period, if $w^A < \min\{W, 1\}$, as happens for many parameter values, the result is that a pareto dominated effort allocation is chosen. When, as in part (3), the office motivation is strong, and both types exert full effort on issue B—which we refer to as a posturing equilibrium—the effect is particularly pronounced. Not only is there the largest possible distortion of effort away from issue A, but this distortion is driven by the incentives for politicians to signal to voters. However, since both types posture, voters don't learn anything about the incumbent politician from this socially wasteful signaling.

While a posturing equilibrium always exists if the office motivation is strong enough, when $W \approx 2$ and $\gamma \approx 1$ a separating equilibrium may not exist for any ϕ. For such parameters, posturing is not very costly. Since issue A will be addressed with probability close to 1 even if $w^B = 1$, and exerting effort on B provides little disutility to the minority type politician, to have a separating equilibrium requires lower office motivation than necessary to induce signaling. A separating equilibrium always exists, for appropriate levels of office motivation, when W is not too close to 2 ($W \leq \bar{W} \in (1,2]$), or γ is not to close to 1 ($\gamma < \bar{\gamma}$).

The most important parameter for reflecting the institutional authority of the politician is W. We now consider how $\bar{\phi}(\sigma, W)$ and $\phi^*(\sigma, W)$ vary with this authority parameter. As it is only possible to support separating equilibria when $\phi \leq \bar{\phi}(\sigma, W)$, and only possible to support an equilibrium that does not involve everyone pooling on B when $\phi < \phi^*(\sigma, W)$, $\bar{\phi}(\sigma, W)$ and $\phi^*(\sigma, W)$ are indices of how likely it is (in a world of randomized parameter values) to have an equilibrium without pervasive posturing. Defining $\bar{\phi}_0(W) \equiv \lim_{\sigma\to 0} \bar{\phi}(\sigma, W)$ and $\phi_0^*(W) \equiv \lim_{\sigma \to 0} \phi^*(\sigma, W)$ we have the following result.

Proposition 2. *Both $\bar{\phi}_0(W)$ and $\phi_0^*(W)$ are strictly increasing in W on $(0, 1)$ and strictly decreasing on $(1, \bar{W})$.*

In other words, we find that, when valence shocks are small, $\bar{\phi}(\sigma, W)$ and $\phi^*(\sigma, W)$ are non-monotonic in W. If W is small, it is difficult to support a separating equilibrium. Since politicians know that their effort allocation is unlikely to influence policy, they have a greater incentive to choose the allocation most likely to get them re-elected — in this case, that means pooling on B.[9] As W increases, effort choices are more likely to have policy consequences, so the incentive for the politician to allocate effort to her preferred policy increases. However, if W is greater than 1, further increases in W make it more difficult to support a separating equilibrium. This is because, when W is large, politicians are capable of getting both $p^A = 1$ and $p^B = 1$ with high probability. As the greatest cost of effort spent to implement $p^B = 1$ is when it comes directly at the expense of effort that could be allocated to the A policy, the costs of posturing are lower when W is large. When $W = 1$ the policy consequences are starkest and so it is possible to support a separating equilibrium for the widest range of parameters.

3.3. **First Period Behavior with Unobservable Effort Choices.** We now consider the incentives when the effort allocation is not transparent. That is, we assume that the voters can observe only the outcomes (p^A and p^B) but not the effort allocations (w^A and w^B).[10] As the incentive for the politician to take each action depends on the beliefs the voters form after

[9] Fox and Stephenson (2011) identify a similar effect. They present a model in which judicial review, by insulating politicians from their policy choices, can increase electoral induced distortions.

[10] An alternative form of non-transparency, observing w^A and w^B but not p^A and p^B would be uninteresting in our model. Conditional on observing the effort allocation, the policy outcomes are purely random, and so the voters do not update based on them.

observing each outcome, the beliefs at off-path information sets can play a key role in determining the politician's incentives. Further, since a non-status-quo policy can only result if a politician exerts positive effort on the issue, off-path information sets are produced by many politician strategies. In our analysis, we focus on the case in which ϕ is large, so the dominant concern is to secure re-election. Then, if the politician's effort allocation were transparent, the result would be the posturing equilibrium in which both types of politicians focus effort first on issue B. As this setting is further removed from the original sender-receiver setting of Cho and Kreps (1987), rather than adapt the refinement further, we simply focus attention on equilibria in which the majority type politician's action corresponds to the transparency case. We then consider the minority type's behavior.

The effect of transparency depends critically on W. When the effort allocation is transparent, if the voters observe any effort allocation other than that chosen by the majority type, they know with certainty that the politician deviated, and so is the minority type. With non-transparency if the minority type deviates this (may) not be observed with certainty. Consequently, parameter values that admit a posturing equilibrium with transparent effort will not necessarily generate the same behavior when effort choices are non-transparent. In particular, when $W < 1$, we have the following result.

Proposition 3. *For any $W < 1$, there exists a $\phi_0^{A0}(\sigma, W) \geq \phi^*(\sigma, W)$ such that, for all $\phi > \phi_0^{A0}(\sigma, W)$, there is a unique pure-strategy equilibrium in which the majority type chooses $w^B = W$. In this equilibrium the minority type's strategy involves $w^A = 0$ and $w^B \in (0, W)$.*

Proposition 3 characterizes the unique pure-strategy equilibrium in which the majority type focuses on B when $W < 1$ and the re-election motive is strong.[11] For high values of ϕ, when $W < 1$, the lack of transparency creates even further welfare losses in the first period: not only will no politician exert effort on A, but minority-type politicians exert less than full effort on securing $p^B = 1$. The reason for this is simple. With non-transparency there cannot be a pooling equilibrium, because, if both types choose the same effort allocation, regardless of the realized outcome $p^B \in \{0, 1\}$ voters would not update about the politician. Because the minority type strictly prefers $p^B = 0$ to $p^B = 1$ from a policy perspective, but the re-election probability would be the same, she would have an incentive to deviate and choose $w^A = w^B = 0$ rather than

[11]There are also mixed strategy equilibria: because the effort choice is not transparent, any two strategies leading to the same probability distribution over p^B are equivalent for voter updating and politician payoff.

$w^B = W$. So we can rule out the possibility of a pooling equilibrium. Further, the minority type cannot choose $w^A > 0$ in any equilibrium. This is because, if the majority type focuses entirely on B, $p^A = 1$ would never occur with a majority type, and so would reveal the politician as the minority type with certainty. As the politician would not be willing to reveal she is the minority type in order to implement policy A when re-election concerns are paramount, the equilibrium must involve the minority type choosing $w^A = 0$ and $w^B < W$. As such, when $W < 1$, transparency over the effort allocation is beneficial for first period welfare. However, transparency over the effort choices impedes the selection of majority-type politicians since we have a pooling equilibrium when effort is transparent but, when effort is non-transparent, the voters update based on the policy outcome, p^B. That transparency can involve tradeoffs between the incentives in the current period and selection for future periods is well known.[12] However, when there is a tradeoff, transparency is generally bad for incentives but good for sorting. Here we find the opposite.

While transparency has ambiguous effects on welfare when W is low, a sharper and unambiguous result appears for the situations where $W > 1$. As noted above, in order to support a posturing equilibrium with transparency, we need only check that the politician does not have an incentive to deviate to her most preferred policy and reveal herself to be the minority type with certainty. Hence we can support a posturing equilibrium if and only if the policy gain to the politician from deviating is not enough to justify the corresponding decrease in her re-election probability. When the effort allocation is non-transparent, the minority type still has this deviation available, but she has other potential deviations as well. In particular, she could deviate to choose $w^A = 1$ and $w^B = W - 1$ and know that voters will only realize she deviated if $p^B \neq 1$. Greater office motivation is necessary to prevent this deviation than to prevent a deviation to her most preferred effort allocation. This is because, with non-transparent effort, a deviation is observed if and only if $p^B = 1$ does not obtain. As the minority type politician reduces her effort on B from $w^B = 1$ she will initially transfer this effort on her main policy goal: securing $p^A = 1$. Once she has ensured this with certainty, however, by setting $w^A = 1$, further decreasing w^B gives less of a policy benefit but the same re-election cost. Hence, the minimal ϕ necessary to support a posturing equilibrium is higher with non-transparency. We get the following proposition.

[12]See Prat (2005), Fox (2007) and Fox and Van Weelden (2012) an analyses of the effects of transparency.

Proposition 4. *There exist $\phi^*_{NA}(\sigma, W)$ and $\phi^{**}(\sigma, W)$ with $\phi^*_{NA}(\sigma, W) > \phi^{**}(\sigma, W) \geq \phi^*(\sigma, W)$ such that, an equilibrium in which both types always choose allocation $w^B = 1, w^A = W - 1$ exists if and only if $\phi \geq \phi^*_{NA}(\sigma, W)$, and, when $\phi \in [\phi^{**}(\sigma, W), \phi^*_{NA}(\sigma, W))$, an equilibrium exists in which the majority type chooses $w^B = 1, w^A = W - 1$ and the minority types chooses allocation $w^A = 1, w^B = W - 1$ with probability $r \in (0, 1]$ and allocation $w^B = 1, w^A = W - 1$ otherwise.*

When $\phi > \phi^*_{NA}(\sigma, W)$ the benefits from holding office are great enough that no politician would want to risk $p^B = 0$ and likely electoral defeat. Hence, regardless of the transparency regime, in equilibrium, politicians pool on maximal effort on issue B and voters cannot update about them. In contrast, on the range $\phi \in [\phi^{**}(\sigma, W), \phi^*_{NA}(\sigma, W))$, for the equilibrium described, the welfare implications of non-transparency is unambiguous for majority-type voters. The minority type places more effort on A, which gives higher payoff to everyone in the first period. Further, because $p^A = 1$ is more likely, and $p^B = 1$ is less likely, when the politician is the minority type, the voters learn about the politician's type, and a majority type is more likely to be retained. Hence, non-transparency over actions is beneficial in this range, both in terms of the first period action, and in terms of selecting majority-type politicians for the future.[13] As non-transparency decreases the reputational benefit from posturing, minority types have less incentive to posture. This breaks the equilibrium with pooling on maximal posturing, leading to more efficient policy choices by politicians, and more learning by voters.

So we have shown that $W > 1$, greater transparency can increase posturing by elected officials *and* decreases the amount voters can learn from this behavior. For example, it is likely that the advent of cable news caused politicians to focus more time on trivialities and polarizing debates; similarly, we may worry that if cabinet meetings were televised, or the minutes were publicly released, that concern about signaling popular preferences would distract members from working to advance the most important goals.[14] While our model considers only one dimension of policymaking, and only one of many ways transparency can affect the policymaking process, our results speak to this concern. And, if greater transparency leads all politicians posture, in

[13]Prat (2005) also finds that transparency can be harmful both in terms of the first period action and selection but for a very different reason. Prat (2005) finds that increased transparency can increase the risk of "conformism" whereby the politician would be unwilling to take an action that goes against the voters' prior.

[14]Kaiser (2013)'s account of the passage of the Dodd-Frank act bears this out. He argues that televising the debate made it very difficult to focus on the important parts of banking regulation.

equilibrium, though politicians spend their time engaging in socially harmful signaling, voters don't actually learn anything about politician preferences.

4. Extension: Posturing and Polarization

So far we have assumed that the election is determined by the preferences of the majority of the voters: the incumbent is re-elected if and only if the majority supports her re-election. It is not always clear, however, that politicians maximize their re-election prospects by signaling their policy preferences are aligned with the majority. Given the possibility of primary challenges, politicians may be predominantly concerned with signaling to members of their own party to ensure they do not lose the nomination. For example, Republicans may feel the need to signal their commitment to preventing tax increases and to conservative social causes in order to ward off potential primary challenges from the "tea party" or the Club for Growth.[15] Alternatively the incumbent may seek the support of an intense minority or powerful interest group.

In our analysis it is the fact that the incumbent is trying to signal her preferences, rather than the specific group she is trying to win over, that drives the inefficiencies. Suppose now that, instead of a fear of losing the general election, the greatest threshold the incumbent must cross to be re-elected is to secure renomination by her party. We then assume that if the incumbent wins the primary she will be re-elected in the general election with certainty, whereas if the incumbent is defeated in the primary a random draw from the same party replaces her on the ticket and wins the general election. While stark, this is a reasonable approximation to heavily gerrymandered districts in which incumbents tend to be re-elected with huge majorities, or in conservative states with possible tea party challenges to incumbent Republican Senators.

We now interpret type $x_j = -1$ as the Democrat and $x_j = 1$ as the Republican position. That is, we assume that in the Republican party the fraction of primary voters and incumbents of type $x_j = 1$, m and m^P respectively, are greater than $1/2$, whereas in the Democratic party both are less than $1/2$. The following result follows immediately from the previous analysis.

[15]The Club for Growth has backed successful primary challenges in recent elections, notably against incumbent Senators Bob Bennett in 2010 and Richard Lugar in 2012. Such threats also exists for Democratic incumbents. For example, Blanche Lincoln lost her bid for re-election after facing a difficult primary challenge in 2010.

Proposition 5. *Under both transparency and non-transparency, there exists a* $\tilde{\phi}(\sigma, W) > 0$ *such that, when* $\phi > \tilde{\phi}(\sigma, W)$*, a Republican incumbent of either type chooses* $w^B = \min\{W, 1\}$ *and* $w^A = W - w^B$*, and a Democrat incumbent of either type chooses* $w^B = -\min\{W, 1\}$ *and* $w^A = W + w^B$*, in the first period.*

There are many examples—from the Terri Shiavo case to the government shutdown in October 2013—where politicians appear to focus excessive effort on divisive issues in order to signal their commitment to their core supporters, even when the preferences of the core supporters are (arguably) out of step with the majority of voters. While there is a concern that posturing to a core constituency may lead politicians to take actions the majority opposes, our results suggest that a greater concern may be that it distracts politicians from common-values issues. If different politicians are posturing to different constituencies, Republicans and Democrats will focus their attention on pursuing diametrically opposed goals on the issues on which voters disagree, ignoring important common-values issues in the process.

5. Empirical Evidence of Political Posturing

This section reports an empirical investigation of political posturing motivated by the theoretical results described in previous sections. Our approach is to construct a measure of political posturing among Members of Congress by analyzing the divisiveness of their speech. We then test two hypotheses derived from our theoretical framework. First, do stronger electoral concerns induce greater political posturing by incumbents? Second, do incumbents engage in greater posturing when their actions are more transparent? To test the first hypothesis we look at the U.S. Senate, exploiting the staggered re-election timing of Senate elections, and test whether Senators spend more time on divisive speech when their re-election run is more imminent. To test the second hypothesis we look at the House of Representatives and exploit variation in the overlap between Congressional districts and local media markets to generate an index of transparency. We then test whether House members engage in more divisive speech when the media coverage is stronger.

[Table 1 (Legislator Characteristics and Treatment Variables)]

Our sample of politicians for the election analysis is the set of 331 Senators working for the years 1973 through 2012 (the 93rd through 112th congressional sessions). To identify the effect of stronger electoral incentives, we exploit the staggering of elections. Senators face re-election every six years, with one third of the Senators up for re-election in any given election cycle. This gives variation in the time to re-election, with a longer time until a given Senator comes up for re-election associated with weaker electoral pressures. Previous papers demonstrating that the staggered election cycle can affect Senator behavior include Levitt (1996), Conconi et al. (2012), and Bouton et al. (2013). Building on the approach taken for these papers, we use fixed effects for each Senator and see how the behavior of a Senator varies according to her electoral cohort. If cohort status is as good as randomly assigned (conditional on the fixed effects), we obtain consistent estimates of the effect of being up for election on the outcome variables of interest. In our regression framework, we represent the election treatment by the variable E_{it} for electoral cohort, which equals one for the first cohort, two for the second cohort, and three for the third cohort (that is, currently up for election). This specification provides a simple linear model of the strength of electoral incentives and is motivated by the upward trend in divisiveness over the election cycle depicted in Figure 1 below.

Our sample of politicians for the transparency analysis is the set of 653 U.S. House Members working for the years 1991 through 2002 (the 102nd through 107th congressional sessions). We use the measure of newspaper coverage constructed by Snyder and Stromberg (2010). This measure exploits the arbitrary overlap between congressional districts and newspaper distribution markets. In particular, our empirical definition of transparency is the log of Snyder and Stromberg's (2010) "congruence" measure, which gives the average overlap between the newspaper markets and each congressional district i:

$$T_{it} = \log(\sum_{m \in M} MarketShare_{itm} ReaderShare_{itm}) \tag{1}$$

where $MarketShare_{itm}$ is the share of the news market filled by newspaper m and $ReaderShare_{itm}$ is the newspaper's reader share in member i's district. Snyder and Stromberg demonstrate that higher newspaper coverage due to higher market-district overlap is associated with more articles and higher voter knowledge about their representative, as well as higher legislator effort on some measures. We use logs so that the coefficients may be interpreted as elasticities—although using the level of the measure generates similar results. Our preferred specification uses House Member fixed effects and identifies changes in the transparency measure due to changes in newspaper market share and due to redistricting.

Our measures of political effort allocation are constructed from the material in the *Congressional Record* attributed to each congressmen for the years 1973 through 2012. We have designed the speech segmenting algorithm to include only floor speech (rather than other written materials read into the *Record*, for example bill text and the material in the Extensions of Remarks). We do this because we want to ensure that our measure reflects effort exerted by the member. We also drop speeches given by the Speaker of the House, the Presiding Officer in the Senate, and non-voting members.[16]

The methods for constructing the speech data are described in detail in Appendix C. After selecting $P = 3000$ high-information phrases, we score each phrase p by chamber c and session t on a metric of divisiveness χ^2_{pct} based on Gentzkow and Shapiro (2010). We then construct the speech divisiveness for congressman i during session t as the log of the frequency-weighted divisiveness of the phrases used by the congressman during session t. That measure is given by

$$Y^c_{it} = \log\left(\sum_{p=1}^{P} \frac{f_{ipt}\chi^2_{pct}}{F_{it}}\right), \tag{2}$$

where f_{ipt} is the normalized frequency of phrase p for congressman i during session t, and F_{it} is the total number of phrases used (from the set of 3000 selected for the analysis). Jensen et al. (2012) use a similar measure to estimate the history of polarization in the House of Representatives.

The chamber index $c \in \{S, H\}$ for Y^c_{it} reflects that phrase divisiveness χ^2_{pct} can be computed from the language of either the Senate (S) or the House (H). In our empirical analysis, when studying the speech of a particular chamber, we prefer to use the phrase divisiveness metric constructed from speech in the *other* chamber. This allows us to avoid any issues with a member's own speech influencing the level of the metric. See Appendix C for more details.

[Table 2 (Most and Least Divisive Phrases)]

To demonstrate the usefulness of the method, we report in Table 2 the most and least divisive phrases, where scores are averaged across sessions using the pooled data set. The divisive phrases are divided between those associated with Republicans and those associated with Democrats. The

[16]The *Record* does not include the speech from committee hearings, so committee assignment should not be a significant source of omitted variable bias. Any effects on speech due to the influence of party enforcers and procedurally powerful congressmen is probably uncorrelated with our treatment variables (the election schedule and the transparency measure). We know anecdotally that Senators have substantial discretion over their floor speeches.

selected phrases follow our intuitions about the conservative and liberal policy focuses of each party. Take abortion-related phrases: For Republicans, we see 'embryonic stem cell' and 'partial birth abortion;' for Democrats, we see 'late term abortion' and 'woman's right to chose.' We see a similar intuitive trend for taxes: the Republican list includes 'capital gains tax,' 'largest tax increase,' and 'marriage tax penalty;' the Democrat list includes 'give tax break,' 'tax breaks (for the) wealthy,' and 'tax cuts (for the) wealthiest.' In the list of least divisive language, meanwhile, we see innocuous phases and references to common values policies such as 'federal highway administration,' 'homeland security appropriation,' and 'law enforcement community.' These intuitive phrase rankings are encouraging for the use of this metric as a measure of divisiveness. The full list of phrases is available from the authors upon request.

[Table 3 (Speech Statistics)]

Table 3 reports summary statistics on congressional speech. Because there are fewer of them, Senators speak a lot more than House members. The minimum frequency numbers may be concerning, but our results are not affected from dropping the observations with the lowest frequencies. The Speech Divisiveness rows give the measures constructed from Senate speech and House speech, respectively. Encouragingly, these measures have a similar distribution and are strongly correlated with each other. The negative numbers reflect that the measures are in logs—a divisiveness measure smaller in absolute value means higher divisiveness. Perhaps expectedly, House members have a higher average divisiveness than Senators. The Minimum and Maximum columns show some outliers—dropping these outliers does not affect the results. Figures A1 and A2 (in Appendix C) give the trends in average divisiveness for both chambers, demonstrating that Republicans and Democrats have similar levels and trends in speech divisiveness.

In our Senate elections regressions, we model divisiveness Y^c_{it} for Senator i during session t as

$$Y^c_{it} = \alpha_i + \alpha_t + \rho_E E_{it} + \varepsilon_{it} \tag{3}$$

where Y^c_{it} is defined in (2), α_i is a Senator fixed effect, α_t is a year fixed effect, and E_{it} is the election cohort variable. Since the outcome variable Y^c_{it} is a log measure, the estimate $\hat{\rho}_E$ can be interpreted as the average percent increase in Senator speech divisiveness from moving into the next election cohort (closer to the next scheduled election). If $\hat{\rho}_E = 0$, then electoral incentives do not affect the tendency to use divisive phrases. If $\hat{\rho}_E < 0$, then electoral incentives mitigate divisive rhetoric. If $\hat{\rho}_E > 0$, as suggested by the theory, then electoral incentives increase the tendency of Senators to use divisive language.

Next, for the House of Representatives, we model speech divisiveness as

$$Y_{it}^c = \alpha_i + \alpha_t + \rho_T T_{it} + \varepsilon_{it} \tag{4}$$

where Y_{it}^c and the fixed effects are the same as (3), and T_{it}, defined in (1), gives the transparency measure for member i at t. Since both T_{it} and Y_{it}^c are in logs, the estimate $\hat{\rho}_T$ can be interpreted as the average percent change in divisiveness due to a one percent increase in transparency. If $\hat{\rho}_T = 0$, then transparency is unrelated to divisiveness. If $\hat{\rho}_T < 0$, then transparency reduces divisive rhetoric. If $\hat{\rho}_T > 0$, as suggested by the theory, then transparency increases the tendency of House members to use divisive language.

The error term ε_{it} includes omitted variables and randomness. Our identifying assumption is that, conditional on the inclusion of fixed effects, ε_{it} is uncorrelated with the treatment variables—the election schedule for the Senate, and the transparency measure for the House. In our regressions we cluster the error term by state, allowing for arbitrary serial correlation across a state's congressmen and over time.[17]

[Table 4 (Election Effects on Senator Speech Divisiveness)]

The results from regressing the use of divisive phrases on the time until the next Senate election are reported in Table 4. Columns 1 and 2 include year fixed effects; Columns 3 and 4 include year fixed effects and Senator fixed effects. Columns 1 and 3 use the Senate-language divisiveness measure Y_{it}^S as the outcome variable, while Columns 2 and 4 use the House-language divisiveness measure Y_{it}^H as the outcome variable. The four specifications generate similar estimates for the effect of election cohort on speech divisiveness. Encouragingly, the coefficients do not change much when including speaker fixed effects, supporting the assumption of exogenous treatment to Senate election cohort.

Our preferred specification is Column 4, which includes speaker fixed effects and uses the House-language divisiveness measure as the outcome variable. The coefficient is positive and statistically significant at the 1% level; we can reject the null hypothesis that $\rho_E = 0$ in favor of the alternative that $\rho_E > 0$. A coefficient of 0.0579 implies that speech divisiveness increases by 5.79% on average as a Senator moves to a cohort nearer to the next election.

[17]Clustering by Member of Congress rather than state generates the same results.

[Figure 1 (Senator Speech Divisiveness by Election Cohort)]

To show this graphically, Figure 1 plots the average speech divisiveness by Senate cohort, after residualizing on the fixed effects for year and speaker. As seen in the graph, there is a large increase in divisiveness between the first and second cohort, and a smaller increase between the second and third cohort. These estimates are consistent with the theory of electorally induced posturing.

[Table 5 (Effect of Transparency on House Speech Divisiveness)]

The results from regressing the use of divisive phrases on the House transparency measure are reported in Table 5. The specifications are analogous to those in Table 4: Columns 1 and 2 include year fixed effects, while Columns 3 and 4 add House member fixed effects. Columns 1 and 3 use Y_{it}^S as the outcome variable, while Columns 2 and 4 use Y_{it}^H as the outcome variable. The inclusion of speaker fixed effects makes a difference in the case of transparency, reflecting that we are capturing the within-member effect of changes in transparency, rather than differences across speakers that have different levels of news coverage in their districts. Still, the fact that the estimates are of the same sign is encouraging support for the validity of the results.

Our preferred specification is Column 3, which includes speaker fixed effects and uses the Senate-language divisiveness measure as the outcome variable. The coefficient is positive, but only significant at the 10% level. Column 4, using Y_{it}^H, gives a positive estimate that is significant at the 5% level. Together, these estimates lend more support for the hypothesis that $\rho_T > 0$ than the hypothesis that $\rho_T = 0$: though the evidence that increased transparency leads to greater posturing is not as strong as the evidence that posturing increases when elections are more imminent. A Column 3 coefficient of 0.0785 implies that for a 1 percent increase in transparency, speech divisiveness increases by .08% on average.

[Figure 2 (House Member Speech Divisiveness by Transparency Level)]

We attempt to show this result graphically in Figure 2. This figure plots the average speech divisiveness by House members after being residualized on the year and speaker fixed effects, grouped by the level of T_{it} in bins of width 1. The binned means, as well as the fitted line, illustrate that increases in transparency across years are associated with increases in the within-member divisiveness of House speech. These results are consistent with the theory that higher transparency increases posturing by incumbent politicians.

6. Conclusions

We have considered the incentives of politicians to "posture" by focusing their efforts on issues that present the greatest opportunity to signal their preferences to voters, even if they are not the most important issues facing the country. We have shown that this incentive can lead politicians to spend their time pursuing policies that are not only harmful to the minority, but also an inefficient use of time from the majority's perspective. In addition, we have shown that greater transparency about how politicians' allocate their time can increase socially inefficient posturing, while at the same time impeding the selection of majority type politicians. Finally we have verified empirically that incumbent politicians engage in more divisive speech when electoral pressures are stronger or their actions are more likely to be observed.

While we have focused on only one component of the policymaking process, our analysis raises important issues for the design of political institutions. Given that our results emphasize the difficulty incentivizing electorally accountable politicians to focus attention on common-values issues, our findings highlight the potential advantage of delegating common-values tasks to individuals who are politically insulated or whose authority is task specific. This can be accomplished, perhaps, by delegating to city managers that are, at least somewhat, politically insulated and who have clearly defined tasks (e.g., Vlaicu and Whalley 2013) or by leaving such issues in the hands of a competent bureaucracy (e.g., Shotts and Wiseman 2010). The design of such institutions, and a full analysis of the tradeoffs, is an important avenue for future research.

From an empirical perspective, our work raises a number of interesting questions. Motivated by our theory, it would be interesting to see which issues incumbents talk about closer to elections and whether the increased focus on divisive issues holds even for those issues that are relatively less important. Such an analysis could be completed by classifying the speech according to different issue topics, and using public opinion data to rank the issues by importance. Finally, while our empirical analysis shows that Congressional speech becomes more divisive closer to election, it would be interesting to understand the policy consequences of this change. Recent literature has explored how political polarization, and its media coverage, could contribute to the business cycle (e.g., Jensen et al. 2012, Azzimonti 2014). In future research we hope to explore the implications of our empirical findings for policy and economic outcomes.

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Appendix

This Appendix consists of three parts. Appendix A provides the formal definition of criterion D1 which was described informally in the main text. In Appendix B we provide the proofs of our theoretical results. Appendix C provides additional details about the specifications for the Empirical Analysis.

Appendix A: Criterion D1. In Appendix A we give the definition of criterion D1 that is incorporated into our definition of equilibrium in Section 3.2. As our model is not a standard sender-receiver game we must first precisely define how criterion D1 is applied to our setting. While Cho and Kreps (1987) define D1 in terms of Sequential Equilibrium, because our game has a continuum of potential actions, we analyze it using Perfect Bayesian Equilibrium. For our purposes, the only relevant restriction on off-path beliefs from Sequential Equilibrium is that all voters hold the same beliefs at all information sets, and we restrict attention to equilibria with that property.

In order to facilitate the definition, we first define $u^*(x^B)$ to be the expected utility of a type x^B politician in a given Perfect Bayesian Equilibrium. Further we define $u(w^A, w^B, \mu|x^B)$ to be the expected utility, given the equilibrium strategies of the other players, of a type x^B politician from choosing allocation (w^A, w^B) in period 1 if the belief the voters form about her type from choosing that allocation is μ and her behavior in the second period is unchanged.

Definition 1. ***Criterion D1 (Cho and Kreps 1987)***
A Perfect Bayesian Equilibrium satisfies criterion D1 if,

(1) *at all information sets all voters hold the same beliefs, μ, about the politician's type.*
(2) *if for some off-path allocation (w^A, w^B), and $x^B \in \{-1, 1\}$,*

$$\{\mu \in [0,1] : u(w^A, w^B, \mu| - x^B) \geq u^*(-x^B)\} \subsetneq \{\mu \in [0,1] : u(w^A, w^B, \mu|x^B) > u^*(x^B)\},$$

then

$$\mu(x^B|w^A, w^B) = 1.$$

In essence, criterion D1 says that if voters observe an out of equilibrium effort level they should believe that effort level was taken by the type of politician who would have an incentive to choose that allocation for the broadest range of beliefs.

Appendix B: Proofs. We begin with the results of section 3.1, proving Lemmas 1 and 2 on second period behavior at the voters' decision.

Proof of Lemma 1. Immediate. □

Proof of Lemma 2. As the election is determined by majority-type voters, we consider the expected second period payoff to a majority voter from a majority type incumbent, a minority type incumbent, and a random replacement, for any W. If the incumbent is a majority type with valence v^j then the expected payoff to a majority-type voter is

$$u_1 = \begin{cases} -q[(1-W)\gamma + (1-\gamma)] - (1-q)(1-\gamma)(1-W) + v^j & \text{if } W \leq 1, \\ -q(1-\gamma)(2-W) + v^j & \text{if } W > 1. \end{cases} \tag{5}$$

Similarly, if the incumbent is a minority type with valence v^j the expected payoff is

$$u_{-1} = \begin{cases} -q[(1-W)\gamma + (1-\gamma)] - (1-q)(1-\gamma)(1+W) + v^j & \text{if } W \leq 1, \\ -qW(1-\gamma) - 2(1-q)(1-\gamma) + v^j & \text{if } W > 1. \end{cases} \tag{6}$$

So a majority voter's payoff if the incumbent is the majority type with probability μ is

$$u(\mu, v^j) = u_1 \mu(w^A, w^B) + u_{-1}(1 - \mu(w^A, w^B)) + v_j. \tag{7}$$

Combining these equations with the fact that a random replacement has expected valence of 0, the expected payoff from a random replacement is

$$u_r = m^P u_1 + (1 - m^P) u_{-1}. \tag{8}$$

The incumbent will be re-elected if and only if $u(\mu, v^j) \geq u_r$ so the re-election probability is $Pr(v^j \geq u_r - u(\mu, 0)) \in (0, 1)$. As $u_1 > u_{-1}$, $u(\mu, 0)$ is strictly increasing in μ, and so the re-election probability is strictly increasing in μ. Further, given that $u(m^P, 0) = u_r$ and v_j is non-negative with probability 1/2, the re-election probability if $\mu = m^P$ is 1/2. □

Having established that the probability of retention is increasing in μ we now define the probability of re-election when voters are sure of the incumbent's type as follows:

$$X(\sigma, W) \equiv Pr(re-elect|\mu = 1), \tag{9}$$

$$Y(\sigma, W) \equiv Pr(re-elect|\mu = 0). \tag{10}$$

By Lemma 2 it follows that $Y(\sigma, W) < 1/2 < X(\sigma, W)$.

We now turn to first period behavior. We begin by characterizing the unique equilibrium—where equilibrium requires off-path beliefs to be consistent with D1, and the uniqueness is up to the beliefs at off-path information sets—in the game with transparent effort. We then proceed to consider the non-transparency case.

Proof of Results with Transparent Effort. We now turn to characterizing first period behavior and proving that there is a unique equilibrium. As this is somewhat involved we break the argument into several pieces, and begin with some supporting lemmas. The first lemma shows that in any equilibrium the majority type must always choose $w^A + w^B = W$. This will allow us to rule out equilibria in which the majority type has surplus effort they do not use.

Lemma 3. *In any equilibrium $w^A + w^B = W$ for any allocation (w^A, w^B) chosen by the majority type on the equilibrium path in period 1.*

Proof. Suppose there exists an allocation (w^A_*, w^B_*) with $w^A_* + w^B_* < W$ chosen on the equilibrium path by the majority type in period 1 in an equilibrium. Let $\pi^* \in [Y(\sigma, W), X(\sigma, W)]$ be the probability with which the politician is re-elected after choosing (w^A_*, w^B_*). Now define $u^x(w^A, w^B, \pi)$ to be the utilities to the politicians of each type, $x \in \{-1, 1\}$, from implementing a given policy (w^A, w^B) if the probability of re-election after choosing policy (w^A, w^B) is π. There are two cases to consider: (a) $u^{-1}(w_*^A, w_*^B, \pi^*)$ less than the equilibrium payoff for the minority type; (b) $u^{-1}(w_*^A, w_*^B, \pi^*)$ equal to the equilibrium payoff for the minority type. We now show that it not possible to have an equilibrium with either (a) or (b).

Consider case (a). For the minority type to be optimizing, (w_*^A, w_*^B) can only be chosen by the majority type, and hence $\pi^* = X(\sigma, W)$. Moreover, by continuity, there exists (w', w'') such that $(w' \geq w_*^A,\ w'' \geq w_*^B)$, with at least one of the inequalities strict, such that $u^{-1}(w', w'', \pi^*)$ is strictly less than the minority type's equilibrium payoff. As such, the minority type would not choose (w', w'') even if it induced re-election with probability $\pi^* = X(\sigma, W)$. Note, however, that since the first period payoff for the majority type is higher by choosing (w', w'') than (w_*^A, w_*^B), the majority type would have a strict incentive to choose (w', w'') over (w_*^A, w_*^B) if the re-election probability was π^*. As the set of beliefs for which the minority type would have an incentive to choose (w', w'') are then a proper subset of the beliefs for which the majority type would, criterion D1 requires that voters believe the incumbent is the majority type with certainty after observing (w', w''). This leads to re-election probability $X(\sigma, W)$, giving the majority type a strict incentive to not choose (w_*^A, w_*^B). Hence, there cannot exist an equilibrium of the specified form satisfying (a).

Now consider case (b), and let (w', w'') be such that $(w' \geq w_*^A,\ w'' \geq w_*^B)$, and at least one of the inequalities strict. Define

$$\pi_1 = \inf\{\pi' : u^1(w', w'', \pi') > u^1(w_*^A, w_*^B, \pi^*)\}$$

and

$$\pi_{-1} = \min\{\pi' : u^{-1}(w', w'', \pi') \geq u^{-1}(w_*^A, w_*^B, \pi^*)\}$$

Then π_1 defines the probability of re-election for which the majority type would have a strict incentive to choose (w', w'') if $\pi > \pi_1$. Similarly π_{-1} defines the minimum probability of re-election for which the minority type would have a weak incentive to choose (w', w'').

We now show that $\pi_1 < \min\{\pi_{-1}, X(\sigma, W)\}$. First, note that the benefit of securing re-election is

$$B_1(W) = \begin{cases} \phi + 2(1-\gamma)(1-m^P)(1-q)W & \text{if } W \leq 1, \\ \phi + 2(1-\gamma)(1-m^P)(1+q(W-2)) & \text{if } W > 1, \end{cases}$$

to a majority type and

$$B_{-1}(W) = \begin{cases} \phi + 2(1-\gamma)m^P(1-q)W & \text{if } W \leq 1, \\ \phi + 2(1-\gamma)m^P(1+q(W-2)) & \text{if } W > 1, \end{cases}$$

to a minority type. Hence, $u^1(w', w'', \pi') > u^1(w_*^A, w_*^B, \pi^*)$ if and only if

$$\gamma(w' - w_*^A) + (1-\gamma)(w'' - w_*^B) > \delta(\pi^* - \pi')B_1(W),$$

Conversely, $u^{-1}(w', w'', \pi') > u^{-1}(w_*^A, w_*^B, \pi^*)$ if and only if

$$\gamma(w' - w_*^A) + (1-\gamma)(w_*^B - w'') > \delta(\pi^* - \pi')B_{-1}(W).$$

Now since $w' \geq w_*^A$, $w'' \geq w_*^B$, with at least one inequality strict, we can see immediately that $\gamma(w' - w_*^A) + (1-\gamma)(w'' - w_*^B) > 0$, and so $\pi_1 < \pi^* \leq X(\sigma, W)$. Similarly, because

$$\gamma(w' - w_*^A) + (1-\gamma)(w'' - w_*^B) \geq \gamma(w' - w_*^A) + (1-\gamma)(w_*^B - w''),$$

and, as $m^P > 1/2$,

$$B_1(W) > B_{-1}(W),$$

we have that $\pi_1 < \pi_{-1}$. So we can conclude that $\pi_1 < \min\{\pi_{-1}, X(\sigma, W)\}$.

We conclude by showing that, since $\pi_1 < \min\{\pi_{-1}, X(\sigma, W)\}$, we cannot have an equilibrium in which the majority type ever chooses (w_*^A, w_*^B). To see this, note that (w', w'') cannot be on path: As $\pi_1 < \min\{\pi_{-1}, X(\sigma, W)\}$, if the majority type ever chooses (w_*^A, w_*^B) over (w', w'') the minority type must strictly prefer (w_*^A, w_*^B) over (w', w'') and so the minority type can never choose (w', w''). As the voters would then assign beliefs that the politician is the majority type with certainty, she would be re-elected with probability $X(\sigma, W)$, and, as $\pi_1 < X(\sigma, W)$, the politician would have a strict incentive to choose (w', w'') over (w_*^A, w_*^B). Further, (w', w'') cannot be off the equilibrium path—if it were, by criterion D1 the voters must believe the politician is the majority type with probability 1. As the probability of re-election would then be $X(\sigma, W)$, the majority type would have a strict incentive to deviate to (w', w''). This shows that we cannot have an equilibrium of the specified form satisfying (b), which completes the proof. □

Next we show that, as choosing B instead of A is less costly for the majority type than the minority type, a deviation to exerting less effort on B is beneficial for a larger set of beliefs for the minority type than the majority type. For this we define

$$\hat{\phi}(W) \equiv \begin{cases} \max\{(1-q)(2\gamma m^P - 1)W, 0\} & \text{if } W \leq 1, \\ \max\{(1+q(W-2))(2\gamma m^P - 1), 0\} & \text{if } W > 1. \end{cases} \tag{11}$$

Our next Lemma shows that, if $\phi > \hat{\phi}(W)$, then the set of beliefs for which a majority type politician is willing increase his effort on issue B is strictly larger than for the minority type. This shows that there cannot be an equilibrium in which both types choose the same two different effort allocations on the equilibrium path. Moreover, as our definition of equilibrium includes criterion D1, it will help pin down off-path beliefs.

Lemma 4. *Consider an allocation w^B and $w^A = W - w^B$, and suppose the probability of being re-elected after that allocation is π. Then, if $\phi > \hat{\phi}(W)$, at any allocation (w', w'') with $w'' < w^B$, one of the following must hold:*

1. *both types would prefer $(W - w^B, w^B)$ to allocation (w', w'') for all beliefs.*
2. *both types would prefer (w', w'') to $(W - w^B, w^B)$ for all beliefs.*
3. *the set of beliefs for which a minority type strictly prefers (w', w'') to $(W - w^B, w^B)$ is a proper superset of those for which a majority type weakly prefers (w', w'') to $(W - w^B, w^B)$.*

Proof. Consider an allocation w^B and $w^A = W - w^B$ and another allocation w', w'' where $w'' < w^B$, and let $\pi \in [Y(\sigma, W), X(\sigma, W)]$ be the probability of being re-elected by implementing $w^B, w^A = W - w^B$. We must show that, the set of beliefs the voters could hold after observing (w', w'') for which the minority would prefer (w', w'') to $w^B, w^A = W - w^B$ is either a proper superset of the beliefs for which the majority type would weakly prefer (w', w''), or alternatively that, for both types, (w', w'') is preferred for either all beliefs, or for no beliefs, voters could hold.

We prove this separately for the case in which $W \leq 1$ and when $W > 1$. Consider first the case in which $W \leq 1$. Then the minority type would have a strict incentive to implement (w', w'') if and only if the re-election probability π' is such that

$$(w' + w^B - W)\gamma + (w^B - w'')(1-\gamma) > \delta(\pi - \pi')[\phi + 2(1-\gamma)(1-q)m^P W],$$

or equivalently

$$\pi' - \pi > \pi_{-1} \equiv \frac{-(w' + w^B - W)\gamma - (w^B - w'')(1-\gamma)}{\delta[\phi + 2(1-\gamma)(1-q)m^P W]}.$$

Now consider the majority type. She will have a weak incentive to prefer (w', w'') if and only if the re-election probability π' is such that

$$(w' + w^B - W)\gamma - (w^B - w'')(1-\gamma) \geq \delta(\pi - \pi')[\phi + 2(1-\gamma)(1-q)(1-m^P)W],$$

or equivalently

$$\pi' - \pi \geq \pi_1 \equiv \frac{-(w' + w^B - W)\gamma + (w^B - w'')(1-\gamma)}{\delta[\phi + 2(1-\gamma)(1-q)(1-m^P)W]}.$$

We now show that $\pi_{-1} < \pi_1$. To see this, note that we can write

$$\pi_{-1} = \frac{(W - w'' - w')\gamma}{\delta[\phi + 2(1-\gamma)(1-q)m^P W]} - \frac{w^B - w''}{\delta[\phi + 2(1-\gamma)(1-q)m^P W]},$$

and

$$\pi_1 = \frac{(W - w'' - w')\gamma}{\delta[\phi + 2(1-\gamma)(1-q)(1-m^P)W]} - \frac{(w^B - w'')(2\gamma - 1)}{\delta[\phi + 2(1-\gamma)(1-q)(1-m^P)W]}.$$

Next note that, as $m^P > 1/2$ it follows that

$$\frac{W - w'' - w'}{\delta[\phi + 2(1-\gamma)(1-q)m^P W]} \leq \frac{W - w'' - w'}{\delta[\phi + 2(1-\gamma)(1-q)(1-m^P)W]}.$$

Hence, given that $w^B > w''$, it is sufficient to show that

$$\frac{1}{\phi + 2(1-\gamma)(1-q)m^P W} > \frac{(2\gamma - 1)}{\phi + 2(1-\gamma)(1-q)(1-m^P)W}.$$

Cross multiplying, this holds whenever

$$\phi > \hat{\phi}(W) = (1-q)(2\gamma m^P - 1)W.$$

As we have now established that $\pi_{-1} < \pi_1$ when $\phi > \hat{\phi}(W)$ we can conclude that either the set of beliefs which give the minority type a strict preference for (w', w'') are a proper subset of those which give the minority type a weak incentive—or that, for both types, (w', w'') is preferred for either all beliefs, or for no beliefs, that the voters could hold.

Now consider the case in which $W > 1$. Then the minority type would have a strict incentive to preference for (w', w'') if and only if the re-election probability $\pi' \in [Y(\sigma, W), X(\sigma, W)]$ is such that

$$(w' + w^B - W)\gamma + (w^B - w'')(1-\gamma) > \delta(\pi - \pi')[\phi + 2(1-\gamma)m^P(1 + q(W-2))],$$

or equivalently

$$\pi' - \pi > \pi_{-1} \equiv \frac{-(w' + w^B - W)\gamma - (w^B - w'')(1-\gamma)}{\delta[\phi + 2(1-\gamma)m^P(1 + q(W-2))]}.$$

Now consider the majority type. She will have a weak incentive to prefer (w', w'') if and only if the re-election probability π' is such that

$$(w' + w^B - W)\gamma - (w^B - w'')(1-\gamma) \geq \delta(\pi - \pi')[\phi + 2(1-\gamma)(1-m^P)(1+q(W-2)],$$

or equivalently

$$\pi' - \pi \geq \pi_1 \equiv \frac{-(w' + w^B - W)\gamma - (w^B - w'')(1-\gamma)}{\delta[\phi + 2(1-\gamma)(1-m^P)(1+q(W-2))]}.$$

We now show that $\pi_{-1} < \pi_1$, as we did for the case $W \leq 1$. To see that this holds, note that

$$\pi_{-1} = \frac{(W - w'' - w')\gamma}{\delta[\phi + 2(1-\gamma)m^P[q(W-1) + (1-q)]]} - \frac{w^B - w''}{\delta[\phi + 2(1-\gamma)m^P(1+q(W-2))]}$$

and

$$\pi_1 = \frac{(W - w'' - w')\gamma}{\delta[\phi + 2(1-\gamma)(1-m^P)[q(W-1) + (1-q)]]} - \frac{(w^B - w'')(2\gamma - 1)}{\delta[\phi + 2(1-\gamma)(1-m^P)(1+q(W-2))]}.$$

As

$$\frac{W - w'' - w'}{\delta[\phi + 2(1-\gamma)m^P[q(W-1) + (1-q)]]} \leq \frac{W - w'' - w'}{\delta[\phi + 2(1-\gamma)(1-m^P)[1+q(W-2))]}$$

and $w^B > w''$ it is sufficient to show

$$\frac{2\gamma - 1}{\phi + 2(1-\gamma)(1-m^P)[1+q(W-2)]} < \frac{1}{\phi + 2(1-\gamma)m^P[1+q(W-2)]}.$$

Cross multiplying and simplifying, this holds when

$$\phi > \hat{\phi}(W) = [1 + q(W-2)](2\gamma m^P - 1).$$

As we have $\pi_{-1} < \pi_1$ when $\phi > \hat{\phi}$, we can conclude that either the set of beliefs which give the minority type a strict preference for (w', w'') are a proper subset of those which give the minority type a weak incentive—or that, for both types, (w', w'') is preferred for either all beliefs or no beliefs the voters could hold. □

We use Lemmas 3 and 4 to prove the next supporting Lemma. Namely we prove that in any equilibrium either: the majority type chooses $w^B = \min\{W, 1\}$ or the majority type reveals themselves with certainty. This will allow us to pin down the behavior on the majority type, allowing us to subsequently characterize the equilibrium by looking at the minority type.

Lemma 5. *If $\phi > \hat{\phi}(W)$, there does not exist an equilibrium in which the majority type ever chooses $w^B < \min\{W, 1\}$ on the equilibrium path and is re-elected with probability $\pi < X(\sigma, W)$.*

Proof. We show, by contradiction, that there cannot exist an equilibrium in which the majority type ever chooses an allocation $w^B_* < \min\{W, 1\}$ and is re-elected with probability less than $X(\sigma, W)$ after taking that action. Note that, by Lemma 3, in any equilibrium the majority type must choose (w^A_*, w^B_*) such that $w^A_* + w^B_* = W$.

Suppose the majority type chooses allocation $w^B_* < \min\{W, 1\}$, $w^A_* = W - w^B_*$ on the equilibrium path, and suppose the probability of re-election after choosing that action is $\pi^* \in [Y(\sigma, W), X(\sigma, W))$. Note that, as the probability of re-election is strictly less than $X(\sigma, W)$

the minority type must also choose $w_*^B < \min\{W,1\}$, $w_*^A = W - w_*^B$ on the equilibrium path. Now, by continuity, there exists an allocation $(W-w', w')$ with $w' > w_*^B$ such that the majority type's utility from choosing $(W-w', w')$ and being elected with probability $X(\sigma, W)$ is strictly higher than from choosing and (w_*^A, w_*^B) and being re-elected with probability π^*. Note that, by Lemma 4, the set of $\pi' \leq X(\sigma, W)$ that a politician who chose $(W-w', w')$ could be re-elected with for which the majority type has a weak incentive to choose (w_*^A, w_*^B) over $(W-w', w')$, is a proper subset of beliefs for which the minority type has a strict incentive to choose (w_*^A, w_*^B) over $(W-w', w')$. This means that in any equilibrium either $(W-w', w')$ is on-path, in which case only the majority take would ever choose it, or it is off-path, in which case to be consistent with criterion D1 the voters must believe that an incumbent who chose $(W-w', w')$ is the majority type with certainty. Either way the re-election probability would be $X(\sigma, W)$ and the majority type would have an incentive to deviate.

This completes the proof that in any equilibrium in which the majority type chooses (w_*^A, w_*^B) with $w_*^B < \min\{W,1\}$ on the equilibrium path, the majority type must be re-elected after (w_*^A, w_*^B) with probability $X(\sigma, W)$. □

With these the lemmas we can determine when a separating, pooling, and partial-pooling equilibria exist, allowing us to characterize equilibrium behavior. As Proposition 1 consists of three parts, we prove when each type of equilibrium exists in sequence as separate lemmas. We begin by considering separating equilibria, and show that the equilibrium must be minimally separating and only exists when the benefits from holding office are not too large.

Lemma 6. *If $\phi > \hat{\phi}(W)$, then there exists a Separating Equilibrium if and only if $\phi < \bar{\phi}(\sigma, W) \equiv \max\{\phi_1(\sigma, W), \hat{\phi}(W)\}$, where*

$$\phi_1(\sigma, W) \equiv \begin{cases} \frac{W}{\delta(X(\sigma,W)-Y(\sigma,W))} - 2(1-\gamma)m^P(1-q)W & \text{if } W \leq 1, \\ \frac{1-(W-1)(2\gamma-1)}{\delta(X(\sigma,W)-Y(\sigma,W))} - 2(1-\gamma)m^P[1+q(W-2)] & \text{if } W > 1. \end{cases} \tag{12}$$

In this equilibrium, the minority chooses $w^A = \min\{W,1\}, w^B = \min\{W,1\} - W$ and the majority chooses $w^B \equiv w_*(\delta, \phi) = \max\{w_*'(\delta, \phi), W-1\} > 0$ where

$$w_*'(\delta, \phi) \equiv \begin{cases} \delta[X(\sigma,W) - Y(\sigma,W)](\phi + 2(1-\gamma)m^P(1-q)W) & \text{if } W \leq 1, \\ (2\gamma-1)(W-1) + \delta[X(\sigma,W) - Y(\sigma,W)](\phi + 2(1-\gamma)m^P[1+q(W-2)]) & \text{if } W > 1. \end{cases} \tag{13}$$

and $w^A = W - w^B$. Moreover, there exists $\bar{W} \in (1,2]$ such that $\phi_1(\sigma, W) > \hat{\phi}(W)$ for all $W \in (0, \bar{W})$. Finally, there exists $\bar{\gamma} > 1/2$ such that, if $\gamma < \bar{\gamma}$ then $\bar{W} = 2$.

Proof. We begin by showing that, if $\phi \in (\hat{\phi}(W), \bar{\phi}(\sigma, W))$, the behavior described can be supported in an equilibrium. First note that, since the politician is revealed to be the majority type with certainty when $w^B = w_*(\delta, \phi), w^A = W - w_*(\delta, \phi)$, and all politicians strictly prefer to implement $w^B = w_*(\delta, \phi), w^A = W - w_*(\delta, \phi)$ to any allocation with $w^B > w_*(\delta, \phi)$, allocations with $w^B > w_*(\delta, \phi)$ are equilibrium dominated for both types. The beliefs after such allocations then are not relevant for the equilibrium behavior. Next note that, under the specified strategies, a minority type that chooses $(W - w_*(\delta, \phi), w_*(\delta, \phi))$ would be re-elected with probability $X(\sigma, W)$, and by following her prescribed strategy of $(\min\{W,1\}, \min\{W,1\} - W)$ she is re-elected with probability $Y(\sigma,W)$. The benefit to a minority type of increasing her re-election probability from $Y(\sigma,W)$ to $X(\sigma,W)$ is

$$\begin{cases} \delta[X(\sigma,W)-Y(\sigma,W)](\phi+2(1-\gamma)m^P(1-q)W) & \text{if } W\leq 1,\\ \delta[X(\sigma,W)-Y(\sigma,W)](\phi+2(1-\gamma)m^P[q(W-1)+(1-q)]) & \text{if } W>1.\end{cases}$$

However, by (13), the cost of implementing $(W-w_*(\delta,\phi),w_*(\delta,\phi))$ instead of $(\min\{W,1\},\min\{W,1\}-W)$ is at least

$$\begin{aligned} &\gamma[\min\{W,1\}+w_*'(\delta,\phi)-W]+(1-\gamma)(w_*'(\delta,\phi)+W-\min\{W,1\})\\ =&\begin{cases} \delta[X(\sigma,W)-Y(\sigma,W)](\phi+2(1-\gamma)m^P(1-q)W) & \text{if } W\leq 1,\\ \delta[X(\sigma,W)-Y(\sigma,W)](\phi+2(1-\gamma)m^P[q(W-1)+(1-q)]) & \text{if } W>1.\end{cases}\end{aligned}$$

As the benefits of deviating are less than or equal to the costs, the minority type has no incentive to deviate. Moreover, since $\phi>\hat{\phi}(W)$ this implies that the majority type strictly prefers $(W-w_*(\delta,\phi),w_*(\delta,\phi))$ to $(\min\{W,1\},\min\{W,1\}-W)$.

Now consider the beliefs after $w^B=w'<w_*(\delta,\phi)$ where $w'\neq\min\{W,1\}-W$. There are two cases to consider: when $w_*(\delta,\phi)=W-1$ and when $w_*(\delta,\phi)<W-1$. In the first case the majority type secures maximal re-election probability by following her most preferred effort allocation and so all other effort allocations are equilibrium dominated for the majority type. Hence specifying that $\mu=0$ for any $w'<w_*(\delta,\phi)$ is consistent with criterion D1.

When $w_*(\delta,\phi)<W-1$ then, given the specified beliefs, the minority type is indifferent between choosing $w^B=\min\{W,1\}-W$ and $w^B=w_*'(\delta,\phi)$ in the initial period. Hence, by Lemma 4, the set of beliefs for which the majority type would have a weak incentive to deviate to $w^B=w'$ are a proper subset of those for which the minority type would have a strict incentive to deviate, and so the voters must infer that a politician who chose any $w'<w_*(\delta,\phi)$ is the minority type with certainty. As the minority type would then prefer to implement $(\min\{W,1\},\min\{W,1\}-W)$ to any other allocation generating those beliefs the minority type, and hence also the majority type, would have a strict incentive not to choose any $w'<w_*(\delta,\phi))$ with $w'\neq\min\{W,1\}-W$. As such, the above strategies constitute an equilibrium.

Having now established that the above strategies constitute an equilibrium we now turn to showing that there is no other separating equilibrium. Note first that, by Lemma 3, the majority type must always choose an allocation such that $w^A+w^B=W$. Moreover, since in a separating equilibrium the type is perfectly revealed from the allocation, and since the majority type receives strictly different first period payoffs from different allocations that satisfy $w^A+w^B=W$ it follows that the majority type must be playing a pure strategy. Consider an equilibrium in which the majority type chooses $w^B=\hat{w}>w_*(\delta,\phi)$ and $w^A=W-\hat{w}$. Now consider the effort allocation $w^B=w'\in(w_*(\delta,\phi),\hat{w}),w^A=W-w'$. We show that such an allocation is equilibrium dominated for the minority type, but not the majority type. Consider first the minority type. We have shown that a minority type politician is indifferent between choosing $w^B=w_*$ and $w^A=W-w_*$ and being re-elected with probability $X(\sigma,W)$ and $(\min\{W,1\},\min\{W,1\}-W)$ with probability $Y(\sigma,W)$. Further, as the minority type strictly prefers the allocation $w^B=w_*,w^A=W-w_*$ to $w^B=w',w^A=W-w'$, she would then have a strict incentive not to choose $w^B=w',w^A=W-w'$ for any voter beliefs. So $w^B=w',w^A=W-w'$ is equilibrium dominated for the minority type. Now consider the majority type. Note first that the politician prefers allocation $w^B = w', w^A = W - w'$ to $w^B = \hat{w}, w^A = W - \hat{w}$ in period 1, so if the beliefs were such that she would be re-elected with probability $X(\sigma, W)$ by choosing $w^B = w', w^A = W - w'$ she would have an incentive to choose that allocation. Therefore, $w^B = w', w^A = W - w'$ is equilibrium dominated for the minority type, but not the majority type, and so the voters must believe that any politician who took that action was the majority type with certainty. Hence, after observing allocation $w^B = w' \in (w_*(\delta, \phi), \hat{w}), w^A = W - w'$ voters must believe the incumbent is the majority type with certainty so the probability of re-election is the same as from choosing $w^B = \hat{w}$ and $w^A = W - \hat{w}$. But, as the majority type politician receives greater utility in the first period by increasing w^A and decreasing w^B, she would not be optimizing by choosing $w^B = \hat{w}$. We can then conclude that it is not possible to support a separating equilibrium with $w^B > w_*(\delta, \phi)$.

Finally, note that $w'_*(\delta, \phi)$ is increasing in ϕ, and, in order to have an equilibrium, we must have $w_*(\delta, \phi) \leq \min\{W, 1\}$. As $w'_*(\delta, \phi_1) = \min\{W, 1\}$, by equations (12) and (13), a separating equilibrium exists if and only if $\phi \in (\hat{\phi}(W), \bar{\phi}(\sigma, W)]$ where $\bar{\phi}(\sigma, W) = \max\{\phi_1(\sigma, W), \hat{\phi}(W)\}$.

We now consider the conditions under which $\phi_1(\sigma, W) > \hat{\phi}(W)$, and so there exists a non-empty interval for which a separating equilibrium exists. Note first that by equation (12), and the fact that $X(\sigma, W) - Y(\sigma, W) < 1$, it follows immediately that $\phi_1(\sigma, W) > 0$. Recalling the definition of $\hat{\phi}(W)$ from equation (11) when $W \leq 1$, $\phi_1(\sigma, W) > \hat{\phi}(W)$ if and only if

$$\phi_1(\sigma, W) = \frac{W}{\delta(X(\sigma, W) - Y(\sigma, W))} - 2(1-\gamma)(1-q)m^P W > (1-q)(2\gamma m^P - 1)W.$$

This inequality follows immediately because

$$\begin{aligned}(1-q)(2\gamma m^P - 1)W &< (2\gamma m^P - 1)W < W - 2(1-\gamma)m^P W \\ &< \frac{W}{\delta(X(\sigma, W) - Y(\sigma, W))} - 2(1-\gamma)(1-q)m^P W.\end{aligned}$$

Hence $\phi_1(\sigma, W) > \hat{\phi}(\sigma, W)$ whenever $W \leq 1$.

Similarly, when $W > 1$ then $\phi_1(\sigma, W) > \hat{\phi}(W)$ if and only if

$$(1 + (W-2)q)(2\gamma m^P - 1) < \frac{1 - (W-1)(2\gamma - 1)}{\delta(X(\sigma, W) - Y(\sigma, W))} - 2m^P(1-\gamma)(1 + (W-2)q),$$

or equivalently

$$(1 + (W-2)q)(2m^P - 1) < \frac{1 - (W-1)(2\gamma - 1)}{\delta(X(\sigma, W) - Y(\sigma, W))}.$$

As this inequality holds strictly when $W = 1$, by continuity there exists $\bar{W} \in (1, 2]$ such that this inequality is satisfied for all $W < \bar{W}$. Finally, since $W < 2$ and $X(\sigma, W) - Y(\sigma, W) < 1$ this inequality is satisfied for all $W \in (1, 2)$ if

$$\gamma < \bar{\gamma} \equiv 1 - (m^P - 1/2)\delta \in \left(\frac{1}{2}, 1\right).$$

We can then conclude that there exists a $\bar{W} \in (1,2]$ and $\bar{\gamma} \in (\frac{1}{2}, 1)$ such that $\phi_1(\sigma, W) > \hat{\phi}(W)$ for all $W \in (0, \bar{W})$ and $\bar{W} = 2$ if $\gamma < \bar{\gamma}$. □

So we have that a separating equilibrium exists only if re-election pressures are not too strong and that when a separating equilibrium exists it can be uniquely characterized. We now consider the possibility of a pooling equilibrium. We show that the only possible pooling equilibrium involves both types pooling on maximal effort on issue B, and that such an equilibrium exists if and only if the benefits of holding office are sufficiently large.

Lemma 7. *Suppose $\phi > \hat{\phi}(W)$. There exists a pooling equilibrium if and only if $\phi > \phi^*(\sigma, W) \equiv \max\{\phi_2(\sigma, W), \hat{\phi}(W)\}$ where*

$$\phi_2(\sigma, W) \equiv \begin{cases} \frac{2W}{\delta(1-2Y(\sigma,W))} - 2(1-\gamma)(1-q)m^P W & \text{if } W \leq 1, \\ \frac{2(1-(W-1)(2\gamma-1))}{\delta(1-2Y(\sigma,W))} - 2m^P(1-\gamma)(1+(W-2)q) & \text{if } W > 1. \end{cases} \tag{14}$$

In this equilibrium both types choose effort allocation $w^B = \min\{W, 1\}$ and $w^A = W - w^B$. Moreover, when $W \in (0, \bar{W})$, $\phi^*(\sigma, W) > \bar{\phi}(\sigma, W) > \hat{\phi}(W)$.

Proof. Since, in a pooling equilibrium, both politician types are re-elected with probability 1/2 (Lemma 2), by Lemma 5 we cannot have a pooling equilibrium unless all politicians choose $w^B = \min\{W, 1\}$ in period 1. We first determine the range of parameters for which there exist off-path beliefs which incentivize both types to choose $w^B = \min\{W, 1\}$ then verify that those off-path beliefs satisfy criterion D1.

We show a pooling equilibrium with $w^B = \min\{W, 1\}$, $w^A = W - w^B$ and voters believing any other effort must have been taking by the minority type can be supported if and only if $\phi \geq \phi^*(\sigma, W)$. Since $\phi > \hat{\phi}(W)$ we need only check that the minority type has no incentive to deviate, and if she were to deviate it would be to $(\min\{W, 1\}, \min\{W-1\} - W)$. This means that by deviating the benefit in terms of policy today is

$$\begin{cases} W & \text{if } W \leq 1, \\ \gamma(2-W) + (1-\gamma)W & \text{if } W > 1. \end{cases}$$

However, the cost of reducing her re-election probability is

$$\begin{cases} \delta\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2(1-\gamma)m^P(1-q)W) & \text{if } W \leq 1, \\ \delta\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2(1-\gamma)m^P[q(W-1) + (1-q)]) & \text{if } W > 1. \end{cases}$$

Hence, using that $\gamma(2-W) + (1-\gamma)W = 1 - (W-1)(2\gamma-1)$ we have that the minority type is incentivized to choose $w^B = \min\{W, 1\}$, $w^A = W - w^B$ if and only if $\phi \geq \phi_2(\sigma, W)$, where $\phi_2(\sigma, W)$ is defined by equation (14). Hence, when $\phi > \hat{\phi}(W)$, there exist off-path beliefs which incentivize both types to choose $w^B = \min\{W, 1\}$ if and only if $\phi \geq \phi_2(\sigma, W)$.

We now must show the beliefs supporting the politicians' strategies are consistent with criterion D1. Now, by Lemma 4, the range of beliefs for which the minority type would have a strict incentive to choose any $w^B = w' < \min\{W, 1\}$ are a proper superset of those for which the majority type would have a weak incentive to choose that allocation. Hence, in order to be consistent with criterion D1 the voters must believe any $w^B < \min\{W, 1\}$ was chosen by a minority type—precisely the beliefs specified above.

We can then conclude that, when $\phi \geq \phi^*(\sigma, W)$, in the unique pooling equilibrium all politicians choose $w^B = \min\{W, 1\}$ in period 1 and, when $\phi < \phi^*(\sigma, W)$, we cannot have a pooling equilibrium. So a pooling equilibrium exists if and only if $\phi \geq \phi^*(\sigma, W) = \max\{\phi_2(\sigma, W), \hat{\phi}(W)\}$. Finally, it follows immediately from comparing (12) and (14) that $\phi_2(\sigma, W) > \phi_1(\sigma, W)$. Hence, given that $\bar{\phi}(\sigma, W) = \phi_1(\sigma, W) > \hat{\phi}(W)$ when $W \in (0, \bar{W})$, it follows that $\phi^*(\sigma, W) > \bar{\phi}(\sigma, W) > \hat{\phi}(W)$ for all $W \in (0, \bar{W})$. □

So we have that when $\phi \leq \bar{\phi}(\sigma, W)$ there exists a unique separating equilibrium but no pooling equilibrium, and, when $\phi \geq \phi^*(\sigma, W)$, there exists a unique pooling equilibrium but no separating equilibrium. And, if $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$, neither a separating or pooling equilibrium can exist. We now explore the possibility of a semi-separating equilibrium. For this range, there exists a unique semi-separating equilibrium in which the minority-type randomizes so that the politician is re-elected with probability between 1/2 and $X(\sigma, W)$ after choosing the posturing allocation: the randomization probability is uniquely determined to make the minority type indifferent and willing to randomize.

Lemma 8. *There exists a partial-pooling equilibrium if and only if* $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$ *and this equilibrium is unique. In this equilibrium, the majority type chooses* $w^B = \min\{W, 1\}, w^A = W - w^B$ *and the minority type randomizes with a non-degenerate probability between* $w^B = \min\{W, 1\}, w^A = W - w^B$ *and* $w^A = \min\{W, 1\}, w^B = \min\{W, 1\} - W$ *in period* 1.

Proof. By Lemma 5 we know that the equilibrium must either involve all majority types choosing $w^B = \min\{W, 1\}$ or have the majority type re-elected with probability $X(\sigma, W)$. Since we cannot have a separating equilibrium, the majority type must choose $w^B = \min\{W, 1\}$ in period 1. Since the majority type always chooses $w^B = \min\{W, 1\}, w^A = W - w^B$, any other effort allocation would reveal the politician to be the minority type with certainty. Hence the equilibrium must involve the minority type randomizing between $w^B = \min\{W, 1\}, w^A = W - w^B$ and $w^A = \min\{W, 1\}, w^B = \min\{W, 1\} - W$. Let $\rho \in [0, 1]$ be the probability with which the minority type takes action $w^B = \min\{W, 1\}, w^A = W - w^B$ and let $\pi(\rho)$ be the associated probability of being re-elected after the voter observes $w^B = \min\{W, 1\}, w^A = W - w^B$. The voters' updated beliefs are

$$\mu(1|w^B = \min\{W, 1\}, w^A = W - w^B) = \frac{m^P}{m^P + (1 - m^P)\rho}$$

As $\mu(1|w^B = \min\{W, 1\}, w^A = W - w^B)$ is decreasing in ρ and equal to 1 when $\rho = 0$ and m^P when $\rho = 1$, the probability of re-election, $\pi(\rho)$, is decreasing in ρ with $\pi(0) = X(\sigma, W)$ and $\pi(1) = 1/2$. We now show that we have a solution with $\rho \in (0, 1)$ if and only if $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$, and that the probability of randomization is unique. In order for the minority type to be willing to randomize we must have that

$$\pi(\rho) - Y(\sigma, W) = \begin{cases} \delta \frac{\phi + 2(1-q)(1-\gamma)m^P W}{W} & \text{if } W \leq 1, \\ \delta \frac{\phi + 2m^P(1-\gamma)(1+(W-2)q)}{1-(W-1)(2\gamma-1)} & \text{if } W > 1. \end{cases}$$

Notice that the left hand side of this expression is decreasing in ρ and the right hand side is constant. Note also that, when $\rho = 0$, $\pi(\rho) = X(\sigma, W)$, and so when $\phi > \bar{\phi}(\sigma, W)$,

$$\pi(0) - Y(\sigma, W) > \begin{cases} \delta \frac{\phi + 2(1-q)(1-\gamma)m^P W}{W} & \text{if } W \leq 1, \\ \delta \frac{\phi + 2m^P(1-\gamma)(1+(W-2)q)}{1-(W-1)(2\gamma-1)} & \text{if } W > 1, \end{cases}$$

and, when $\rho = 1$, $\pi(\rho) = 1/2$, and so when $\phi < \phi^*(\sigma, W)$,

$$\pi(1) - Y(\sigma, W) < \begin{cases} \delta \frac{\phi + 2(1-q)(1-\gamma)m^P W}{W} & \text{if } W \leq 1, \\ \delta \frac{\phi + 2m^P(1-\gamma)(1+(W-2)q)}{1-(W-1)(2\gamma-1)} & \text{if } W > 1. \end{cases}$$

Hence, there exists a unique solution with $\rho \in (0, 1)$ when $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$ and no solution otherwise. We conclude that there exists a unique partial pooling equilibrium if $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$, and there does not exist a partial pooling equilibrium otherwise. □

We have now established that, for $\phi \in (\hat{\phi}(\sigma, W), \bar{\phi}(\sigma, W)]$ the only equilibrium is the minimally separating equilibrium. When $\phi \geq \phi^*(\sigma, W)$ the unique equilibrium is the pooling equilibrium. And when $\phi \in (\bar{\phi}(\sigma, W), \phi^*(\sigma, W))$ the unique equilibrium is partial-pooling. Hence we have characterized the unique equilibrium for different levels of office motivation. Combining these Lemmas completes the proof of Proposition 1.

Proof of Proposition 1. Follows immediately by combining Lemmas 6 – 8. □

Having characterized the equilibrium we now turn to the comparative statics result of Proposition 2.

Proof of Proposition 2. Recall first that, it is sequentially rational for a majority type voter to vote to re-elected the incumbent if and only if $u(\mu, v^j) \geq u_r$, where $u(\mu, v^j)$ and u_r are given by (7) and (8). Hence, if $\mu = 1$ incumbent is re-elected if and only if

$$v^j \geq \begin{cases} -2(1-\gamma)(1-m^P)(1-q)W & \text{if } W \leq 1, \\ -2(1-\gamma)(1-m^P)[1+q(W-2)] & \text{if } W > 1, \end{cases}$$

and if $\mu = 0$ the incumbent is re-elected if and only if

$$v^j \geq \begin{cases} 2(1-\gamma)m^P(1-q)W & \text{if } W \leq 1, \\ 2(1-\gamma)m^P[1+q(W-2)] & \text{if } W > 1. \end{cases}$$

So, in a separating equilibrium, the re-election probabilities of majority and minority types are

$$X(\sigma, W) = \begin{cases} F\left(\frac{2(1-\gamma)(1-m^P)(1-q)W}{\sigma}\right) & \text{if } W \leq 1, \\ F\left(\frac{2(1-\gamma)(1-m^P)[1+q(W-2)]}{\sigma}\right) & \text{if } W > 1, \end{cases} \tag{15}$$

$$Y(\sigma, W) = \begin{cases} F\left(-\frac{2(1-\gamma)m^P(1-q)W}{\sigma}\right) & \text{if } W \leq 1, \\ F\left(-\frac{2(1-\gamma)m^P[1+q(W-2)]}{\sigma}\right) & \text{if } W > 1, \end{cases} \tag{16}$$

where F is the cdf of the standard Normal. Now since $2(1-\gamma)(1-m^P)(1-q)W$ and $2(1-\gamma)(1-m^P)[1+q(W-2)]$ are strictly positive and independent of σ and $-2(1-\gamma)m^P(1-q)W)$

and $-2(1-\gamma)m^P[1+q(W-2)]$ are strictly negative and independent of σ we can conclude that

$$\lim_{\sigma\to 0} X(\sigma, W) = 1,$$
$$\lim_{\sigma\to 0} Y(\sigma, W) = 0.$$

Next recall that, by Proposition 1, when $W \in (0, \bar{W})$, we have $\bar{\phi}(\sigma, W) = \phi_1(\sigma, W)$ and $\phi^*(\sigma, W) = \phi_2(\sigma, W)$, where $\phi_1(\sigma, W)$ and $\phi_2(\sigma, W)$ are defined in equations (12) and (14). So we can see immediately that

$$\bar{\phi}_0(W) \equiv \lim_{\sigma\to 0} \phi_1(\sigma, W) = \begin{cases} \frac{W}{\delta} - 2(1-\gamma)(1-q)m^P W & \text{if } W \leq 1, \\ \frac{1-(W-1)(2\gamma-1)}{\delta} - 2m^P(1-\gamma)(1+(W-2)q) & \text{if } W > 1, \end{cases}$$

and

$$\phi_0^*(W) \equiv \lim_{\sigma\to 0} \phi_2(\sigma, W) = \begin{cases} \frac{2W}{\delta} - 2(1-\gamma)(1-q)m^P W & \text{if } W \leq 1, \\ \frac{2(1-(W-1)(2\gamma-1))}{\delta} - 2m^P(1-\gamma)(1+(W-2)q) & \text{if } W > 1. \end{cases}$$

Differentiating with respect to W,

$$\frac{\partial \bar{\phi}_0(W)}{\partial W} = \begin{cases} \frac{1}{\delta} - 2(1-\gamma)(1-q)m^P & \text{if } W \leq 1, \\ -\frac{2\gamma-1}{\delta} - 2m^P(1-\gamma)q & \text{if } W > 1, \end{cases}$$

and

$$\frac{\partial \phi^*}{\partial W} = \begin{cases} \frac{2}{\delta} - 2(1-\gamma)(1-q)m^P & \text{if } W \leq 1, \\ -\frac{2(2\gamma-1)}{\delta} - 2m^P(1-\gamma)q & \text{if } W > 1. \end{cases}$$

It then follows by inspection that $\bar{\phi}_0(W)$ and $\phi_0^*(W)$ are increasing in W on $(0, 1)$ and decreasing on $(1, \bar{W})$. □

Proof of Results with Non-Transparency. We now turn to proving the results from Section 3.3 when the effort allocation is not observed. We first show that when $W < 1$ in equilibrium the minority type chooses $w^B < W$ but exerts no effort on issue A.

Proof of Proposition 3. We begin by defining

$$\phi_0^{A0}(\sigma, W) \equiv \frac{4}{3}\left(\frac{2}{\delta(1-2Y(\sigma, W))} - 2(1-q)(1-\gamma)m^P W\right) \geq \phi^*(\sigma, W).$$

For there to be an equilibrium of the form described, the minority type must be indifferent between $p^B = 1$ and $p^A = p^B = 0$ and prefer either alternative to $p^A = 1$. As the benefit to a minority type of securing re-election is $\phi + (1-q)(1-\gamma)m^P W$ in period 2, in order to have the minority type indifferent between B and 0 it must be that

$$1 - \gamma = (\pi_B - \pi_0)\delta[\phi + (1-q)(1-\gamma)m^P W]$$

where π_i is the probability of being re-elected after outcome i. Assume that after seeing $p^A = 1$, the incumbent is re-elected with probability $\pi_A = Y(\sigma, W)$ regardless of p^B. The above indifference condition is equivalent to

$$\pi_B - \pi_0 = \frac{1-\gamma}{\delta[\phi + 2(1-q)(1-\gamma)m^P W]}.$$

Note that in order to have an equilibrium, in addition to the above indifference condition, we must have that neither type wants to exert effort on A, and that the majority type prefers B to doing nothing. Note however that $\pi_B > \pi_0$, and $\phi > \phi_0^{A0}(\sigma, W) > \hat{\phi}(\sigma, W)$, so if the minority type is optimizing it means that the majority type is as well.

We first show that there exists a unique w^B such that the minority type is indifferent between B and 0. To see this, note that the right hand side is constant in w^B but

$$\mu(p^A = 0, p^B = 1) = \frac{m^P W}{m^P W + (1 - m^P) w^B}$$

is decreasing and

$$\mu(p^A = 0, p^B = 0) = \frac{m^P (1 - W)}{m^P (1 - W) + (1 - m^P)(1 - w^B)}$$

is increasing in w^B. As the probability of re-election is increasing in the probability perceived to be the majority type, $\pi_B - \pi_0$ is decreasing in w^B. Furthermore, evaluating at $w^B = 0$ and $w^B = W$, we see that $\pi_B - \pi_0$ is greater than $X(\sigma, W) - 1/2$ when $w^B = 0$ and equal to 0 when $w^B = W$. Moreover, by equations (15) and (16), we know that when $\phi > \phi^{A0}(\sigma, W)$,

$$X(\sigma, W) - 1/2 \geq 1/2 - Y(\sigma, W) > \frac{1 - \gamma}{\delta[\phi + (1 - q)(1 - \gamma) m^P W]} > 0.$$

So by the intermediate value theorem we have a solution $w^B \in (0, W)$, and since $\pi_B - \pi_0$ is decreasing this solution is unique.

As the probability of re-election after $p^A = 1$ is $\pi_A = Y(\sigma, W)$, to show that the minority type would not want to deviate to A it is sufficient to show that

$$\pi_B - Y(\sigma, W) \geq \frac{1}{\delta[\phi + 2(1 - q)(1 - \gamma) m^P W]}.$$

But, as $\pi_B > 1/2$ and $\phi > \phi^{A0}(\sigma, W)$, this follows immediately. We have then established that there exists an equilibrium of the described form.

We now turn to showing that this is the unique pure strategy equilibrium of the specified form. We rule out all other equilibria by contradiction. There are three possibilities to rule out: the minority type chooses $w^B = W$, the minority type chooses $w^A = w^B = 0$, and the minority type chooses $w^A > 0$ or $w^B < 0$. Note, however, that we have already seen that $w^B = W$ and $w^A = 0$ cannot be an equilibrium. If $w^B = W$ then

$$\pi_B - \pi_0 = 0 < \frac{1 - \gamma}{\delta[\phi + 2(1 - q)(1 - \gamma) m^P W]},$$

so the minority type prefers $p^B = 0$ to $p^B = 1$ and so would benefit from reducing effort on B. Similarly, if $w^A = w^B = 0$ then

$$\pi_B - \pi_0 > X(\sigma, W) - \frac{1}{2} > \frac{1 - \gamma}{\delta[\phi + 2(1 - q)(1 - \gamma) m^P W]}$$

and the minority type would benefit from increasing effort on B.

We conclude by showing that we cannot have a pure-strategy equilibrium in which the minority type chooses $w^A > 0$ or $w^B < 0$. Suppose there is an equilibrium in which the minority type chooses $w^A > 0$ on issue A and $w^B \in [0, W - w^A]$ on issue B. As $p^A = 1$ never happens when the incumbent is the majority type we have that the probability of re-election after $p^A = 1$, regardless of p^B is $\pi_A = Y(\sigma, W)$. Next, note that by Bayes' rule,

$$\mu(p^A = 0, p^B = 0) = \frac{m^P(1-W)}{m^P(1-W) + (1-m^P)(1-w^A)(1-w^B)} < m^P,$$

$$\mu(p^A = 0, p^B = 1) = \frac{m^P W}{m^P W + (1-m^P)(1-w^A)w^B} > m^P.$$

Hence, the probability of re-election after $p^A = 0, p^B = 1$ is $\pi_B > 1/2$, and the probability of re-election after $p^A = p^B = 0$ is $\pi_0 < 1/2$. Note that the minority type's probability of re-election is

$$w^A Y(\sigma, W) + (1-w^A)w^B\pi_B + (1-w^A)(1-w^B)\pi_0 < w^A Y(\sigma, W) + w^B\pi_B + (1-w^A-w^B)\pi_0.$$

If she deviates to effort allocation $(0, w^A + w^B)$ her probability of re-election is

$$(w^A + w^B)\pi_B + (1 - w^A - w^B)\pi_0,$$

and her first period policy payoff is decreased by $(2\gamma - 1)w^A$. So, in order for $(0, w^A + w^B)$ not to be a profitable deviation we must have

$$w^A \geq w^A(\pi_B - Y(\sigma, W))(\phi + 2(1-q)m^P(1-\gamma)W) > w^A\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2(1-q)m^P(1-\gamma)W),$$

which contradicts the assumption that $\phi > \phi^{A0}(\sigma, W)$. As such, we cannot have an equilibrium in which $w^A > 0$.

Now consider the possibility of $w^B < 0$. Then since $p^A = 1$ or $p^B = -1$ only happens if the incumbent if a minority type, we have $\pi_A = \pi_{-B} = Y(\sigma, W)$. As above we have $\pi_B > 1/2 > \pi_0 > Y(\sigma, W)$. The minority type's re-election probability is then

$$(1-w^A)(1-w^B)\pi_0 + (w^A + w^B - w^A w^B)Y(\sigma, W),$$

and the probability of re-election from $(0, w^A + w^B)$ is

$$(1 - w^A - w^B)\pi_0 + (w^A + w^B)\pi_B,$$

so the cost in forgone election probability is at least

$$\delta(\phi + 2m^P(1-\gamma)W)(w^A + w^B - w^A w^B)(\pi_B - Y(\sigma, W).$$

As the cost in terms of first period policy payoff is

$$w^A + 2w^B(1-\gamma) < w^A + w^B,$$

given that $w^A + w^B \leq W < 1$ this deviation is profitable unless

$$\begin{aligned} w^A + w^B &> \delta(\phi + 2m^P(1-\gamma)W)(w^A + w^B - w^A w^B)(\pi_B - Y(\sigma, W), \\ &\geq \delta(\phi + 2m^P(1-\gamma)W)(w^A + w^B - \frac{(w^A+w^B)^2}{4})(\pi_B - Y(\sigma, W), \\ &\geq \frac{3}{4}(w^A + w^B)\delta(\phi + 2m^P(1-\gamma)W)(\pi_B - Y(\sigma, W). \end{aligned}$$

However, this contradicts the assumption that $\phi > \phi^{A0}(\sigma, W)$.

Having now ruled out every other possibility, we can conclude that when $\phi > \phi^{A0}(\sigma, W)$ the minority type chooses $w^A = 0$ and $w^B < W$ in the unique pure strategy equilibrium. □

We conclude with the result when effort is non-transparent and $W > 1$.

Proof of Proposition 4. We begin by defining

$$\phi^*_{NA}(\sigma, W) \equiv \frac{2}{\delta(1 - 2Y(\sigma, W))} - 2m^P(1-\gamma)[1 + q(W-2)]. \tag{17}$$

and verifying that $\phi^*_{NA}(\sigma, W)$ as defined in equation (17) is larger than $\phi^*(\sigma, W) = \max\{\hat{\phi}(W), \phi_1(\sigma, W)\}$, where $\hat{\phi}(W)$ and $\phi_1(\sigma, W)$ are given by equations (11) and (12) respectively. Note that

$$\begin{aligned} \phi_1(\sigma, W) &= \frac{2(1-(W-1)\gamma)}{\delta(1-2Y(\sigma, W))} - 2m^P(1-\gamma)(1+(W-2)q) \\ &< \frac{2}{\delta(1-2Y(\sigma, W))} - 2m^P(1-\gamma)(1+(W-2)q) = \phi^*_{NA}(\sigma, W), \end{aligned}$$

and

$$\hat{\phi}(W) = \frac{1+(W-2)q}{2}(2\gamma m^P - 1) < \gamma m^P < \frac{2}{\delta(1-2Y(\sigma, W))} - 2m^P(1-\gamma) < \phi^*_{NA}(\sigma, W),$$

so it follows that $\phi^*_{NA}(\sigma, W) > \phi^*(\sigma, W)$ as claimed.

We now show that we can support a pooling equilibrium in which the minority type chooses allocation $w^B = 1, w^A = W - 1$ if and only if $\phi \geq \phi^*_{NA}(\sigma, W)$. First note that, given that in the purported equilibrium the incumbent is re-elected with probability 1/2 if $p^B = 1$ regardless of p^A. The harshest possible beliefs, to support such an equilibrium, induce re-election probability $Y(\sigma, W)$ when $p^B = 0$. So, in order to prevent the minority type from deviating to $(w^A = 1, w^B = W - 1)$, we must have

$$(2 - W) \leq \delta(2 - W)\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2m^P(1-\gamma)(1 + q(W-2)),$$

or, equivalently, $\phi \geq \phi^*_{NA}(\sigma, W)$. So the above strategies cannot constitute an equilibrium if $\phi < \phi^*_{NA}(\sigma, W)$. We now verify that there is no other profitable deviation, given these beliefs, if $\phi \geq \phi^*_{NA}(\sigma, W)$. In equilibrium, as we have pooling behavior, the voter does not update based on p^A. Hence, the probability of re-election is 1/2 if $p^B = 1$ and $Y(\sigma, W)$ if $p^B = 0$. Suppose the minority type deviates to (w^A, w^B) where $w^B < 1$. Then the benefit in terms of first period payoff is

$$(w^A + 1 - W)\gamma + (1 - w^B)(1 - \gamma) \leq (1 - w^B).$$

The cost, in terms of forgone re-election probability is

$$\delta(1 - w^B)\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2m^P(1 - \gamma)(1 + q(W - 2))$$

Hence, this deviation is not profitable if

$$\delta\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2m^P(1 - \gamma)(1 + q(W - 2)) \geq 1,$$

or, equivalently, $\phi \geq \phi^*_{NA}(\sigma, W)$. Hence, we have that the minority type is optimizing if and only if $\phi \geq \phi^*_{NA}(\sigma, W)$. Moreover, since $\phi > \hat{\phi}(W)$ when $\phi \geq \phi^*_{NA}(\sigma, W)$, if the minority type is optimizing the majority type is optimizing as well. Hence we haven an equilibrium with both types pooling on $(W - 1, 1)$ if and only if $\phi \geq \phi^*_{NA}(\sigma, W)$.

We now show that there exists $\phi^{**}(\sigma, W) < \phi^*_{NA}(\sigma, W)$ such that, for all $\phi \in (\phi^{**}(\sigma, W), \phi^*_{NA}(\sigma, W))$, there exists an equilibrium in which the majority type chooses allocation $(W-1, 1)$ and the minority type chooses effort allocation $(1, W-1)$ with probability $r \in (0, 1]$, and allocation $(W-1, 1)$ otherwise. Note that, given the above strategies,

$$\mu(p^A = 1, p^B = 1) = m^P,$$

$$\mu(p^A, p^B = 0) = 0,$$

$$\mu(p^A = 0, p^B = 1; r) = \frac{m^P(1 - W)}{m^P(1 - W) + (1 - m^P)(1 - r)(1 - W)} = \frac{m^P}{m^P + (1 - m^P)(1 - r)}.$$

Notice that $\mu(0, 1; r)$ is increasing in r and $\mu(0, 1; 1) = 1$. We first show that the majority and minority type are optimizing conditional on choosing allocation $(w^A, w^B) \in \{(1, W-1), (W-1, 1)\}$. For each r we then have $\pi_A = \pi_0 = Y(\sigma, W)$, $\pi_{AB} = 1/2$, and $\pi_B = \pi(r)$, where $\pi(r)$ is increasing in r with $\pi(0) = 1/2$ and $\pi(1) = X(\sigma, W)$. Now note that, in order to have the minority type willing to randomize we must have that her payoff from choosing $(1, W-1)$ is the same as $(W-1, 1)$. As the difference in first period utility is $W-1$, and the change in re-election probability is $(W-1)(\pi_B - \pi_A)$ randomization is optimal if and only if

$$1 = (\pi(r) - Y(\sigma))(\phi + 2m^P(1 - \gamma)(1 + q(W - 2)).$$

Note that, since $\phi < \phi^*_{NA}(\sigma, W)$ we have

$$1 > \delta\left(\frac{1}{2} - Y(\sigma, W)\right)(\phi + 2m^P(1 + q(W-2)) = \delta(\pi(0) - Y(\sigma, W))(\phi + 2m^P(1-\gamma)(1 + q(W-2)),$$

and since $\pi(r)$ is increasing, we have a solution with $r \in (0, 1)$ if and only if

$$1 < \delta(\pi(1) - Y(\sigma, W))(\phi + 2m^P(1 + q(W-2)) = \delta(X(\sigma, W) - Y(\sigma, W))(\phi + 2m^P(1-\gamma)(1 + q(W-2)).$$

So if $\phi \geq \frac{1}{\delta(X(\sigma,W) - Y(\sigma,W))} - 2m^P(1 + q(W - 2))$ there exists a unique $r \in (0, 1)$ to make the minority type indifferent. If $\phi < \frac{1}{\delta(X(\sigma,W) - Y(\sigma,W))} - 2m^P(1 - \gamma)(1 + q(W - 2))$ then the minority type's strategy must involve $r = 1$.

Now note that, if the minority type is randomizing, the majority type has a strict preference for allocation $(W-1,1)$ over $(1,W-1)$. If $\phi < \frac{1}{\delta(X(\sigma,W)-Y(\sigma,W))} - m^P(1+q(W-2))$ and so $r=1$, we must check that the majority type prefers allocation $(W-1,1)$ to $(1,W-1)$. This requires that

$$2\gamma - 1 \leq \delta(\pi(1) - Y(\sigma,W))(\phi + 2(1-m^P)(1-\gamma)(1+q(W-2))).$$

Notice that this is satisfied if and only if

$$\phi > \frac{2\gamma-1}{\delta(X(\sigma,W)-Y(\sigma,W))} - 2(1-m^P)(1-\gamma)(1+q(W-2)),$$

which, when $\phi > \hat{\phi}(W)$ is strictly lower than $\frac{1}{\delta(X(\sigma,W)-Y(\sigma,W))} - 2m^P(1-\gamma)(1+q(W-2)) = \phi^*_{NA}(\sigma,W)$. Defining

$$(18)\quad \phi^{**}(\sigma,W) = \max\{\phi^*(\sigma,W), \frac{2\gamma-1}{\delta(X(\sigma,W)-Y(\sigma,W))} - 2(1-m^P)(1-\gamma)(1+q(W-2))\},$$

we have established that neither the majority or minority type wants to deviate between $(W-1,1)$ and $(1,W-1)$ when $\phi > \phi^{**}(\sigma,W)$. It is immediate that $\phi^{**}(\sigma,W) < \phi^*_{NA}(\sigma,W)$.

We now must show that neither the majority or minority type can benefit from deviating to $(w^A,w^B) \notin \{(1,W-1),(W-1,1)\}$ when $\phi \in (\phi^{**},\phi^*_{NA})$. Recall that under the above strategies $\pi_A = Y(\sigma,W)$, $\pi_{AB} = 1/2$, and $\pi_B \in (1/2, X(\sigma,W))$. Note that the beliefs when $p^A = p^B = 0$ or $p^B = -1$ are off the equilibrium path; we assign beliefs $\mu = 0$ at either information set so that $\pi_0 = \pi_{-B} = Y(\sigma,W)$. Note that, as the re-election probability is then $Y(\sigma,W)$ from any strategy with $w^B \leq 0$, and we have established in Lemma 8 that when $\phi > \phi^*(\sigma,W)$ both types prefer to implement $w^B = 1, w^A = W-1$ and be re-elected with probability 1/2 to any effort allocation that ensures re-election probability $Y(\sigma,W)$, we can then restrict attention to deviations with $w^B > 0$.

The probability of re-election from choosing (w^A,w^B) is then

$$\begin{aligned} w^B(1-w^A)\pi_B + w^A w^B \pi_{AB} + w^A(1-w^B)\pi_A + (1-w^A)(1-w^B)\pi_0 &= \\ w^B(1-w^A)\pi_B + \frac{1}{2}w^A w^B + (1-w^B)Y(\sigma,W). \end{aligned}$$

To see that the minority type has no incentive to choose $(w^A,w^B) \notin \{(1,W-1),(W-1,1)\}$, note that if the minority type chooses allocation (w^A,w^B) her first period payoff is

$$-\gamma(1-w^A) - (1-\gamma)w^B.$$

Her first period payoff from allocation $(1,W-1)$ however is $-(1-\gamma)(W-1)$ and her re-election probability is $(W-1)\frac{1}{2} + (2-W)Y(\sigma,W)$. Hence, for the minority type to prefer (w^A,w^B) to $(1,W-1)$ requires that

$$\gamma(1-w^A) + (1-\gamma)(1+w^B-W) <$$
$$\delta(w^B(1-w^A)\pi_B + (1+w^A w^B - W)\frac{1}{2} - (1+w^B-W)Y(\sigma,W))(\phi + 2m^P(1-\gamma)(1+q(W-2))).$$

To verify that this inequality is violated for all w^A it is sufficient to check for $w^A = \min\{1, W - w^B\}$. Note that when $w^A = W - w^B$ this inequality reduces to

$$(1+w^B-W) < (1+w^B-W)(w^B(\pi_B-Y(\sigma,W))+(1-w^B)\left(\frac{1}{2}-Y(\sigma,W)\right)(\phi+2m^P(1-\gamma)(1+q(W-2))).$$

But because the minority type weakly prefers $(1, W-1)$ to $(W-1, 1)$, and $\phi < \phi^*_{NA}(\sigma, W)$, this inequality cannot be satisfied. Similarly, when $w^A = 1$, since $1 + w^B - W \leq 0$ this reduces to

$$(1-\gamma) > \left(\frac{1}{2} - Y(\sigma,W)\right)(\phi + 2m^P(1-\gamma)(1+q(W-2))),$$

Which violates the assumption that $\phi > \phi^{**}(\sigma, W) \geq \phi^*(\sigma, W)$. So it is not optimal for the minority type to deviate to any $(w^A, w^B) \notin \{(1, W-1), (W-1, 1)\}$ when $\phi \in (\phi^{**}(\sigma, W), \phi^*_{NA}(\sigma, W))$.

We conclude by considering the majority type. The majority type's first period payoff from allocation (w^A, w^B) is

$$-\gamma(1-w^A) - (1-\gamma)w^B,$$

while the first period payoff from $(W-1, 1)$ is $-\gamma(2-W)$ with associated re-election probability $(W-1)\frac{1}{2} + (2-W)\pi_B$. Note that, as the majority type's first period payoff, and re-election probability, are both increasing in w^B we can restrict attention to cases in which $w^B = \min\{1, W - w^A\}$ without loss of generality. The majority type would only benefit from deviating if $\gamma(W-1-w^A) + (1-\gamma)(1-w^B)$ is strictly less than

$$\delta[(w^B(1-w^A) + W - 2)\pi_B + (w^A w^B + 1 - W)/2 + (1-w^B)Y(\sigma, W)]$$
$$(\phi + 2(1-m^P)(1-\gamma)(1+q(W-2))).$$

Note first that when $w^B = 1$ this reduces to

$$\gamma(W-1-w^A) < \delta\left(\pi_B - \frac{1}{2}\right)(W-1-w^A)(\phi + 2(1-m^P)(1-\gamma)(1+q(W-2)))$$

which, because $\gamma > 1/2$, can't be satisfied when $\phi < \phi^*_{NA}(\sigma, W)$. And, if $w^B = W - w^A$, using the fact that $\pi_B > 1/2$, it implies that

$$(2\gamma-1)(1+w^A-W) \;\; > \;\; (1+w^A-W)\left(\frac{1}{2} - Y(\sigma,W)\right)(\phi + 2(1-m^P)(1-\gamma)(1+q(W-2))),$$

which can't be satisfied when $\phi > \phi^{**}(\sigma, W)$. So the majority type doesn't have an incentive to deviate to any $(w^A, w^B) \notin \{(1, W-1), (W-1, 1)\}$.

We can then conclude that it is an equilibrium for both types to choose $(W-1, 1)$ if and only if $\phi \geq \phi^*_{NA}(\sigma, W) > \phi^*(\sigma, W)$, and when $\phi \in (\phi^{**}(\sigma, W), \phi^*_{NA}(\sigma, W))$ it is an equilibrium for the minority type to randomize between $(W-1, 1)$ and $(1, W-1)$ while the majority type chooses $(W-1, 1)$. □

Appendix C: Empirical Methods. Appendix C describes how the text data were assembled and used to construct our measure of speech divisiveness.

The raw text of the *Congressional Record* were obtained from Jensen et al. (2012). Data are stored and analyzed as a relational database. The segmentation and processing of text is implemented using Python's Natural Language Toolkit package. Our statistical estimates were produced using Stata.

A script reads through the text, detects dates and speakers, and segments speeches for each congressman. Next, we remove capitalization and punctuation, tokenize the text into sentences and words, and use a "lemmatizer" to reduce words to their dictionary root when possible. This is preferred by NLP practitioners to the relatively lossy Porter stemmer, which just removes word suffixes.

[Table A1 - List of Excluded Words]

We have developed a relatively aggressive list of words for exclusion from the corpus. First we remove any words fewer than 3 characters. Second we remove common "stop-words" such as "the" and "which." We also did our best to exclude procedural vocabulary, which could be correlated with our treatment variables without indicating changes in policy effort. We also removed other non-policy words that are common in the record, such as the names of states. Finally, some common misspellings are included. A full list of excluded words (at least three letters long) is included in Table A1.

An individual floor speech is represented as a list of sentences, each of which is a list of words. Speeches with two or fewer sentences are excluded. Then for each congressman, all of the sentences for a two-year congressional session are appended together as his speech output for that session.

[Table A2 - Filtering the Feature Set]

From the tokenized sentences we then construct lists of two-word and three-word phrases (bigrams and trigrams), not allowing for word sequences across sentence boundaries. The full set of phrases has over 120 million features. To achieve a computationally feasible metric for divisiveness of speech, we reduced the feature set as follows. We began by removing any phrases that did not appear in at least ten of the twenty congressional sessions in our sample. Then we ranked each phrase p in two ways. First, the overall frequency of the phrase in the corpus, f_p. Second, the point-wise mutual information (PMI) for the phrase, PMI_p. This metric is used by linguists to uncover the most informative phrases from a corpus (Bouma 2009). For example, one of the highest-PMI phrases in our corpus is "notre dame" — the words "notre" and "dame" rarely occur except in the name of the university. We selected the phrases with the highest frequency and the highest PMI, with some subjective judgement about where to set the cutoffs. As a reasonably large and computationally feasible set of phrases, we selected 2000 bigrams and 1000 trigrams. The thresholds for these numbers were $f_p \geq 2336, PMI_p \geq 3.145$ for bigrams, and $f_p \geq 1173, PMI_p \geq 10.016$ for trigrams.

The full phrase feature set for our empirical analysis are available on request from the authors. These data include frequency and PMI for each phrase. Note that this set of phrase features is more representative of the distribution of topics in the Congressional Record than that used in Gentzkow and Shapiro (2010) and Jensen et. al (2012). In those papers, the authors selected the most divisive phrases as ranked by the Chi-squared metric (see below). Instead, we construct our feature set using non-political metrics (frequency and PMI), and then score this set of representative phrases by divisiveness.

The Chi-squared metric for the political divisiveness of a phrase is constructed as follows. We begin with the phrase frequencies for each political party in each congressional chamber and each congressional session. Define n^D_{plct} and n^R_{plct} as the number of times phrase p of length l is used by Democrats and Republicans, respectively, during session t in legislative chamber c (House or Senate). Let $N^D_{lct} = \sum_p n^D_{plct}$ and $N^R_{lct} = \sum_p n^R_{plct}$ be the summed frequencies of all phrases of length l used by Democrats and Republicans, respectively, at session t in chamber c. Finally, let $\tilde{n}^D_{plct} = N^D_{lct} - n^D_{plct}$ and $\tilde{n}^R_{plct} = N^R_{lct} - n^R_{plct}$ equal the total number of times phrases of length $l \in \{2, 3\}$ besides p (but still in the filtered sample) were used by Democrats and Republicans, respectively, during session t in chamber c. Then construct Pearson's χ^2_{plct} statistic for each phrase p of length $l \in \{2, 3\}$ at time t in chamber c as

$$\chi^2_{plct} = \frac{(n^R_{plct}\tilde{n}^D_{plct} - n^D_{plct}\tilde{n}^R_{plct})^2}{N^D_{lct}N^R_{lct}(n^D_{plct} + n^R_{plct})(\tilde{n}^D_{plct} + \tilde{n}^R_{plct})}.$$

As shown in Gentzkow and Shapiro (2010), this metric ranks phrases by their association with particular political parties. If the frequencies n^D_{plct} and n^R_{plct} are drawn from multinomial distributions, χ^2_{plct} provides a test statistic for the null that phrase p is used equally by Democrats and Republicans during session t in chamber c. That paper provides a lengthy discussion of the measure.

Now that we have an annual divisiveness score for each phrase, we use these phrases to construct a measure of the divisiveness of congressman speech. Our approach is based on Jensen et al. (2012), who use a similar method to measure historical levels of polarization in the U.S. House. First define the raw frequency for phrase p by congressman i in chamber c during session t as ϕ^c_{ipt}. Using the set of frequencies for phrase p in chamber c at year t, $\{\phi^c_{1pt}, \phi^c_{2pt}, \phi^c_{3pt}, ...\}$, construct the mean μ^c_{pt} and standard deviation σ^c_{pt} of the frequency for that phrase-chamber-year, and define the normalized frequency f^c_{ipt} to have zero mean and standard deviation one:

$$f^c_{ipt} := \frac{\phi^c_{ipt} - \mu^c_{pt}}{\sigma^c_{pt}}.$$

This will mean that each phrase has the same influence on our congressman divisiveness measure.

Define the number of phrases P, indexed by $p \in \{1, 2, ..., P\}$. In our case $P = 3000$. The divisiveness of phrase p for chamber c at year t is χ^2_{pct}, where we drop l and ignore length since all the phrases are scored on the same scale. Let

$$F_{it} = \sum_{p=1}^{P} f_{ipt},$$

the total number of phrases spoken by congressman i during t. We define politician divisiveness as the frequency-weighted phrase divisiveness for the phrases used by the congressman. In particular:

$$Y^c_{it} = \log(\sum_{p=1}^{P} \frac{f_{ipt}\chi^2_{pct}}{F_{it}}).$$

We have taken logs to obtain a unitless measure. Jensen et al. (2012) show the usefulness of this aggregate measure in a range of contexts.

Note that the phrase divisiveness metric χ^2_{pct} can be based on the language of either chamber $c \in \{H, S\}$. This will matter in our empirical analysis—when studying the posturing behavior in a particular legislative chamber, we prefer to use the phrase divisiveness metric constructed from speech in the other chamber. This allows us to avoid any issues with a congressman's own speech influencing the level of the metric.

[Figure A1 (Senator Speech Divisiveness, 1973-2012)]

[Figure A2 (House Member Speech Divisiveness, 1991-2002)]

Figures A1 and A2 give the trends in average divisiveness for the Senate and House of representatives, respectively. As seen in the figures, Republicans and Democrats have similar levels and trends in speech divisiveness. Note that chamber-wide differences in divisiveness over time will not affect our results, since we include year fixed effects in our regressions.

TABLE 1
Legislator Characteristics and Treatment Variables

	Summary Statistics			
	Mean	Std. Dev.	Minimum	Maximum
Senators				
Year	1992.189	11.64728	1973	2011
Experience	10.82447	9.385472	0	50
Republican	0.4529325	0.4979024	0	1
Election Cohort	1.956136	0.8252356	1	3
House Members				
Year	1995.929	3.411143	1991	2001
Experience	8.591297	8.085978	0	52
Republican	0.4659864	0.4989478	0	1
Transparency	-2.070948	1.174374	-5.516822	0

Observation is a congressman-session. Sample includes 331 senators and 653 House members. *Experience* refers to the number of years since joining Congress. *Republican* equals one for Republican Congressmen. *Election Cohort* equals 1, 2, or 3 depending on senator election cohort status. *Transparency* is the (log) measure of news coverage constructed by Snyder and Stromberg (2010).

TABLE 2

Most and Least Divisive Phrases, 1973-2012

Divisive Phrases Associated with Republicans

adult stem cell	health saving account	personal income tax
balanced budget constitution	income tax rate	right bear arm
billion barrel oil	iraq study group	small business owner
capital gain tax	largest tax increase	special interest group
center medicare medicaid	marginal tax rate	stand adjournment previous
embryonic stem cell	marriage tax penalty	stood trillion hundred
federal debt stood	medical saving account	tax increase history
federation independent business	national drug control	trade promotion authority
free enterprise system	national federation independent	trillion cubic foot
global war terror	oil natural gas	wage price control
gross national product	partial birth abortion	windfall profit tax

Divisive Phrases Associated with Democrats

allocation current level	cut social security	prescription drug cost
billion trade deficit	distinguished republican leader	prescription drug plan
boehlert boehner bonilla	education health care	resolve committee union
child health insurance	give tax break	tax break wealthy
civil right movement	johnson sam jones	tax cut wealthiest
civil service discharged	late term abortion	tax cut wealthy
committee interior insular	managed care plan	test ban treaty
comprehensive test ban	martin luther king	trade deficit billion
conduct hearing entitled	minimum wage worker	veteran health care
cost prescription drug	nuclear arm race	victim domestic violence
credit card company	oversight government reform	woman right choose

Least Divisive Phrases

banking finance urban	forward continuing work	merchant marine fishery
chemical weapon convention	great deal money	passed signed law
civil service commission	hard work dedication	played important role
committee held hearing	homeland security appropriation	played key role
committee worked hard	important step forward	protect national security
dedicated public servant	improve health care	public private partnership
defense appropriation subcommittee	international financial institution	public private sector
democracy human right	law enforcement assistance	renewable energy source
federal highway administration	law enforcement community	research development administration
finance urban affair	made great stride	theater missile defense
fiscal budget request	major step forward	worked long hard

List of 33 most divisive Republican trigrams, most divisive Democrat trigrams, and least divisive trigrams, as scored by Pearson's Chi-squared metric (Gentzkow and Shapiro, 2010), using the average score pooled across the years in the sample. This ranking uses speech from both the senate and house.

TABLE 3
Speech Statistics

	Summary Statistics			
	Mean	Std. Dev.	Minimum	Maximum
Senators				
Phrases Used	985.9221	440.4701	1	2306
Summed Frequency	3902.801	3306.333	1	26435
Speech Divisiveness (S)	-12.08357	0.7778213	-17.52781	-9.844401
Speech Divisiveness (H)	-11.82648	0.6756834	-18.22767	-9.465147
House Members				
Phrases Used	326.3737	230.3673	1	1475
Summed Frequency	821.5714	968.5123	2	11974
Speech Divisiveness (S)	-10.77591	0.6645891	-16.39381	-8.1004
Speech Divisiveness (H)	-10.54856	0.7323265	-18.24471	-8.536487

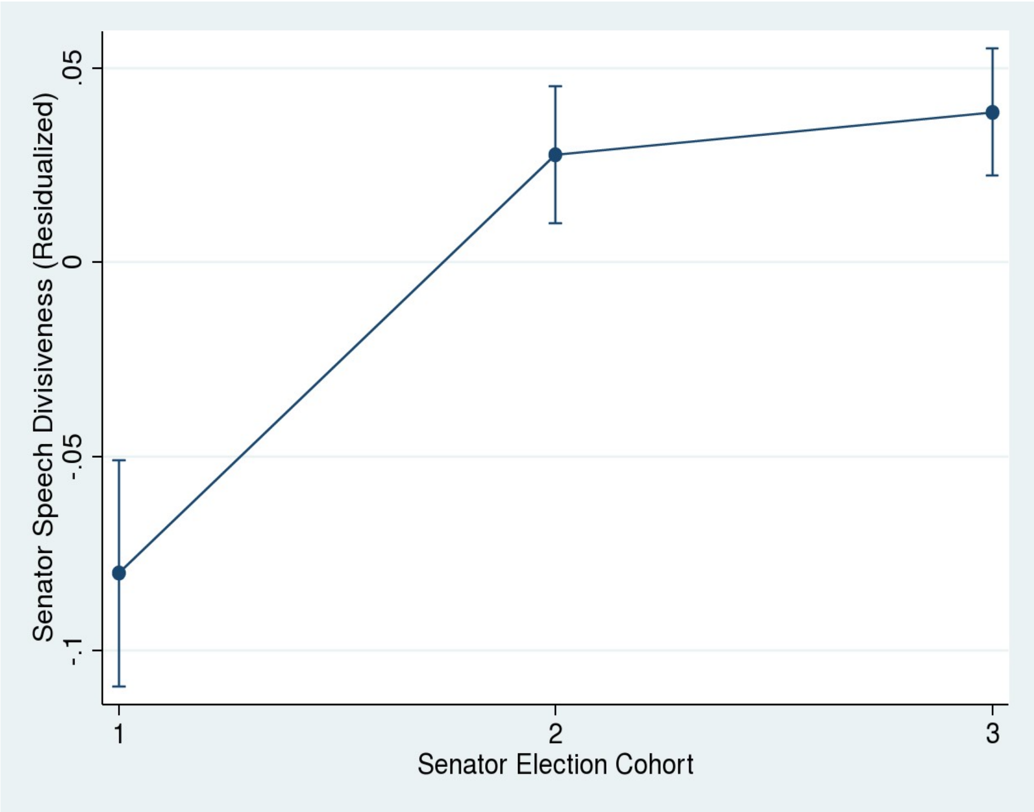
Observation is a congressman-session. *Phrases Used* refers to the number of phrases (out of the 3000-phrase vocabulary) used in a session. *Summed Frequency* refers to the total number of times a phrase in the vocabulary is used in a session. *Speech Divisiveness (S)* refers to the (log) measure constructed using Senate speech, and *Speech Divisiveness (H)* refers to the (log) measure constructed using House speech. See details in Appendix C.

TABLE 4
Election Effects on Senator Speech Divisiveness

	(1)	(2)	(3)	(4)
Election Cohort	0.0343+	0.0407*	0.0565**	0.0579**
	(0.0171)	(0.0159)	(0.0177)	(0.0157)
adj. R-sq.	0.129	0.144	0.436	0.352
Divisiveness Measure	Senate	House	Senate	House
Year Fixed Effects	X	X	X	X
Speaker Fixed Effects			X	X

Standard errors in parentheses, clustered by state. + p <0.1, * p<0.5, ** p<0.01. The sample includes 331 senators, 20 sessions, and 1,771 senator-sessions. Election Cohort equals 1, 2, or 3 depending on senator cohort status. Divisiveness Measure refers to the speech source used to score the divisiveness of phrases (Senate speech or House speech).

Figure 1
Senator Speech Divisiveness by Election Cohort



This figure plots the residuals from a regression of senator speech divisiveness on a year fixed effect and speaker fixed effect, grouped by senator election cohort status. Error spikes indicate standard errors. Speech divisiveness measure is constructed from House speech.

TABLE 5

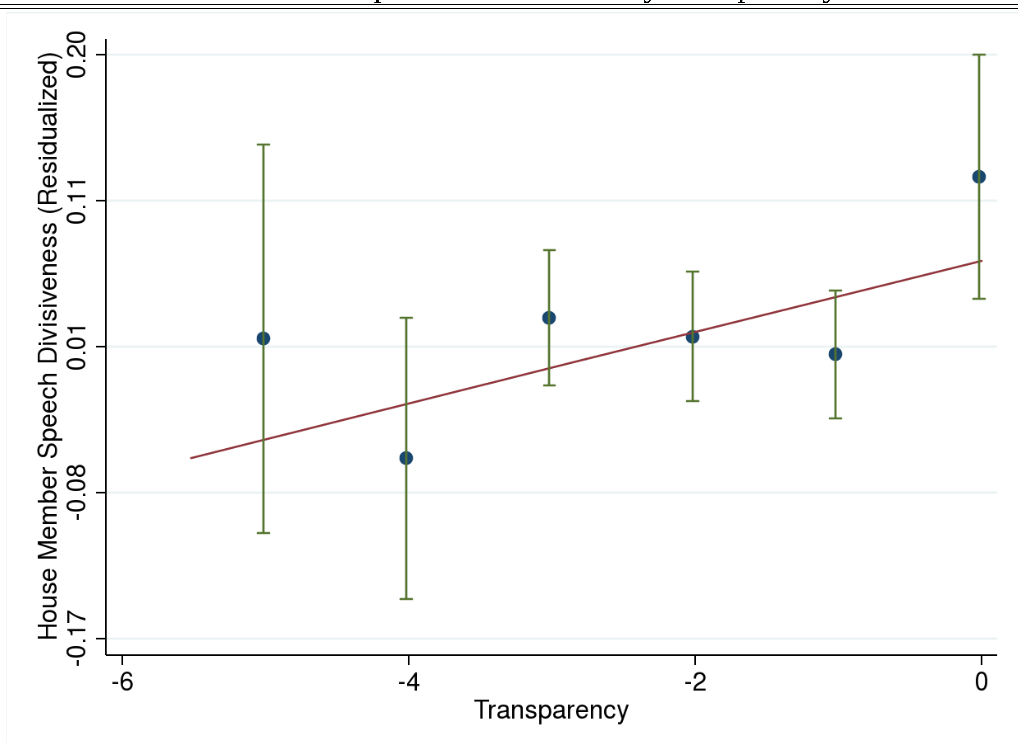
Effect of Transparency on House Speech Divisiveness

	(1)	(2)	(3)	(4)
Transparency	0.0221	0.0252	0.0785+	0.0970*
	(0.0166)	(0.0192)	(0.0411)	(0.0455)
adj. R-sq.	0.042	0.041	0.243	0.407
Divisiveness Measure	Senate	House	Senate	House
Year Fixed Effects	X	X	X	X
Speaker Fixed Effects			X	X

Standard errors in parentheses, clustered by state. + p <0.1, * p<0.5, ** p<0.01. The sample includes 653 House members, 6 sessions, and 1,697 member-sessions. Transparency refers to the transparency measure constructed by Snyder and Stromberg (2010), as described in the text. Divisiveness Measure refers to the speech source used to score the divisiveness of phrases (Senate speech or House speech).

Figure 2

House Member Speech Divisiveness by Transparency Level



This figure plots the residuals from a regression of House member speech divisiveness on a year fixed effect and speaker fixed effect, grouped in bins of width 1. Red line gives linear fit. Error spikes indicate 95% confidence intervals. Speech divisiveness constructed from Senate speech.

TABLE A1
List of Excluded Words

a's	and	before	come	dont	following
able	announce	beforehand	comes	down	follows
about	announced	behind	complet	downwards	for
above	another	being	concerning	during	former
absence	any	believe	confer	each	formerly
absent	anybody	below	conference	edu	forth
absnce	anyhow	bers	congress	effort	four
according	anyone	beside	congressional	eight	friday
accordingly	anything	besides	connecticut	eign	from
across	anyway	best	consent	either	further
act	anyways	better	consequently	else	furthermore
acting	anywhere	between	consider	elsewhere	gentleman
actually	apart	beyond	consideration	enactment	gentlewoman
adding	appear	bill	considering	ence	georgia
adopt	appreciate	bloc	contain	enough	get
affirm	appro	both	containing	ent	gets
after	appropriate	brief	contains	entirely	getting
afterwards	approve	busi	corresponding	eral	given
again	april	but	could	ernment	gives
against	are	c'mon	couldn't	ers	goes
ago	aren't	c's	coun	especially	going
agree	arizona	california	country	etc	gone
ain't	arkansas	call	course	even	got
aisle	around	came	currently	ever	gotten
alabama	aside	can	dakota	every	greetings
alaska	ask	can't	date	everybody	gress
all	asked	cannot	debat	everyone	had
allow	asking	cant	debate	everything	hadn't
allows	assistant	carolina	december	everywhere	hampshire
almost	associated	cause	defeat	exactly	happens
alone	ator	causes	delaware	example	hardly
along	attend	cer	described	except	has
already	august	certain	desk	express	hasn't
also	available	certainly	despite	extend	have
although	away	chairman	device	far	haven't
always	awfully	chapter	did	favor	having
amdt	aye	chil	didn't	february	hawaii
amend	ayes	cial	different	ference	he's
amended	back	clause	distinguish	few	hello
amendment	became	clearly	dle	fifth	hence
america	because	clerk	does	first	her
american	become	clotur	doesn't	five	here
among	becomes	colleague	doing	floor	here's
amongst	becoming	colorado	don't	florida	hereafter
ance	been	com	done	followed	hereby

List of words excluded from text before construction of bigrams and trigrams.

TABLE A1 (cont.)
List of Excluded Words

herein	itself	maine	ness	ours	provision
hereupon	ity	mainly	nevada	ourselves	pur
hers	january	majority	never	out	purpose
herself	jersey	make	nevertheless	outside	que
him	join	many	new	over	question
himself	joint	march	next	overall	quite
his	journal	maryland	nine	override	quorom
hither	july	massachusetts	nobody	own	quorum
hopefully	june	may	non	page	rather
house	just	maybe	none	particular	read
how	kansas	mean	noone	particularly	really
howbeit	keep	meanwhile	nor	pass	reasonably
however	keeps	meet	normally	passag	reconsider
i'd	kentucky	member	not	passage	record
i'll	kept	ment	note	past	regarding
i'm	kill	merely	nothing	pct	regardless
i've	know	mexico	novel	pennsylvania	regards
idaho	known	michigan	november	peo	reject
ident	knows	might	now	people	relatively
ignored	last	minnesota	nowhere	per	remark
illinois	lately	minute	number	percent	rep
immediate	later	mississippi	objection	perhaps	report
inasmuch	lation	missouri	obviously	period	requir
inc	latter	mittee	oclock	permission	requisite
include	latterly	monday	october	placed	resolut
increas	least	montana	off	ple	resolution
indeed	legisla	month	officer	please	respectively
indiana	legislative	more	often	plus	result
indicate	less	moreover	ohio	point	retary
indicated	lest	most	okay	possible	revise
indicates	let	mostly	oklahoma	pre	rhode
ing	let's	motion	old	present	rise
ington	lic	move	once	presid	roll
inner	lieu	much	one	president	rollcall
inserting	lieve	must	ones	presiding	rule
insofar	like	myself	only	presumably	said
instead	liked	name	onto	printed	saturday
into	likely	namely	oppos	pro	saw
invok	line	nay	order	probably	say
inward	little	near	ordered	proceed	saying
iowa	look	nearly	oregon	proceeded	says
isn't	looking	nebraska	other	program	section
it'd	looks	necessary	others	propos	see
it'll	louisiana	need	otherwise	proposed	seeing
it's	ltd	needs	ought	provide	seem
its	madam	neither	our	provides	seemed

List of words excluded from text before construction of bigrams and trigrams.

TABLE A1 (cont.)
List of Excluded Words

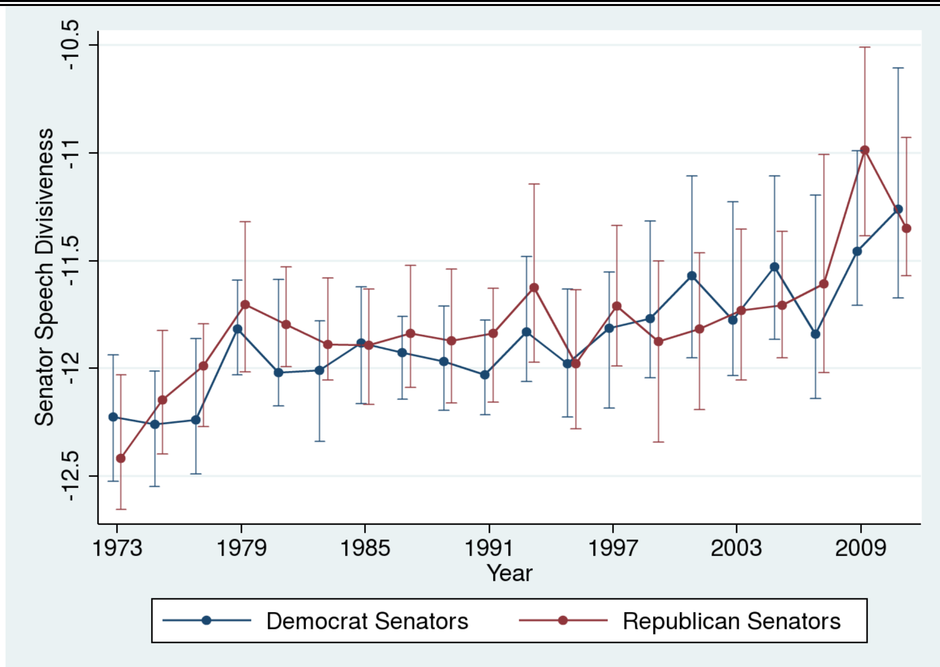
seeming	stat	thereby	twice	well	yield
seems	state	therefore	two	went	york
seen	states	therein	unanimous	were	you
self	statu	thereof	under	weren't	you'd
selves	still	theres	unfortunately	what	you'll
senat	strike	thereupon	united	what's	you're
senate	striking	these	unless	whatever	you've
senator	sub	they	unlikely	when	your
send	subchapter	they'd	until	whence	yours
sense	subsection	they'll	unto	whenever	yourself
sensible	subsequ	they're	upon	where	yourselves
sent	such	they've	urge	where's	zero
september	sunday	think	use	whereafter	
sergeant	sup	third	used	whereas	
serious	support	this	useful	whereby	
seriously	sure	thorough	uses	wherein	
serv	suspend	thoroughly	using	whereupon	
session	t's	those	usually	wherever	
seven	table	though	utah	whether	
several	take	three	uucp	which	
shall	taken	through	various	while	
she	tary	throughout	vermont	whither	
should	tell	thru	very	who	
shouldn't	tem	thursday	veto	who's	
side	tempore	thus	via	whoever	
since	tends	tiff	vide	whole	
sion	tennessee	time	vided	whom	
sions	ter	tion	virginia	whose	
six	texas	tional	viz	why	
some	than	tions	vol	will	
somebody	thank	title	vote	willing	
somehow	thanks	tive	wait	wisconsin	
someone	thanx	tleman	waive	wish	
something	that	today	want	with	
sometime	that's	together	wants	within	
sometimes	thats	too	was	without	
somewhat	the	took	washington	won't	
somewhere	their	toward	wasn't	wonder	
soon	theirs	towards	way	word	
sorry	them	tried	we'd	would	
speak	themselves	tries	we'll	wouldn't	
speaker	then	truly	we're	wyoming	
specified	thence	try	we've	yea	
specify	there	trying	wednesday	year	
specifying	there's	tuesday	week	yes	
spend	thereafter	ture	welcome	yet	

List of words excluded from text before construction of bigrams and trigrams.

TABLE A2
Filtering the Feature Set

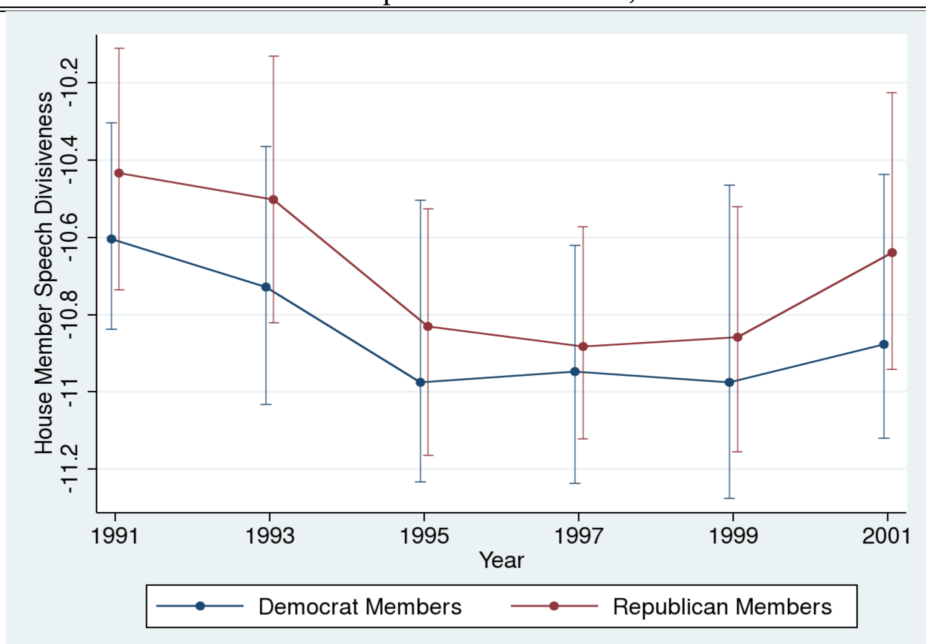
	Feature Filtering Step	Set of Text Features
1	Entire Vocabulary	671,679 words
2	Words used in at least 10 separate sessions	56,392 words
3	Words used at least 50 times per session on average when they appear	13,088 words
4	Full set of bigrams and trigrams using the vocabulary from Step 3.	20,271,332 bigrams; 99,78,398 trigrams
5	Bigrams with total frequency >= 2336 and PMI >= 3.14, trigrams with PMI >= 10 and total frequency >= 1000	2000 bigrams, 1000 trigrams

Figure A1
Senator Speech Divisiveness, 1973-2012



This figure plots the mean senator speech divisiveness for each congressional session, separately by political party. Error spikes indicate 25th and 75th percentiles. Speech divisiveness measure is constructed from House speech.

Figure A2
House Member Speech Divisiveness, 1991-2002



This figure plots the mean House member speech divisiveness for each congressional session, separately by political party. Error spikes indicate 25th and 75th percentiles. Speech divisiveness measure is constructed from Senate speech.