Expressive Politics: How Animus and Cognitive Dissonance Affect Electoral Extremism

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Abstract

We study a model of electoral competition that incorporates two expressive benefits of candidate position taking: the psychological costs of deviating from one's own preferred policy and the psychological benefits of antagonizing an out-group. Whereas concerns about cognitive dissonance consistently temper candidate extremism, we show, the effects of animus are non-monotonic—exacerbating policy divisions when baseline levels are low, and triggering one candidate's capitulation (as distinct from both candidates' moderation) when they are high. We further show that when communication channels are siloed and voters are less concerned about voting for someone who represents their own policy views, candidates are especially inclined to stoke inter-group animosities. Our findings have broad implications for understandings of political polarization, partisan sorting and representation, fragmented media markets, and separation of powers.

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"Now people vote for candidates not based on what they'll do for them but their ability to inflame the other side which they hate so much." Scott Galloway on Pivot, December 6, 2022.

Electoral politics feature more than just narrow disagreements about policy. They also are infused with social and political identities, psychological needs and wants, and demonstrations of inter-group animosities—or what Brennan (2011) calls "expressive considerations." Elections, thus understood, do more than just alter the direction of public policy-making. They also give voice to voters' self-understandings and feelings about others.

What implications do these expressive considerations have for candidate position-taking and government lawmaking? When will candidates choose to inflame inter-group enmities and thereby amplify the political relevance of expressive considerations? And when, instead, will candidates counsel mutual understanding and tolerance? To investigate these matters, we study a model of electoral competition that incorporates two types of expressive benefits: one that reflects the reputational and/or psychological costs of deviating from one's own preferred policy; and another that captures the benefits of antagonizing an out-group that one does not merely disagree with, but that one actively dislikes. Just as voters wish to minimize their own cognitive dissonance, they occasionally derive pleasure in offending their opponents—something that, for some supporters of Donald Trump, takes the form of "rage farming"[1] or "owning the libs and pissing off the media... That's what we believe in now. There's really not much more to it."[2]

Expressive considerations, we show, have very different effects on the positions that candidates assume. Whereas previous research shows that ideological rigidity is associated with political extremism within the electorate (see, e.g., (Zmigrod, 2020)), we find that it creates incentives for political candidates to moderate their own policy positions. Voters who experience high levels of cognitive dissonance and hence are reluctant to compromise their own policy beliefs do not tether

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[1] As quoted in Erin Douglas, "Texas GOP's voting meme show how Trump-style messaging wins internet's attention." *The Texas Tribune*, January 8, 2012.

[2] As quoted in Tim Alberta, "The Grand Old Meltdown: What Happens When a Party Gives Up on Ideas?" *Politico*, August 24, 2020.

candidates to extreme and opposing positions. Quite the opposite, these voters induce candidates from competing parties to mitigate their differences.

The effects of animus on equilibrium candidate positions are more subtle but just as surprising. When baseline levels of animus are low, increasing animus (in either one or both groups) leads candidates to diverge, as even moderate voters react less to policy positions. However, when baseline levels of animus are much higher and only felt by one group, marginal increases ultimately lead to one party's utter capitulation to the other, leaving the portion of the electorate that experiences no animus devoid of meaningful political representation.

The model also reveals how obstacles to public policymaking exacerbate polarization. When a candidate's policy proposals are unlikely to become law—either because of legislative gridlock, political dysfunction, partisan intransigence, or institutional weaknesses of the office she seeks— voters may have fewer qualms with voting for someone who does not represent their policy interests. Candidates then have fewer incentives to moderate and deliver, instead, proposals that directly satisfy members of one group by antagonizing the members of the other. The model, as such, explains an essential aspect of Trump's enduring political appeal—as many voters remain convinced that the political system is irredeemably broken but that Trump, at least, gives voice to their anger towards others, be they Democrats, immigrants, racial minorities, or members of the D.C. establishment (Howell and Moe, 2020; Sides, Tesler and Vavreck, 2018; Webster, 2020).

Finally, the model clarifies the incentives of candidates to foment inter-group hostilities. When channels of communication remain broad and inclusive, we find in an extension that endogenizes animus, political candidates counsel mutual tolerance. Doing otherwise, after all, stimulates voters' demand for policy extremism. But this rather salubrious result quickly falls apart when communication becomes siloed. While both candidates would be better off if animus was kept to a minimum in both groups, each candidate individually benefits from stoking anger within her affiliated group–particularly when voters assign less importance to the expressive benefits of voting for candidates with whom they agree and impediments to lawmaking diminish. Lacking any disciplinary mechanism, comity quickly gives way to the lure of demagoguery.

We proceed as follows. After the first section summarizes the formal and empirical literatures on expressive voting, the second section introduces the model. The third section distinguishes the group sorting that arises in our model from that observed in standard models of partisan attachment. The fourth section characterizes the equilibria and comparative statics for different values of animus, and the fifth endogenizes its selection. The sixth section reflects upon the model's implications for partisan polarization, partisan sorting and representation, political communication, and separation of powers. The final section concludes.

1 Literature Review

Our model draws from and contributes to two distinct bodies of research: a formal literature on expressive voting and a predominantly empirical literature on the psychological foundations of political behavior.

1.1 Expressive Voting

Over the last quarter century, a substantial body of research has been devoted to "expressive voting," or what Clark and Lee (2016) call "the emotional and/or moral satisfaction" that comes from participating in elections (for reviews, see Hamlin and Jennings 2011; 2018). By voting, this literature postulates, people do more than just improve the odds that their favored policy is implemented. They also give voice to their feelings about themselves and others, which satiates a variety of psychological appetites for self-expression (Brennan, 2008).

By attempting to explain why rational actors would pay any cost to vote given the vanishingly small probability that their ballots will alter the outcome of an election, much of this literature focuses on turnout (Riker and Ordeshook, 1968; Fiorina, 1976; Jones and Hudson, 2000). The mere act of participation, these scholars suggest, yields expressive benefits that may adequately compensate for the inconveniences of voting. Participation, however, is hardly guaranteed. When these

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expressive needs are not acutely felt, voters may opt to stay at home (Brennan, 2008; Schuessler, 2000). And when candidates' positions diverge sufficiently from those of voters, even when one candidate is strictly preferred over another, alienation may set in and voters may be inclined to abstain (for examples, see Hinich, Ledyard and Ordeshook (1972); Adams, Dow and Merrill (2006)).

Expressive considerations, however, do more than just convince people to show up on Election Day. They also inform the votes that people actually cast. For instance, in Callander and Wilson's (2006; 2008) model of context-dependent voting, a voter's choice between two alternatives depends on the availability of other candidates in the choice set, such that, for example, the presence of a third candidate who is anti-immigrant may raise the salience of immigration policy differences between the two main candidates. Other models seek to explain how instrumental and expressive considerations jointly translate into vote choices, whether by reference to people's separate preferences for each (Brennan and Hamlin, 1998; Kamenica and Brad, 2014; Taylor, 2015) or the levels of popular support that different candidates from different groups receive within an electorate (Schuessler, 2000).[3]

Three features of this literature warrant emphasis, the first of which concerns the sheer capaciousness of expressive considerations. Scholars recognize all manner of psychological phenomena as the potential subject of expressive voting, ranging from the joys of cheerleading (Aldrich 1997) to vitriol directed toward an out-group. As Hamlin and Jennings (2011, 333) put it, expressive considerations could include any "aspect of the voter's beliefs, values, ideology, identity or personality regardless of any impact that the vote has on the outcome of the election." In many papers, therefore, expressive benefits are treated as a separate but undifferentiated category of voter preferences (Fiorina, 1976; Jones and Hudson, 2000). And even when specific interpretations are offered, they routinely collapse to a single parameter in a model of turnout or voting (Brennan, 2008; Kamenica and Brad, 2014).

Second, this literature does not characterize how different expressive preferences jointly inform the actions that candidates take. To vote at all, or to vote for a particular candidate, reliably yields

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[3]For a related literature that focuses on labor strikes, see Glazer (1992).

such benefits. Expressive benefits, as such, are not endogenously generated through the interactions of voters and candidates. Rather, they are presumed to come with the political territory.

Lastly, there is the referent of these expressive benefits. For most studies, it is the voter herself, as benefits flow from the fulfillment of her own patriotism, sense of civic duty, ideological consistency, or some other cognitive need. A handful of studies, meanwhile, recognize the benefits of expressing views about others, such as the enmity one feels towards an out-group (Glazer, 2008). No one in this literature, however, examines the tradeoffs between different classes of expressive benefits.

1.2   Cognitive Dissonance and Animus

Though certainly not exhaustive, two expressive needs routinely inform our politics: one that affirms a person's own ideological consistency, and another that affords an opportunity to distinguish oneself from the opposition. Each warrants some discussion.

Going back decades, psychologists have recognized the benefits of signaling one's ideological purity; or, observationally equivalently, reducing the psychological burdens of inconsistency.[4] When making choices of any kind, very much including political ones, people seek to minimize their cognitive dissonance. Simultaneously holding in mind two contradictory thoughts is cognitively taxing, and so too is acting in ways that expressively violate one's core convictions. In electoral politics, consequently, the costs of voting for someone with whom one disagrees appear twice over: first, when pivotal, in the policy losses that may accompany her election; and second, regardless of whether one's vote actually makes a difference in the electoral outcome, in the cognitive dissonance that comes from acting in ways that violate one's principles.[5]

Expressive considerations, however, are not exclusively about self-care. They also encourage attacks on a perceived out-group that one does not merely oppose, but that one actively dislikes

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[4]For a review of much of the field's early development, see Harmon-Jones and Mills (1999).

[5]For a discussion of the cognitive rewards associated with casting votes for someone who reaffirms one's ideological priors, see Beasley and Joslyn (2001).

(Webster, 2020). Recent studies on "affective polarization" lay out the basic argument as it relates to Democrats and Republicans in American politics (for a review, see Iyengar et al. (2019)).[6] Rooted in social identity theory, this literature builds upon Henri Tajfel's famous observation that members of an in-group will discriminate against an out-group "even if there is no reason for it in terms of the individual's own interest" (Tajfel (1970), 99). Tajfel recognized that discrimination is "extraordinarily easy to trigger" even when groups are randomly assigned (102). In politics, however, groups and allegiances are hardly random. Rather, studies of affective polarization emphasize, political parties offer powerful and salient social identities for many Americans (Mason, 2015; Abramowitz and Webster, 2016); so much so, in fact, that these "mega identities" have become wellsprings of partisan animus in contemporary American politics (Mason, 2018a,b; Iyengar, Sood and Lelkes, 2012; Iyengar and Westwood, 2015).

It isn't difficult to see how inter-group animosities can whet a person's appetite for antagonism—a character trait that, along with agreeableness, defines one of the five main dimensions of human personality (Lynam and Miller, 2019). Members of an out-group, after all, are often perceived as not merely mistaken or wrong, but as inferior, immoral, or wicked. Compromising with them, as such, invites scorn (Davis, 2019), whereas antagonizing them is cause for minor celebration. Recall, then, the insignia "I really don't care, do u?" written across a green jacket that Melania Trump famously wore in 2019 when she toured an immigration detention center holding children who had been separated from their parents. The first lady shrugged off the public firestorm around the sartorial selection. "I'm driving liberals crazy... You know what? They deserve it."[7] Attuned to her own expressive needs, the First Lady relished the opportunity to antagonize her husband's political adversaries. Their outrage was her delight. As Adam Serwer put it in an *Atlantic* essay, "the cruelty is the point."[8]

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[6] For related studies in psychology, see (Pietraszewski et al., 2015; Pietraszewski, Cosmides and Tooby, 2014). And for work on the centrality of anger as a mobilizing force in American politics, see (Valentino et al., 2011).

[7] As quoted in Wolkoff 2020.

[8] Adam Serwer, "The Cruelty is the Point: President Trump and his supporters find community by rejoicing in the suffering of those they hate and fear." *Atlantic*, October 3, 2018. Nor do these dynamics appear to be confined to the Trump presidency. In another more recent *Atlantic* essay on the Republican Party's communication strategies during the Biden Administration, Elizabeth Bruenig observed that "liberal hysteria is no longer an obstacle to good policy making or even an irritating by-product of the democratic process, but rather the desired outcome of almost all right-

2 The Model

We envision an electorate with two distinct groups, $i = 1, 2$, that can be understood by reference to either their partisanship (such as Democrat or Republican) or any other salient ascriptive characteristic (such as their race, religion, or language).[9] A citizen in each of these two groups is characterized by an ideal point $\theta \in \mathbb{R}$.

From an ex-ante perspective, the distribution of ideal points is uncertain and determined by a shift-variable M, drawn from a distribution $F(\cdot)$ that is symmetric around zero, and has a non-decreasing (non-increasing) density to the left (right) of zero. A positive (negative) realization of M denotes a shift of all voters' ideal points to the right (left). Formally, for any realization m, the distribution of θ for group $i = 1, 2$ is given by $\Phi_i(\theta - m - \mu_i)$, where Φ_i is symmetric around zero. Observe that, from an ex-ante perspective (i.e., before the realization of M), μ_i is the expected median policy ideal point of group i.

Let ϕ_i and f be the pdfs of Φ_i and F, respectively. To guarantee that second-order conditions for the candidates' optimization problems are satisfied, we assume that the distribution F has a strictly increasing hazard rate on its support, i.e., $f(m)/(1 - F(m))$ is strictly increasing in m (when $F(m) \in (0, 1)$).[10] Finally, let q_i denote the fraction of the population that is of type i.

Consistent with Hamlin and Jenning's (2011, p. 650) observation that "expressive and instrumental motivations are best seen as joint inputs into an overall analysis of behavior," our model incorporates a richer set of voter considerations than the canonical spatial voting model. Specifi-

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wing political rhetoric." ("Lauren Boebert's Gun Photo Is Doing Exactly What She Wanted." *Atlantic*, December 8, 2021.) Or as Molly Jong-Fast observes, a Republican Party that remains in the thrall of Trump continues to make "a point of eschewing policy in favor of 'owning the libs' to garner likes, retweets, and small-dollar donations." ("Owning the Libs Is the Only GOP Platform." *Atlantic*, January 12, 2022.)

[9]In principle, we could analyze a more general setting with multiple groups that experience varying levels of animus toward one another (including, possibly, some groups that are neutral and either not targets and/or not sources of animus). We stick with the two group setting as the multi-group setting would be much more cumbersome to describe without yielding qualitatively new insights.

[10]This is a standard assumption that is satisfied, for example, for uniform and normal distributions.

cally, the utility of a voter θ in group i from voting for a candidate with proposed policy x is

$$u_{\theta,i}(x) = \alpha_i|x - \mu_{-i}| - \beta|x - \theta|, \tag{1}$$

where the first term is the main innovation. Consistent with the literature on affective polarization, we recognize that voters from group i are motivated, to some degree, by a political dislike of the out-group, denoted $-i$. We further assume that this animus can be satisfied by voting for a candidate who espouses a position detrimental to their interests, such that α_i is the weight on the animus utility and μ_{-i} is the position of the median member of the out-group. Clearly, setting $\alpha = 0$ reduces our model to the typical case in the literature where voters care only about policy in relation to their own ideal point.[11]

The second term corresponds to the standard spatial policy utility, but with a slight twist. In the existing literature, one is accustomed to thinking of this policy utility as the instrumental value of voting for a candidate based on the possibility that this vote might determine the election outcome.[12] Without making any assumptions about pivotality, however, this term can be understood in purely expressive terms, as people *like to vote* for the candidate whose policy they prefer. Interpreted this way, the two terms can be compared directly. Specifically, α_i/β represents the marginal rate of substitution at which voters in group i trade off their two expressive needs.[13]

How should we think about the determinants of the relative magnitudes of α_i and β? Clearly, α_i reflects to the degree to which group i dislikes the out-group. The parameter β, meanwhile,

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[11]The core findings in Section 4 do not depend on using linear-loss functions. However, as in the standard model with policy-motivated candidates and quadratic loss functions it is only possible to establish existence of local equilibria. This generates technical issues when endogenizing animus as in Section 5.

[12]This interpretation is particularly common in costly voting models, where the chance of influencing the policy outcome is what motivates (some) citizens to pay the opportunity cost of participating in the election. Consequently, costly voting models cannot explain positive participation rates in large elections, where the pivotality probability goes to zero even if preferences in the electorate are extremely closely matched. In contrast, a model in which voters' payoff is expressive (i.e., arises from the act of voting) is consistent with the positive participation rates that we see, for example, in U.S. presidential elections even in those states where the outcome is not in question. A further indication of the importance of this utility component is that, in elections with multiple candidates, a significant number of voters cast their lots for candidates who have no chance of winning ("sincere voting").

[13]To avoid knife-edge cases, we assume that $\alpha_i \neq \beta$ for $i = 1, 2$. If a voter's α_i is exactly equal to β, then such a voter is completely indifferent between many policies, which would make characterizing the voters' and candidates' optimal choices more cumbersome.

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depends on the cost of "cognitive dissonance" for an individual who votes for a candidate who espouses a policy position that differs from her own.

Here we highlight one consideration for β that is particularly important for the model interpretations that follow. Suppose that the winning candidate only succeeds in implementing a policy platform with probability p; while with probability $1 - p$, the status quo prevails. The costs of cognitive dissonance may well depend on not only the act of voting for a disliked candidate, but also on the expectation of having to live under that candidate's policy. Thus, when a political system is mired in gridlock and the policy platforms of the winning candidate are unlikely to be implemented (i.e., p is small), this cost may be small and β will assume a low value. By contrast, when policy proposals reliably become law, these costs are likely to rise and β increases in value.

The two candidates' ideal points θ_L and θ_R are (without loss of generality) normalized to be symmetric around zero, $\theta_L = -\theta_R$. The candidates are entirely policy-motivated, with utility $u_P(x) = -|x - \theta_P|$, $P \in \{L, R\}$, where x is the implemented platform. While candidates themselves harbor no animus against any group, they are aware that voters do, and thus rationally consider voters' reactions when they (simultaneously) choose their policy positions $x_L, x_R \in \mathbb{R}$.

3 Voter behavior

In most models of electoral competition, candidates face a standard tradeoff: by moderating their policy position, they improve their chances of winning; but conditional on winning, candidates increase their policy utility by adopting a more extreme position. The introduction of different forms of expressive benefits, we find, alters this tradeoff in interesting and non-obvious ways.

To determine how candidates' positions affect their probability of winning, we need to find the cutoff value $m(x_L, x_R)$ for the shift parameter for which the election ends in a tie, given platforms x_L and x_R. The first step towards this objective is to identify and analyze the behavior of indifferent

voters. The voter type θ in group i who is indifferent between the candidates is given by

$$\alpha_i |x_L - \mu_j| - \beta |x_L - \theta| = \alpha_i |x_R - \mu_j| - \beta |x_R - \theta|. \tag{2}$$

Note first that, if $x_L = x_R$, then (2) holds for all θ—i.e., all voters are indifferent between the candidates, exactly as in the case with standard voter preferences. Intuitively, the introduction of expressive preferences does not change this result, because they are *not* based on a direct "partisan" preference for candidates "associated" with the voter's in-group or out-group, as in Adams and Merrill (2003) and Erikson and Romero (1990). Rather, expressive preferences work through the candidates' proposed policies, and when both candidates choose the same position, each voter is rendered indifferent.

If, by contrast, $x_L \neq x_R$, we obtain the following result:

Lemma 1 *Let $x_L < x_R$. Then the group i voter who is indifferent between candidates located at x_L and x_R is given by*

$$\bar{\theta}_i = \begin{cases} \frac{\alpha_i}{\beta}\mu_j + \frac{\beta-\alpha_i}{\beta} \cdot \frac{x_L+x_R}{2} & \text{if } x_L < \mu_j < x_R; \\[2mm] \frac{x_L+x_R}{2} + \frac{\alpha_i}{\beta} \cdot \frac{x_R-x_L}{2} & \text{if } \mu_j \geq x_L, x_R; \\[2mm] \frac{x_L+x_R}{2} - \frac{\alpha_i}{\beta} \cdot \frac{x_R-x_L}{2} & \text{if } \mu_j \leq x_L, x_R. \end{cases} \tag{3}$$

All proofs are in the Appendix.

We can begin to see how expressive considerations inform candidate position-taking. Let $\bar{x} = \frac{x_L+x_R}{2}$ be the midpoint between the candidates' positions. Without voter animus ($\alpha_i = 0$), the cutoff voter's position is at $\bar{\theta}_i = \bar{x}$, just like in the standard model. Now suppose, instead, that group i voters feel animus ($\alpha_i > 0$) towards a right-leaning out-group, and consider the case where $\mu_j > \bar{x}$. By Lemma 1, we have that $\bar{\theta}_i > \bar{x}$, so a group i voter with policy ideal point $\theta = \bar{x}$ strictly prefers candidate L. Intuitively, Candidate L's policy hurts the out-group j more than Candidate R's position because $\mu_j > \bar{x}$. Increasing α_i or decreasing β increases the gap between $\bar{\theta}_i$ and $\bar{x}$.

In contrast to the standard model, ours yields some overlap in the policy preferences of the

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supporters of the left and right candidates. Figure 1 assumes that the two groups' medians are located symmetrically around zero at -1 and 1 for the two groups, and that the candidates' policies are distinct and symmetric around zero. Then (3) implies that $\bar{\theta}_1 > 0$ and $\bar{\theta}_2 < 0$, as shown.
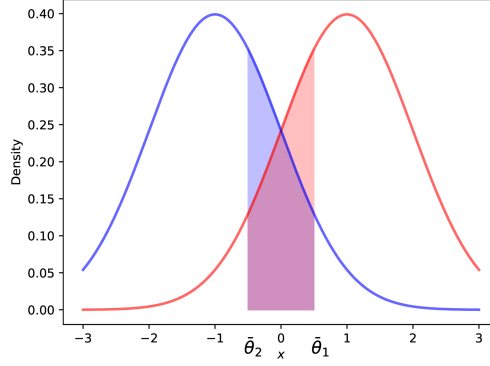

Figure 1: Overlapping voters: Group 1 voters to the left of $\bar{\theta}_1$ vote for candidate L, and group 2 voters to the right of $\bar{\theta}_2$ vote for candidate R.

It is instructive to compare our model with one in which each voter has a *partisan* attachment to one of the two parties; that is, on top of the payoff from policies, Republican partisans receive an additional fixed, non-policy payoff if a Republican wins, and vice versa. In such a model of partisanship, overlap also arises, because some Democratic partisans who are policy-wise closer to the Republican position will nonetheless vote for a member of their own party, just as similarly situated Republican partisans do the same.

The nature of this overlap, however, is quite different from the one that arises in our model. In the partisan model, partisanship matters most when the parties assume the same policy positions; that is, the size of the overlap in the partisan model reaches its maximum when the voter is policy-wise indifferent between the parties. In such a setting, almost all Democratic and Republican partisans (irrespective of their policy preferences) vote for Democrats and Republicans, respectively. In terms of the voters' ideological positions, the overlap is complete. If, instead, the

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policy difference between the parties is large, then partisanship plays a smaller role because, for most people, the policy utility difference between the parties outweighs the partisan payoff.

In our model, by contrast, the overlap results from voters' animus toward one another. If the parties' policy positions are indistinguishable from one another, neither candidate provides much of an advantage in antagonizing the out-group. In this case, the cutoffs of both groups are very close to the average party position, and the overlap is minimal. If, instead, the difference between the parties' positions is large, then one of the candidates is significantly worse for the out-group, and many in-group voters are willing to support that candidate even at a cost of some policy utility loss. Of course, the behavior among voters of the other group is symmetric. Thus, in our model, large policy differences between parties result in a large overlap in the two groups' voting behavior.

Knowing the indifferent voter in each group allows us to determine m, the critical value of the shift parameter M that determines which candidate wins the election. The election ends in a tie if

$$q_1 \Phi_1 \left(\bar{\theta}_1 - m - \mu_1 \right) + q_2 \Phi_2 \left(\bar{\theta}_2 - m - \mu_2 \right) = \frac{1}{2}, \tag{4}$$

and the left (right) party wins for smaller (larger) values of M. In Lemma 2, we explicitly solve equation (4) for m when the groups are equal sized and have the same preference distributions.

Lemma 2 *If $q_1 = q_2$ and $\Phi_1 = \Phi_2$, then the state at which the election ends in a tie is*

$$m(x_L, x_R) = \frac{\bar{\theta}_1 + \bar{\theta}_2 - \mu_1 - \mu_2}{2}, \tag{5}$$

where $\bar{\theta}_i$ is defined in (3).

In combination with Lemma 1, Lemma 2 reveals that animus among voters reduces candidates' incentives to moderate in electoral competition. To see this crucial result, suppose for example that $\theta_L < x_L < x_R < \theta_R$ and hence

$$m(x_L, x_R) = \frac{\alpha_1 \mu_2 + \alpha_2 \mu_1}{2\beta} + \frac{\beta - 0.5(\alpha_1 + \alpha_2)}{\beta} \cdot \frac{x_L + x_R}{2}. \tag{6}$$

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If $\alpha_1 = \alpha_2 = 0$, then the factor in front of the average policy position (i.e., $\frac{x_L + x_R}{2}$) simplifies to one, while this factor shrinks as α_i increases. Thus, in a world with animus, a candidate's electoral benefit of moderation (in terms of by how much moderation shifts the indifferent voter), is smaller than in a world without animus. By contrast, the cost of moderation only depends on the candidates' policy preferences and is thus the same as in the standard model.

4   Equilibrium Analysis

In this section, we assume that the groups are of equal size, located symmetrically around zero (i.e., $\mu_2 = -\mu_1 = \mu$), and that the candidates' ideal positions are also symmetric around zero ($\theta_L = -\theta_R$). Furthermore, we focus on a politically salient case in which candidates are more extreme than the medians of the two population groups (Fowler et al., 2022), and that there is some intermediate amount of uncertainty about the position shift parameter—that is, $\mu_2 < 1/(2f(0)) < \theta_R$.

Candidate L and R solve, respectively,

$$\max_{x_L} -F(m(x_L, x_R))|x_L - \theta_L| - (1 - F(m(x_L, x_R)))|x_R - \theta_L|, \tag{7}$$

$$\max_{x_R} -F(m(x_L, x_R))|x_L - \theta_R| - (1 - F(m(x_L, x_R)))|x_R - \theta_R|. \tag{8}$$

Each candidate here trades off the benefits of positioning closer to his ideal point (good in case of victory) against the costs of reducing his winning probability.

Suppose that $x_L < -\mu$ and $x_R > \mu$. Substituting $\mu_2 = -\mu_1 = \mu$ into equation (6) implies

$$m = \frac{\mu(\alpha_1 - \alpha_2)}{2\beta} + \frac{\beta - \bar{\alpha}}{\beta} \frac{x_L + x_R}{2}, \tag{9}$$

where $\bar{\alpha} = (\alpha_1 + \alpha_2)/2$ denotes the average level of animus.

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4.1 Low to Moderate Levels of Animus

Having established preliminaries, we now consider a situation in which inter-group animus is not especially large. In particular, let $\bar{\alpha} \leq \beta$.

Is there an equilibrium in which both candidates adopt positions between their respective ideal points and zero? As proved in Lemma 3 in the Appendix, for an interior equilibrium with $x_L > \theta_L$ and $x_R < \theta_R$, the following first-order conditions are necessary and sufficient:

$$- f(m(x_L, x_R))\left(\frac{\beta - \bar{\alpha}}{2\beta}\right)(x_L - x_R) - F(m(x_L, x_R)) = 0, \tag{10}$$

$$- f(m(x_L, x_R))\left(\frac{\beta - \bar{\alpha}}{2\beta}\right)(x_R - x_L) + (1 - F(m(x_L, x_R))) = 0. \tag{11}$$

When we add these equations, the first terms of both equations cancel out, such that $F(m) = 1/2$. Thus, in equilibrium, both candidates win with probability $1/2$, and hence $m = 0$. Using this, (9) and (10) imply

$$x_L = -\frac{\beta + f(0)\mu(\alpha_1 - \alpha_2)}{f(0)\,(2\beta - \alpha_1 - \alpha_2)}; \tag{12}$$

$$x_R = \frac{\beta + f(0)\mu(\alpha_2 - \alpha_1)}{f(0)\,(2\beta - \alpha_1 - \alpha_2)}. \tag{13}$$

Averaging (12) and (13), the expected policy position is

$$\frac{x_L + x_R}{2} = \frac{\mu(\alpha_2 - \alpha_1)}{2\beta - (\alpha_1 + \alpha_2)} = \frac{1}{2}\frac{\mu\Delta\alpha}{\beta - \bar{\alpha}}, \tag{14}$$

where $\Delta\alpha = \alpha_2 - \alpha_1$ is the animus difference, and $\bar{\alpha} = (\alpha_1 + \alpha_2)/2$ is the average animus.

We now want to identify the parameter values for animus under which candidates choose interior positions, and those for which candidates choose their ideal points. Without loss of generality, assume that $\Delta\alpha \geq 0$, i.e., the on-average right-leaning group feels more animus against the left-leaning group than the other way around.[14] In this case, by (14), the expected policy is

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[14]Evidently, the case where $\Delta\alpha < 0$ is analogous.

right-of-center. This implies that, as $\bar{\alpha}$ increases, x_R will reach θ_R before x_L reaches θ_L. A further marginal increase in $\bar{\alpha}$ then only decreases x_L, while keeping x_R at θ_R.

This result is formally stated in Proposition 1:

Proposition 1 *In the symmetric model (i.e., $\theta_R = -\theta_L$, $\mu_2 = -\mu_1 = \mu$), let $\mu < 0.5/f(0) < \theta_R$ and $\Delta\alpha \geq 0$. Then there exists $k_1 \leq k_2 < \beta$ (where k_1 and k_2 are given by (21) and (22) in the Appendix, respectively), such that the following holds:*

1. *There exists an equilibrium. The equilibrium is unique for all $\bar{\alpha} \leq \beta$.*

2. *If $\bar{\alpha} < k_1$, then x_L and x_R are given by (12) and (13), respectively. Each candidate wins with probability 0.5.*

3. *If $k_1 < \bar{\alpha} < k_2$, then $x_R = \theta_R$ and $x_L > \theta_L$.*

4. *If $k_2 < \bar{\alpha} \leq \beta$, then $x_L = \theta_L$ and $x_R = \theta_R$. Candidate R's winning probability is $F(\Delta\alpha/\beta) \geq 0.5$.*

5. *Changing (α_1, α_2) can only change the candidates' winning probabilities if it changes $\Delta\alpha$.*

Proposition 1 shows that increasing animus leads to polarization between candidates, even though the candidates themselves are only policy-motivated. The intuition here is straightforward: as animus increases, voters in both groups become less willing to switch to the candidate associated with the out-group, and therefore both candidates have less incentive to moderate.

Figure 2 displays the equilibrium policy positions for symmetric animus ($\bar{\alpha} = \alpha_1 = \alpha_2$). As $\bar{\alpha}$ increases, both candidates polarize symmetrically until both candidates simultaneously reach their ideal points θ_i, $i = L, R$. Throughout, both candidates have an equal probability of winning.

Now consider a situation with asymmetric animus. In Figure 3, group 1 does not feel any animus against group 2 ($\alpha_1 = 0$). We then increase group 2's animus against group 1, so that $\Delta\alpha > 0$. Again, both candidates' policy positions become more extreme. In contrast to Figure 2, however,
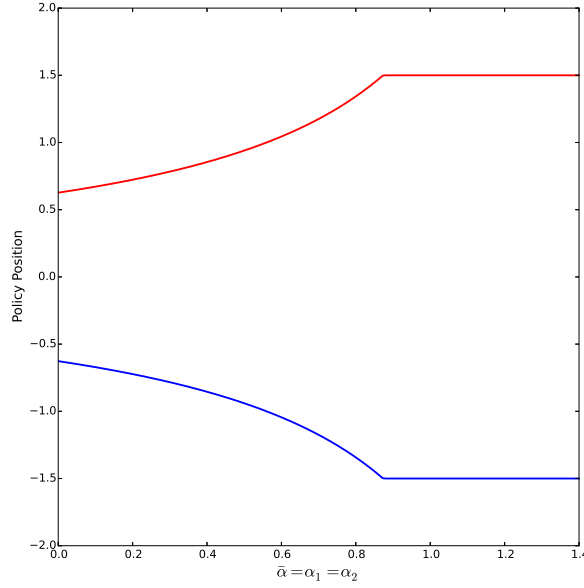
Figure 2: Symmetric animus. Candidate positions when $\alpha_1 = \alpha_2 = \bar{\alpha}$: $\theta_R = 1.5$, $\theta_L = -1.5$, $\beta = 1.5$, $F \sim N(0, 0.5)$.

Candidate R reaches her ideal point θ_R before Candidate L. Further, unlike in the symmetric case, Candidate R's probability of winning the election also increases when animus increases.

Lastly, we evaluate the comparative statics on the cognitive dissonance weight, β. Remember that one of the interpretations was that a higher probability that a candidate's proposed policy would be implemented translates into a higher β. For example, an increased probability that a proposed policy does not just irritate an out-group, but that it is actually implemented, would result in a higher weight on the cognitive dissonance cost because it would be costly for the voter to know that he voted for a policy that he dislikes and now has to live with.

Corollary 1 *Consider an interior equilibrium where positions are determined by* (12) *and* (13), *and assume $\Delta \alpha \geq 0$. As β increases,*

1. *polarization, $x_R - x_L$, decreases, and the average policy, $0.5(x_R + x_L)$, moves towards zero;*

2. *candidate R, the candidate associated with the group with stronger animus, becomes more*
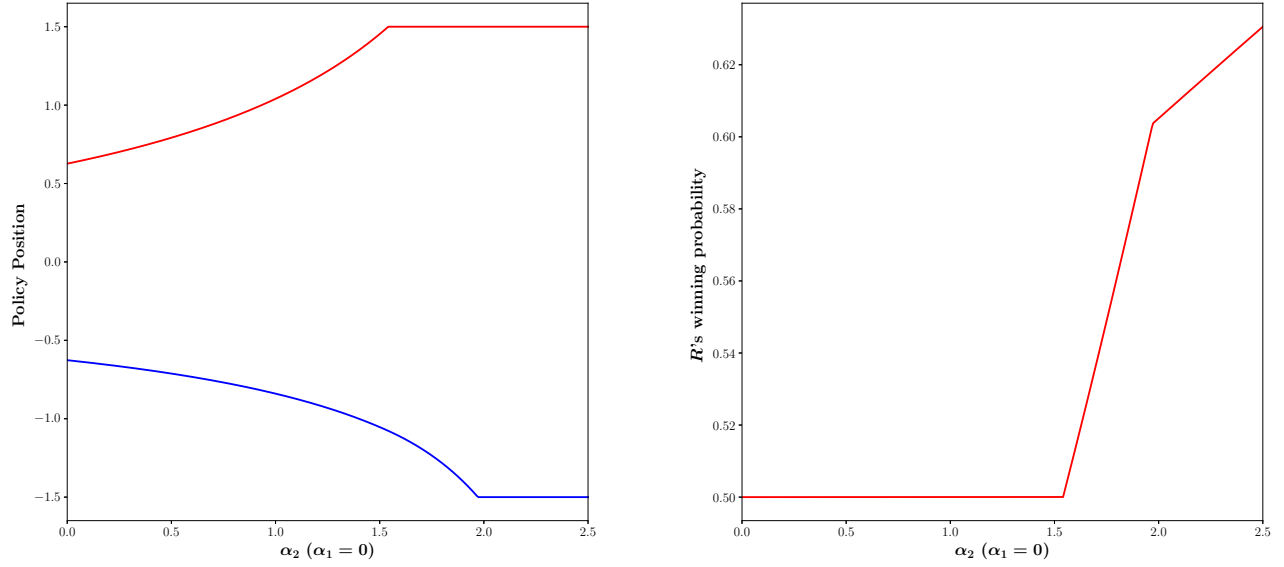
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Figure 3: Asymmetric animus. Candidate positions and candidate R's winning probability when $\alpha_1 = 0, \theta_R = 1.5, \theta_L = -1.5, \beta = 1, F \sim N(0, 0.5), p = 0.5$.

moderate; and candidate L becomes more moderate if and only if $\bar{\alpha} > f(0)\Delta\alpha$.

The corollary shows that candidates are less likely to indulge voters' appetite for antagonism when β increases; polarization decreases, and the average policy moves closer to the center. Furthermore, candidate R, who is aligned with voters who harbor animus, always moderates whenever either of these parameters increases. By contrast, candidate L, who is aligned with voters who harbor no animus, becomes more moderate if and only if $\bar{\alpha} > f(0)\Delta\alpha$.

Intuitively, while an increase in β does not affect the candidates' utilities directly, it does increase the marginal voter's cost of posturing. Thus, voters react more strongly to candidate positions, which generally encourages candidates to moderate their positions.

4.2   High Levels of Animus

We now consider the case where animus becomes large, i.e. $\bar{\alpha} > \beta$. Establishing equilibrium existence here is significantly eased when the set of feasible policies is bounded. We therefore assume that x_L, x_R are restricted to the interval $[-X, X]$, where $X > \theta_R$. All other preliminaries carry through as before.

Proposition 2 considers a symmetric setting in which $\alpha_1 = \alpha_2$ (i.e., $\Delta\alpha = 0$) and is the natural extension of Proposition 1. As before, higher animus leads to increased candidate polarization. In this instance, though, candidates' policy position do not converge to their ideal points. Rather, candidates adopt positions that are even *more extreme* than their ideal points; and for α sufficiently large, candidates choose the most extreme policies available, $-X$ and X, respectively.

Proposition 2 *Let $\theta_R = -\theta_L$; $\mu_2 = -\mu_1 = \mu$; and $\alpha_1 = \alpha_2 = \alpha > p + \beta$. Furthermore, suppose the set of feasible positions is given by $[-X, X]$, where $X > \theta_R$. Then,*

1. *for an interior equilibrium, the first-order conditions* (25) *and* (26) *are necessary and sufficient;*

2. *there exists $k > \beta$, such that for all $\alpha > k$, $x_L = -X$ and $x_R = X$.*

Intuitively, when $\bar{\alpha} > \beta$, voters become more willing to vote for a candidate who proposes a policy farther away from their ideal point as long as it harms the out-group. In this setting, the trade-off between electability and their policy preferences drives candidates to positions that are more extreme than not only voters' ideal positions, but also their own.

When we allow members of the two groups to experience different levels of animus towards one another, the results change substantially. Consider a setting in which only group 2 dislikes group 1, i.e., $\alpha_1 = 0$, and α_2 is large. To simplify the argument, let us further assume that both Φ and F have bounded support. In this scenario, we find that increased animus does not cause the candidates to polarize, but rather produces a political environment in which both candidates cater to the policy interests of the group consumed with anger.

Why is this so? Suppose, by way of contradiction, that candidate positions are at $-X$ and X, respectively. Then, (3) implies that $\bar{\theta}_2 = -\alpha_2\mu/\beta$ goes to $-\infty$. Thus, bounded support of the type and shock distribution implies that all voters in group 2 support Candidate R. Further, if the support of F is not too large compared to the distribution Φ, then a strictly positive share of group 2 voters support Candidate R, and he wins with probability 1. This outcome, however, cannot happen in equilibrium. To see why, consider a deviation by Candidate L to a position that is slightly to the left of X. Then L's winning probability becomes strictly positive, and thus $x_L < X$ is implemented with strictly positive probability. Hence $x_L = -X$, $x_R = X$ is not an equilibrium. Instead, the equilibrium is asymmetric, with Candidate L choosing $x_L \in (\mu, \theta_R)$, while Candidate R chooses $x_R > \theta_R$. We formalize this intuition in Proposition 3.

Proposition 3 *Suppose that Φ and F have bounded support. Let $\theta_R = -\theta_L$, $\mu_2 = -\mu_1 = \mu$, and $q_1 = q_2 = 0.5$. Policies are restricted to the interval $[-X, X]$ where $\theta_R < X < \theta_R + 2\mu$. For any fixed α_1, there exists $k > 0$ such that for $\alpha_2 > k$, the unique equilibrium has the following features:*

1. *the positions of both candidates converge to θ_R as $\alpha_2 \to \infty$;*

2. *positions satisfy $\mu < x_L < \theta_R < x_R$;*

3. *and Candidate L is more likely to win than Candidate R.*

Figure 4 illustrates the implications of Proposition 3 for the case that group 2 harbors animus against group 1, but not vice versa. As α_2 increases, the two candidates do not moderate to a position between their respective ideal points. Rather, Candidate R assumes less extreme positions that are closer to her ideal point, while Candidate L deviates sharply from her preferred policy. Asymptotically, the two candidates converge to θ_R (marked by the dashed line), as Candidate L (who is aligned with the harmonious, and now abandoned, voters in group 1) capitulates to Candidate R (who is aligned with the enraged, and now accommodated, voters in group 2).

In the right panel we present Candidate R's winning probabilities, where the dashed line is the limit predicted by Proposition 3. Candidate R's winning probability increases in α_2, but it remains

much less than 0.5. By moving to the right, we find, Candidate L accepts significantly inferior policy positions in order to increase her chances of winning. The result is a political landscape in which the candidate who is aligned with the only group that harbors large amounts of animus wins relatively rarely, but remains perfectly content with the outcome as the other candidate does her policy bidding.[15]
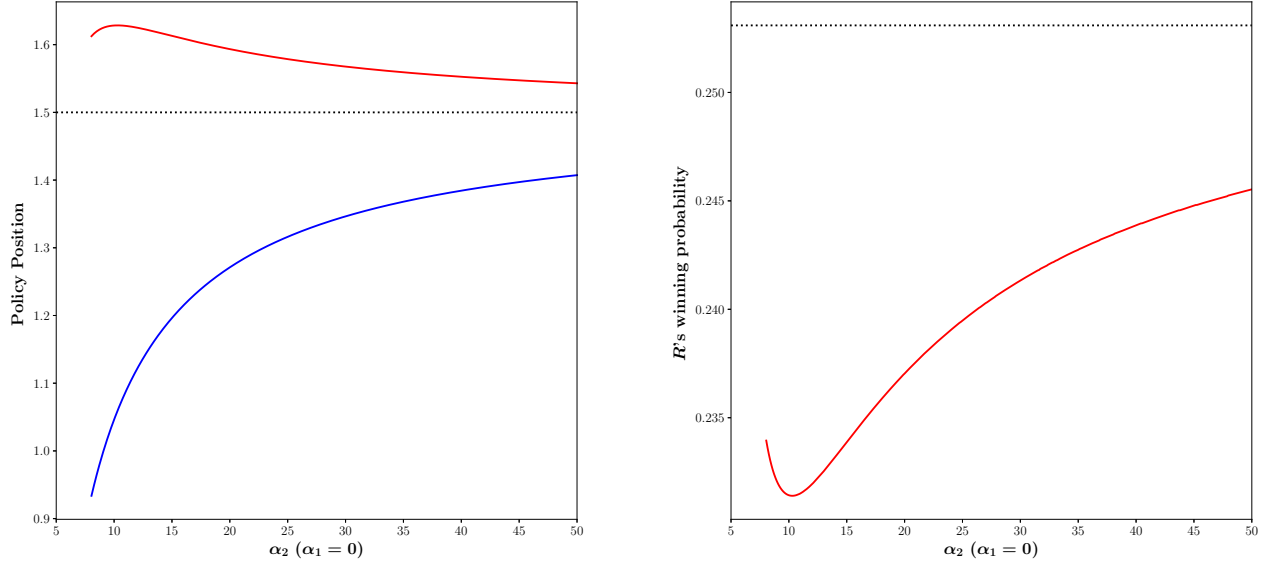

Figure 4: Candidate positions and candidate R's winning probability when $\alpha_1 = 0$, $\theta_R = 1.5$, $\theta_L = -1.5$, $\beta = 1.5$, $F \sim N(0, 0.5)$, $\bar{X} = 1.7$.

5   Endogenous Animus

In addition to responding to people's pre-existing antipathies, politicians also stoke them.[16] To clarify the conditions that support such activity, we now allow candidates to manipulate the amount of animus one group of voters feels about another (or both feel about each other).

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[15]Proposition 3 further indicates that the limiting policy, as well as the winning probabilities, are independent of β. The latter follows, because the limit cutoff value m^* is determined solely by θ_R and the distribution F.

[16]For example, Ash, Morelli and Van Weelden (2017) examine how members of Congress allocate time across different issues in their floor speeches, and they find that US senators focus on divisive issues when they are up for election.

When endogenizing α_i, candidates' behavior depends on whether increases in animus felt by one group can occur without affecting the other; or whether, instead, animus increases in both groups. In the latter case, wherein a candidate can only increase α_1 and α_2 by the same amount, inflammatory speech has no benefit. As Proposition 1 indicates, if $\alpha = \alpha_1 = \alpha_2$ and α is increased but remains below $\tilde{\alpha}$, then both candidate positions become more extreme, but the candidates' ex-ante expected utilities do not change.[17] If α rises above $\tilde{\alpha}$, then both candidates are actually worse off. Consequently, if a candidate pays any cost associated with increasing animus, then $\alpha = 0$ is optimal.

Things look very different, however, when candidates communicate through segregated communication channels. When an increase in the animus felt by one group does not automatically induce equivalent increases felt by the other, candidates may have incentives to foment inter-group hatred—at least under some well-specified conditions. To see this, suppose again that both groups have the same size ($q_1 = q_2 = 1/2$), with $\mu_2 = -\mu_1 = \mu$, and that ϕ and f are symmetric. We consider the setting of Section 4.1 with symmetric candidates ($\theta_R = -\theta_L$) and $\mu < 0.5/f(0) < \theta_R$, but with two important differences.

First, each candidate can choose, at cost $c(\alpha_i) = b\alpha_i$, the level of α_i in the group with which she is ideologically aligned. After this choice becomes common knowledge, the game proceeds as before with the candidates adopting positions, voters selecting a winner, and proposed policies being implemented probabilistically.

Second, we now explicitly separate the forces that were, thus far, both subsumed into β—first, an explicit dislike of voting for a candidate who espouses positions different from one's own, regardless of whether this policy is implemented; and second, a desire for absolution from voting for a candidate who is ultimately responsible for implementing an objectionable policy. For simplicity, we consider an additive form such that $\beta = \hat{\beta} + p$. We now separate these parameters because they have different effects on politicians, who remain entirely policy-motivated. While $\hat{\beta}$,

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[17]The latter follows from the fact that our candidates have absolute distance preferences and so are, in effect, risk-neutral with respect to policy lotteries, as long as all realizations of the lottery are on one side of their ideal point. If, instead, candidates have strictly concave utility functions, they would dislike the larger risk even in this case.

as a parameter of voter preferences, has no direct effect on a policy-motivated politician's utility, p determines how likely a politician's choice of α_i is to yield actual changes in policy. With probability $1 - p$, the policy remains at some status quo x_S, which is the same regardless of which candidate is elected.

In summary, candidate R's first-period optimization problem is

$$\max_{\alpha_2 \geq 0} -pF(m(\alpha_1, \alpha_2))|x_L(\alpha_1, \alpha_2) - \theta_R| - p(1 - F(m(\alpha_1, \alpha_2)))|x_R(\alpha_1, \alpha_2) - \theta_R| - b\alpha_2, \qquad (15)$$

and analogously for candidate L; and voters' behavior in the second period is unchanged from above, given the levels of animus α_1 and α_2 chosen by the candidates. Note that the utility derived from the status quo, x_S, can be dropped from the optimization problem, because it is not affected by the choices of animus and policies.

Remember that, for equilibria with $\theta_L < x_L < x_R < \theta_R$, the policy positions are given by (12) and (13), where we now substitute β by $\hat{\beta} + p$. We first analyze whether there exist equilibrium animus levels α_1 and α_2, such that policies are strictly between θ_L and θ_R. For such an equilibrium to exist, the winning probabilities must be $1/2$ even if $\alpha_1 \neq \alpha_2$. In the first stage, therefore, Candidate R solves $\max_{\alpha_2} 0.5px_L(\alpha_1, \alpha_2) + 0.5px_R(\alpha_1, \alpha_2) - b\alpha_2$, subject to (i) $x_R(\alpha_1, \alpha_2) < \theta_R$ and (ii) $x_L(\alpha_1, \alpha_2) > \theta_L$. Note that (14) implies that this function is strictly convex in α_2. Hence, the solution is either at $\alpha_1 = 0$ or at a point where constraints (i) or (ii) bind. A similar argument holds for Candidate L.

For larger $\alpha = \alpha_1 = \alpha_2$, both candidates choose policies at their respective ideal points. The cutoff value for which this occurs is given in (16) below. Once α exceeds another threshold $\hat{\alpha}$, also defined in (16), no equilibrium exists unless policies are restricted to some compact interval $C = [-X, X]$. If X is sufficiently large, then candidates do not have an incentive to raise animus to a level where policies reach the boundary of this set. Thus, in the following we assume that policies are exogenously bounded, but that these bounds are not binding. This ensures that equilibria are defined in all subgames, but the subgames in which the bounds matter are off the equilibrium path.

Proposition 4, whose remaining steps are proved in the Appendix, summarizes the candidates'
decisions about whether to stoke animus.

Proposition 4 *Suppose that $\theta_R = -\theta_L$, $\mu_2 = -\mu_1 = \mu$, the distribution and size of groups is
identical, and $\mu < 1/(2f(0)) < \theta_R$. Let*

$$\tilde{\alpha} = (\hat{\beta} + p)\left(1 - \frac{1}{2\theta_R f(0)}\right). \tag{16}$$

Then,

1. *in any subgame-perfect and symmetric pure strategy equilibrium, animus is either $\alpha_1 = \alpha_2 = 0$ or $\alpha_1 = \alpha_2 \geq \tilde{\alpha}$;*

2. *there exists $\bar{b} > 0$ such that a subgame-perfect, pure strategy equilibrium with no animus ($\alpha_1 = \alpha_2 = 0$) exists if and only if $b \geq \bar{b}$. The cost cutoff $\bar{b}$ is strictly increasing in $\hat{\beta}$ and strictly decreasing in p. In particular, if no animus is an equilibrium for some value of $\hat{\beta}$ and p then it remains an equilibrium if $\hat{\beta}$ is increased or p is decreased.*

Proposition 4 reveals that any increase in animus will occur rapidly if the cost of increasing
animus or the candidates' policy preferences fluctuate over time. A very slight change in these
underlying fundamentals may move the candidates from a situation in which widespread comity
prevails ($\alpha_1 = \alpha_2 = 0$) to one in which candidates incite significant inter-group hostilities.

A candidate's interest in stoking animus depends upon $\hat{\beta}$ and p. The second point of Proposition 4 shows that when $\hat{\beta}$ increases, the critical cost threshold beyond which a candidate no longer
invests in animus decreases. Intuitively, if $\hat{\beta}$ is large, changes in animus affect voter behavior less,
and hence are less valuable to candidates seeking to win election. As a result, when voters are
particularly concerned about the costs of cognitive dissonance, candidates choose lower levels of
animus.

The second point of Proposition 4 also shows that when p decreases, the critical cost threshold
beyond which a candidate no longer invests in animus increases, leaving fewer such cases. To see

why, remember that candidates incur a reputational cost for increasing the level of animus; and the only reason candidates are willing to pay this cost is to obtain a policy platform that is closer to their own ideal point. If the probability p of being able to implement one's policy proposals is small, then the cost of stoking inter-group hostilities is no longer worthwhile. The production of animus, as such, arises out of concern for the genuine policy stakes of electoral competition.

6 Discussion

By embedding a richer voter utility function within a standard model of electoral competition, we discover new insights into the origins of partisan polarization, the dynamics of partisan sorting and representation, the animosities that roil our new, more fragmented media landscape, and the electoral consequences of separation of powers.

Partisan Polarization. Our model speaks most directly to an empirical phenomenon that has long puzzled scholars of American politics: namely, why the two major parties have grown increasingly polarized at a time when voters, in the main, have remained ideologically moderate (Ansolabehere, Rodden and Snyder, 2006; Fiorina, Abrams and Pope, 2008; Fowler et al., 2022; Hill and Tausanovitch, 2015).[18] To reconcile these two facts, scholars have offered a variety of explanations that implicate the rise of money in politics (e.g., (Baron, 1994; Moon, 2004; Ensley, 2009)), changes in partisan coalitions (Levendusky, 2009), political activists (Layman et al., 2010), partisan primaries (Hill and Tausanovitch, 2015, 2018; Hirano et al., 2010; Krasa and Polborn, 2018), rule changes within Congress (Theriault, 2008; Polborn and Snyder Jr, 2017), increasing partisan competition (Lee, 2009), and growing wealth and income inequality (McCarty, Poole and Rosenthal, 2016).[19] To the mix, we add another that focuses our attention squarely on the voters' expressive needs.

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[18]Note, too, the even longer body of work in comparative politics on May's "law of curvilinear disparity," which suggests that rank-and-file party members will be more extreme than either party leadership or voters (May, 1973).

[19]For further discussion of these and other potential causes of polarization, see Barber and McCarty 2018; McCarty 2019.

Expressive considerations are not of a piece. Moreover, we show, they pull in different directions. As voters care more about minimizing cognitive dissonance, our model reveals, candidates assume increasingly moderate positions. But as voters' animosities toward an out-group grow, regardless of whether such animosities are reciprocated, candidates drift to the extremes. A political world in which anchoring beliefs seem less important and inter-group hostilities become inflamed, our model reveals, supports rising levels of polarization.

Notice, too, how the voters themselves drive these changes. Whereas much of the existing literature on the causes of polarization points towards external factors that push against the otherwise moderating influence of voters (for a review, see (McCarty, 2019), chapter 5), and whereas a vast behavioral literature suggests that ill-informed and politically naive voters blindly follow members of their own party or reflexively reject members of the opposition (e.g., (Achen and Bartels, 2017)), our model reveals how policy polarization can result from political elites exploiting divisions among voters that are unrelated to policy. To draw a straight line from polarized elites to an electorate, one need not reject the possibility that voters hold relatively moderate policy views; nor must one adopt an especially dim view of voters' agency or knowledge. Rather, one need only recognize the expressive needs that inform people's voting behavior.

Partisan Sorting and Representation. A substantial body of work investigates when voters sort themselves into parties that best represent their policy preferences; and when, instead, voters support a party with which they merely share some allegiance or identity (see, e.g., Levendusky (2009)). Our model clarifies how expressive considerations affect both the propensity of voters to ally themselves with a party that may not represent their policy views well, and the implications their choices have for candidate behavior.

Animus, we show, reifies partisanship and other ascriptive characteristics. As animus towards an out-party increases, voters are inclined to stick with the party with which they are associated, even when the other party does a better job of representing their policy views. Recognizing these calculations by voters, the candidates tack toward their ideal points and, if animus is sufficiently severe and symmetric, beyond. Meanwhile, when animus is high and asymmetric, we see party

allegiances hold even as the substantive representation of one group's policy views altogether evaporates. As a result, rising levels of animus strengthen the appeal of parties that are either ideologically extreme or indistinguishable from one another.

The New Media Landscape. Much has been written about the downsides of an increasingly fragmented media market in which consumers self-select into self-affirming news environments (for reviews, see Prior (2013); Winneg et al. (2014); Barberá (2020)). In this new media landscape, it is argued, communication is channelled through enclaves of like-minded individuals. Opportunities for persuasion, mutual understanding, and even the shared recognition of common facts all run in short supply. The result, say some, is a polity that is increasingly divided and "a breeding ground for extremism" (Sunstein, 2018, 71).[20]

Our model highlights yet another pathology associated with the proliferation of these exclusionary channels of political communication. Recall how candidates behave when given the opportunity to manipulate inter-group tensions. When their actions affect voters' understandings of both groups, as assuredly occurs when they are viewed by an entire electorate, candidates seek to temper animosities. By increasing the animus felt by all voters, after all, candidates are driven to the extremes of the policy spectrum without recovering any clear electoral reward. But when candidates can target their messages to voters more closely associated with their own group, incentives shift. Here, a candidate is more likely to win election when voters' enmity toward a group associated with the opposition grows. Rather than counsel inter-group tolerance and understanding, therefore, candidates in this setting stoke voters' animosities toward an out-group.

It is clear to see how the new media landscape puts us squarely in this latter world. But notice the source of the polarization that arises. The problem is not just that voters only hear views from political elites with whom they are aligned. The problem also is that voters are not privy to other communications in which their group is the target of hostilities. This structural asymmetry, in which voters rarely hear what the opposition is saying about groups to which they are affiliated,

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[20]But see Barberá (2020) for a discussion of empirical studies that suggest that cross-cutting interactions occur more frequently than is usually supposed.

encourages political elites to foment inter-group hatreds. Changes in the media environment, as such, do not just facilitate new patterns of communication and behavior, as documented by the existing empirical literatures on the media. These changes also alter the political incentives for political elites to stoke animosities within an electorate.

Separation of Powers. Our model reveals an interesting, under-appreciated, and vaguely ironic pathology of systems of separated power, which deliberately impede the translation of campaign promises into established law. In the United States, the Constitution's framers divided power among the various branches of government not just to guard against the accumulation of authority in any single individual or faction. They did so, also, as a check against the worst impulses of what they considered to be an ill-informed, unreasoning electorate. Through staggered elections and the distribution of state power across multiple and sometimes overlapping jurisdictions, it was thought, the government—and by extension, the nation itself—would be afforded some measure of protection against the turbulences and follies of popular sentiment.

James Madison makes the point most forcefully in *Federalist Paper 10*. In it, he recognizes the unavoidable "propensity of mankind to fall into mutual animosities" that yield factions intending to "vex and oppress each other." Unable to extinguish the "impulse of passion," the government instead must seek to control its effects. Because "the CAUSES of faction cannot be removed," Madison insists, "relief is only to be sought in the means of controlling its EFFECTS." And the primary way of doing that is through the separation of powers.

At one level, Madison's design plainly succeeds. Separation of powers makes it nearly impossible for any one individual, no matter where she resides within the federal government, to advance a policy agenda all on her own. Consequentially, the outcome of any single election bears only weakly on the production of public policies, and the damage wrought by a would-be demagogue is mitigated.

Our model, however, reveals two other ways in which separation of powers affects the very political forces that Madison sought to contain. To begin, notice the effect that separation of

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powers has on candidate position-taking. Precisely because the probability of implementation is relatively small in systems of separated powers, voters incur a relatively low cost of insincere posturing (i.e., a low β in the language of our model). Consequentially, candidates have greater incentives to indulge the voter's animus—the baser passions and animosities, that is, that Madison lamented. So doing, the candidates assume increasingly extreme policy positions.

A second effect arises when animus is endogenized, and this one offers some reassurance for Madison's institutional design. As Proposition 4 tells us, the propensity of candidates to stoke inter-group rivalries decreases in the probability that a proposal becomes law (again, so that β is small). To the extent that separation of powers impedes lawmaking, therefore, it tempers the production of incendiary public appeals.

Separation of powers, we now can see, functions at different registers. In ways Madison plainly intended, this institutional design impedes the designs of a demagogue. But in ways he obviously did not, this same institutional design increases the chances that politicians will surrender to an electorate's appetite for demagoguery itself by assuming increasingly extreme policy positions.

7   Conclusion

We study a model of electoral competition in which candidates' positions are informed by voters' self-understandings and group enmities. By incorporating two expressive considerations into the voter's utility, we recover reasonably clear comparative statics on candidate position-taking, electoral fortunes, and the manipulation of inter-group animosities. All of these effects derive from changing electoral incentives for policy-motivated candidates.

Whereas concerns about cognitive dissonance discourage candidate extremism, we show, inter-group animosities encourage it. When the stakes of an election are low, either because insufficient power is vested in an office or because other (un-modeled) political entities stand in its way, candidates can be expected to indulge voters' expressive needs and wants. And when candidates can

target their communications, they have individual incentives to inflame inter-group tensions, even though doing so makes them collectively worse off.

From the very beginning, the nation's founders worried that politicians might "flatter [citizens'] prejudices to betray their interests," as Alexander Hamilton famously wrote in Federalist 71. Underscoring such concerns, our model illuminates how extremism is born of candidates' periodic efforts to accommodate voters' expressive needs. In ways the founders failed to appreciate, though, the model also illuminates how separation of powers and other impediments to lawmaking can whet a public's appetite for antagonism and deliver a more polarized politics.

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8   Online Appendix

Proof of Lemma 1. In case that $\mu_j < x_L, x_R$ or $\mu_j > x_L, x_R$, simplifying (2) yields

$$\beta|x_R - \bar{\theta}_i| - \beta|x_L - \bar{\theta}_i| = \begin{cases} \alpha(x_R - x_L) & \text{if } \mu_j < x_L, x_R \\ -\alpha(x_R - x_L) & \text{if } \mu_j > x_L, x_R \end{cases} \tag{17}$$

If, on the left-hand side, the two terms inside the absolute values are either both positive or both negative, the equation simplifies to $\alpha = \beta$ (i.e., the case that all individuals are indifferent between all policy positions), or $\alpha = -\beta$, a contradiction since both parameters are positive by assumption.

Thus, consider the case $x_L < \bar{\theta}_i < x_R$. Simplifying (2) then yields the expressions in the statement of the lemma.

In case that $x_L < \mu_j < x_R$, attempting $\bar{\theta}_i < x_L, x_R$ or $> x_L, x_R$ leads to an immediate contradiction. Thus, conjecture that $\bar{\theta}_i \in [x_L, x_R]$. Then, simplifying (2) yields the expression in the statement of the lemma. ∎

Proof of Lemma 2. Recall that the distributions Φ_i are symmetric around zero. Thus, if $q_1 = q_2$ and $\Phi_1 = \Phi_2$ then (4) holds if and only if $\bar{\theta}_1 - m - \mu_1 = -(\bar{\theta}_2 - m - \mu_2)$. Solving this equation for m yields (5). ∎

Lemma 3

1. *If $\bar{\alpha} < \beta$ then:*

   (a) *any solution to the first-order conditions (10) or (11) solves the candidates' optimization problems.*

   (b) *any solution to the first-order conditions (25) or (26) is a local Nash equilibrium.*

2. *If $\bar{\alpha} > \beta$ then:*

(a) (10) *and* (11) *have no solution. In particular, Candidate L's expected payoff is strictly decreasing in* x_L, *while Candidate R's is strictly increasing in* x_R.

(b) *any solution to the first-order conditions* (25) *and* (26) *solves the candidates' optimization problems. Further, Further, the solutions depends on* x_L *and* x_R *only through the average* $\bar{x} = (x_L + x_R)/2$.

(c) *Any solution to* (30) *and* (31) *is a local Nash equilibrium if* $x_L \geq \mu$.

Proof of Lemma 3. First consider the first-order condition (10), and let x_L^* be a solution for given x_R. We show that, if this first order condition holds for L or R, respectively, then the left-hand side is decreasing in x_L and x_R, respectively in the neighborhood of any solution of the first order condition.

Suppose that $\bar{\alpha} > \beta$. Then the left-hand side of (10) is strictly negative, i.e., increasing x_L lowers Candidate L's expected payoff, while (11) is strictly negative, i.e., Candidate R's expected payoff strictly increases with x_R. This also implies that there is no solution to the first-order condition in this case.

Now suppose that $\bar{\alpha} < \beta$. Dividing both sides of (10) by $F(m)$, and using the symmetry of the distribution F yields

$$\frac{f(-m)}{1 - F(-m)} \left(\frac{\beta - \bar{\alpha}}{2\beta} \right) (x_R - x_L) - 1 \tag{18}$$

Equation (9) implies that m is strictly increasing in x_L. Because F has a monotone hazard rate, $f(-m)/(1 - F(-m))$ is decreasing in x_L. Similarly, $x_R - x_L$ is decreasing in x_L and hence the fact that $\beta - \bar{\alpha} > 0$ implies that (18) is decreasing in x_L. Thus, if (10) is zero at x_L^*, then (25) is strictly positive for $x_L < x_L^*$, and strictly negative when $x_L > x_L^*$. Thus, any solution to the first order condition (10) maximizes Candidate L's utility, i.e., is a global maximum.

The argument for Candidate R's first order condition (11) is similar. In this case, we divide both sides of (11) by $1 - F(m)$ and again use the fact that the hazard rate is monotone.

Now consider the first-order condition (25) for Candidate L. Suppose that $x_L + x_R > 2\theta_L$. For

the first-order condition to hold, $\bar{\alpha} > \beta$. Now divide the left-hand side of (25) by $F(m)$ and use symmetry of the distribution to get

$$\left(\frac{\beta - \bar{\alpha}}{2\beta}\right) \frac{f(-m)}{1 - F(-m)} (x_R + x_L - 2\theta_L) + 1. \tag{19}$$

Because $\bar{\alpha} > \beta$ equation (9) implies that m decreases as x_L is increased. Hence, $f(-m)/(1 - F(m))$ increases with x_L. Similarly, the third factor in (19) is strictly increasing in x_L. Thus, the product of these two positive factor is strictly increasing. Because $\bar{\alpha} > \beta$ it follows that (19) is strictly decreasing in x_L. We can therefore again conclude that any solution to the first order condition is a global maximum. (The argument for Candidate R is analogous.)

Now suppose that $x_L + x_R < 2\theta_L$. Then $\bar{\alpha} < \beta$. We can rewrite (19) as follows

$$-\left(\frac{\beta - \bar{\alpha}}{2\beta}\right) \frac{f(-m)}{1 - F(-m)} (2\theta_L - x_L - x_R) + 1. \tag{20}$$

Because $\bar{\alpha} < \beta$ it follows that m increases as x_L is increased. Thus, $f(-m)/(1 - F(-m))$ decreases with x_L. Similarly, $2\theta_L - x_L - x_R > 0$ and decreasing in x_L. Because the first factor in (20) is strictly negative, it follows that (20) is strictly increasing. Thus, a solution to the first order condition is a minimum in this case. Again, a similar argument applies for Candidate R.

Finally, suppose that (30) and (31) are satisfied. Similar arguments again show the left-hand sides of the equations are strictly decreasing at any solution. Thus, any solution to both equations is a local equilibrium if $x_L > \mu$. ∎

Proof of Proposition 1. First, suppose that $\bar{\alpha} < \beta$. Lemma 3 implies that neither (25) nor (26) applies. Thus, we have the following possibilities: (i) both (10) and (11) must be satisfied; (ii) only one of the first-order condition holds, while the other candidate chooses a policy at his ideal point; (iii) both candidates are at their respective ideal policy positions.

Case (i) is discussed in the text, and the formulas for x_L and x_R are derived. It is also immediate

that the equilibrium is unique. Further, this type of equilibrium exists for all $\bar{\alpha} < k_1$, where k_1 is given by the value of $\bar{\alpha}$ that makes x_R equal to θ_R. This yields

$$k_1 = \beta\left(1 - \frac{1}{2\theta_R f(0)}\right) - \frac{\mu\Delta\alpha}{2\theta_R}. \tag{21}$$

When $\bar{\alpha}$ increases above k_1, Candidate R's position remains at $x_R = \theta_R$. Lemma 3 implies that Candidate L's position is given by the solution of the first-order condition (10) if we substitute $x_R = \theta_R$. Note that, if $\bar{\alpha} = \beta$, then (9) implies that the cutoff realization $m = -\Delta\alpha/\beta$, and is therefore independent of x_L and x_R. Thus, the solutions of maximization problems (7) and (8) are $x_L = \theta_L$ and $x_R = \theta_R$, respectively. Thus, as $\bar{\alpha}$ increases above k_1, we must eventually reach the point where $x_L = \theta_L$. At this point, the first order condition (10) must hold with equality. Raising $\bar{\alpha}$ and keeping $x_L = \theta_L$ immediately implies that the left-hand side of (10) becomes strictly negative.

Furthermore, the cutoff value for $\bar{\alpha}$ is given by

$$k_2 = \beta\left(1 - \frac{1 - F\left(\frac{\mu(\Delta\alpha)}{2\beta}\right)}{f\left(\frac{\mu(\Delta\alpha)}{2\beta}\right)\theta_R}\right). \tag{22}$$

Note that $k_2 > k_1$ if $\Delta\alpha > 0$, because F has a monotone hazard rate, and hence $(1 - F(m))/f(m) < (1 - F(0))/f(0) = 1/(2f(0))$.

For $\bar{\alpha} = \beta > k_2$, the change in a candidate's position has no impact on the election probability. In particular, (9) implies that the cutoff is given by $m = -\mu\Delta\alpha/(2\beta + 2p)$.

Lemma 3 indicates that only (25) and (26) can apply if $\bar{\alpha} > \beta$. Thus, for $\bar{\alpha} \le \beta$ we get the cases that we just analyzed. ∎

Proof of Corollary 1. Differentiating (13) with respect to β yields

$$\frac{\partial x_R}{\partial \beta} = \frac{[f(0)(2\beta - 2\bar{\alpha})] - 2f(0)[\beta + f(0)\mu(\alpha_2 - \alpha_1)]}{[f(0)(2\beta - \alpha_1 - \alpha_2)]^2} = \frac{-2f(0)[\bar{\alpha} + f(0)\mu\Delta\alpha]}{[2f(0)(\beta - \bar{\alpha})]^2}, \tag{23}$$

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which is always negative. Thus, an increase in β leads to a leftward shift in x_R. Similarly,

$$\frac{\partial x_L}{\partial \beta} = -\frac{f(0)(2\beta + \Delta\alpha) - [\beta - f(0)\mu\Delta\alpha]2f(0)}{[f(0)(2\beta - \alpha_1 - \alpha_2)]^2} = \frac{2f(0)[\bar{\alpha} - f(0)\Delta\alpha]}{[2f(0)(\beta - \bar{\alpha})]^2}. \tag{24}$$

This is positive if and only if the term in square brackets is positive; thus, in particular, if $\Delta\alpha$ is sufficiently close to zero. ∎

Proof of Proposition 2. When α is large, $x_L < \theta_L$ and $x_R > \theta_R$ then the following first-order conditions are clearly necessary for an equilibrium.

$$-f(m(x_L, x_R))\left(\frac{\beta - \bar{\alpha}}{2\beta}\right)(2\theta_L - x_R - x_L) + F(m(x_L, x_R)) = 0, \tag{25}$$

$$-f(m(x_L, x_R))\left(\frac{\beta - \bar{\alpha}}{2\beta}\right)(2\theta_R - x_R - x_L) - (1 - F(m(x_L, x_R))) = 0. \tag{26}$$

Furthermore, by Lemma 3, these first-order conditions are, in fact, sufficient conditions for an equilibrium. This proves the first claim.

Note that we can replace x_L and x_R in (25) and (26) by the average policy $\bar{x} = (x_L + x_R)/2$. The same is true for (9). Thus, we have an overdetermined system, because there are three equations but only two variables $\bar{x}$ and m. As a consequence, these first order conditions can only be satisfied for some values of $\bar{\alpha}$, and they will not hold if $\bar{\alpha}$ becomes sufficiently large.

Then, the left-hand side of (25) becomes strictly negative, while the right-hand side of (26) becomes strictly positive at $x_L = -X$ and $x_R = X$. Thus, in equilibrium both players choose the most extreme policy positions available and win with probability 0.5. ∎

Proof of Proposition 3. Lemma 1 and Lemma 2 imply that the critical value of m is given by (9) if $x_L < -\mu < \mu < x_R$. If $\mu < x_L < x_R$ then the cutoff is given by

$$m(x_L, x_R) = \frac{x_L + x_R}{2} - \frac{x_R - x_L}{2}\frac{\bar{\alpha}}{\beta}. \tag{27}$$

First, suppose that $x_L < -\mu$ and $x_R > \mu$. Then the first-order conditions (25) and (26) apply. Subtracting (25) from (26) and substituting the result into (26) we get the following two equations:

$$2\theta_R f(m)\left(\frac{\bar{\alpha} - \beta}{\beta}\right) = 1; \tag{28}$$

$$\frac{\theta_R - \bar{x}}{2\theta_R} = 1 - F(m). \tag{29}$$

In addition, m is given by (9).

For every $\bar{\alpha} > \beta$ there is a unique $\bar{x}$ that solves (29). Let $\Delta\alpha \geq 0$. Then (9) implies $m \leq 0$ for $\bar{x} = 0$, which implies $1 - F(m) \geq 0.5$. Hence, the left-hand side of (29) is less or equal to the right-hand side. Next, let $\bar{x} = -\theta_R$. Then the left-hand side of (29) is one, and therefore at least as large as the right-hand side. Hence, by continuity there exists a $\bar{x}$ that solves (29)

To show uniqueness, note that the left-hand side of (29) is strictly decreasing in $\bar{x}$. Further, (9) implies that increasing $\bar{x}$ decreases m because $\bar{\alpha} > \beta$. Thus, $1 - F(m)$ increases, which implies that the solution $\bar{x}(\alpha_2)$ is unique.

Next, (9) implies that m is strictly decreasing in α_2 and hence $1 - F(m)$ is increasing when $\bar{x} > -\mu$ while the reverse is true when $\bar{x} < -\bar{\mu}$. Thus, $\bar{x}(\alpha_2)$ is decreasing in α_2 when $\bar{x}(\alpha_2) > -\mu$ and increasing when $\bar{x}(\alpha_2) < -\mu$. Hence, $\bar{x}(\alpha_2)$ remains bounded for large α_2. Thus, (29) implies that $F(m)$ remains bounded away form 0 and 1. This, in turn, implies that $f(m)$ is bounded away from 0 for large α_2. However, this implies that the left-hand side of (28) goes to infinity as $\alpha_2 \to \infty$. Hence, no solution to the first order conditions exists for large α_2, and hence no equilibrium with $x_L < \theta_L < \theta_R < x_R$

It is easy to see that equilibria with $x_L = \theta_L$ or $x_R = \theta_R$ also cannot exist for large α_2. A similar argument shows that equilibria with $-\mu < x_L < \mu < x_R$ does not exist.

Thus, it remains to consider the case where $\mu < x_L < \theta_R < x_R$. The first-order conditions are

given by

$$-f(m(x_L, x_R))\left(\frac{\beta + \bar{\alpha}}{2\beta}\right)(x_L - x_R) - F(m(x_L, x_R)) = 0, \tag{30}$$

$$-f(m(x_L, x_R))\left(\frac{\beta - \bar{\alpha}}{2\beta}\right)(2\theta_R - x_R - x_L) - (1 - F(m(x_L, x_R))) = 0, \tag{31}$$

where m must satisfy (27). The first-order conditions immediately imply

$$\frac{x_L + x_R}{2} = \theta_R - \frac{(1 - F(m))\beta}{f(m)(\bar{\alpha} - \beta - p)}, \tag{32}$$

$$\frac{x_R - x_L}{2} = \frac{F(m)\beta}{f(m)(\bar{\alpha} + \beta)}. \tag{33}$$

Substituting (32) an (33) into (27) and rearranging terms yields.

$$f(m)(\theta_R - m) = \frac{\bar{\alpha}F(m)}{\bar{\alpha} + \beta} + \frac{\beta(1 - F(m))}{\bar{\alpha} - \beta} \tag{34}$$

Dividing both sides of (35) by $F(m)$ and using symmetry yields

$$\frac{f(-m)}{1 - F(-m)}(\theta_R - m) = \frac{\bar{\alpha}F(m)}{\bar{\alpha} + \beta} + \frac{\beta(1 - F(m))}{F(m)(\bar{\alpha} - \beta)} \tag{35}$$

For $m = \theta_R$ the left-hand side of (35) is less than the right-hand side. Now let $m = 0$. Then the left-hand side of (35) is equal to $2f(0)\theta_R$. Further, the right-hand side is decreasing in $\bar{\alpha}$ and converges to 0.5 as $\bar{\alpha} \to \infty$. Hence, for large $\bar{\alpha}$ the right-hand side is less or equal to 1. However, by assumption $\theta_R > 2f(0)$. Hence the left-hand side of (35) is strictly larger than 1. Hence, by continuity there exists an $m > 0$ that solves the equation. Further, because the left-hand side is decreasing in m while the right-hand side is increasing for large $\bar{\alpha}$, it follows that the solution is unique.

Finally, to show that we have an equilibrium, it remains to check that it is not optimal for Candidate L to deviate to a position $x_L < \mu$. The above argument shows that we have solution to the candidates' optimization problem if the cutoff value of m is given by (27). Suppose that

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Candidate L deviates to x_L with $-\mu \le x_L \le \mu$. Then the cutoff $\bar\theta_1$ is still described by the same formula, i.e., the third case in (3). The cutoff for $\bar\theta_2$ changes from the third case to the first case in (3). Denote these values by $\bar\theta_{2,3}$ and $\bar\theta_{2,1}$. Then

$$\bar\theta_{2,3} - \bar\theta_{2,1} = \frac{\alpha_2(\mu + x_L)}{\beta} \ge 0,$$

with the strict equality holding for $x_L > -\mu$. Lemma 2 implies that the cutoff $m = 0.5(\bar\theta_1 + \bar\theta_2)$. Thus, the cutoff is higher under $\bar\theta_{2,3}$ than $\bar\theta_{2,1}$. Thus, if we replace (27) by the actual equation for m the utility of Candidate L is decreased. Because a deviation is not optimal with cutoff (27) it is also not optimal for the actual cutoff equation.

Next, suppose that Candidate L deviates to $X < x_L < -\mu$. Then the fact that x_L is closer to $-\mu$ than x_R implies that $\theta_2 \to -\infty$ as $\alpha_2 \to \infty$. Therefore as discussed in the text, group 2 does not vote for Candidate L and Candidate L always loses, i.e., policy x_R is implemented with probability 1. In contrast, in the proposed equilibrium Candidate L wins with positive probability with policy $x_L < x_R$.

Taking the limit of (34) for $\alpha_2 \to \infty$ (and hence $\bar\alpha_2 \to \infty$) the equation becomes $f(m)(\theta_R - m) = F(m)$ which determines the equilibrium cutoff in the limit. Again, it follows that $m > 0$, i.e., Candidate L's winning probability exceeds 0.5.

∎

Proof of Proposition 4.

Let $\tilde\alpha$ be the value at which (12) and (13) are equal to θ_L and θ_R, respectively for $\alpha_1 = \alpha_2 = \tilde\alpha$. Thus, $\tilde\alpha$ solves

$$\frac{\hat\beta}{2f(0)(\hat\beta - \tilde\alpha)} = \theta_R. \tag{36}$$

Hence, $\tilde\alpha$ is given by (16). Note $\theta_L < x_L < x_R < \theta_R$ when $\alpha_1 = \alpha_2 < \tilde\alpha$. In the main text we have shown that an equilibrium with $\alpha_i > 0$ and $\theta_L < x_L < x_R < \theta_R$ cannot exist. Thus, in a symmetric equilibrium either $\alpha_1 = \alpha_2 = 0$ or $\alpha_i \ge \tilde\alpha$, for $i = 1, 2$. This proves the first statement.

Suppose that $\alpha_1 = \alpha_2 = 0$. Because of convexity of payoffs in α_i when $\theta_L < x_L < x_R < \theta_R$, it is sufficient to consider deviations to and α_i at which candidate i's policy just moves to the ideal point θ_i, $i = L, R$. Further, without loss of generality we can restrict attention to deviations by candidate R. Also, note that

Let $\alpha_1 = \alpha_2 = 0$. Then substituting (10) and the fact that the winning probabilities are 0.5 into (15) implies that candidate R's utility is

$$-p\frac{1}{2}\left(\theta_R - \frac{1}{2f(0)}\right) - p\frac{1}{2}\left(\theta_R + \frac{1}{2f(0)}\right) = -p\theta_R. \tag{37}$$

If $\alpha_1 = 0$ then the level of animus that candidate 2 would need to reach $x_R = \theta_R$ is given by

$$\tilde{\alpha}_2 = \hat{\beta}\frac{2\theta_R f(0) - 1}{f(0)(2 + \theta_R)}. \tag{38}$$

Substituting this value of $\tilde{\alpha}_2$ into (10) implies that x_L does not depend on $\hat{\beta}$. Because the winning probabilities are 0.5, (15) implies that candidate R's payoff after a deviation to $\tilde{\alpha}_2$ equals

$$-\frac{1}{2}p(\theta_R - x_L) - b\tilde{\alpha}_2. \tag{39}$$

In order for no-animus to be an equilibrium, the payoff from deviation must be less or equal to the equilibrium payoff (37), which is equivalent to

$$\frac{1}{2}(\theta_R - x_L) + \frac{b\tilde{\alpha}_2}{p} \geq \theta_R. \tag{40}$$

Note that $\tilde{\alpha}_2$ is increasing in $\hat{\beta}$. Thus, (40) is easier to satisfy if $\hat{\beta}$ is increased of p is decreased.

Let $\bar{b}$ be the value of b at which (40) holds with equality. Then

$$\bar{b} = \frac{3p(\theta_R - x_L)}{2\tilde{\alpha}_2}. \tag{41}$$

Thus, $\bar{b}$ is increasing in p and decreasing in $\hat{\beta}$ (through $\tilde{\alpha}_2$), which proves the second statement. ∎