Campaign Spending and Lobbying

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Abstract

Interest groups can influence governmental policy through multiple channels. First, they may spend money before elections to help elect their preferred candidate. Second, they may also lobby after the election to affect the implemented policy. We analyze a game-theoretic model of campaign spending and lobbying to understand the strategic relationship between these two means of outside influence. We consider how several lobbying environments, each featuring different access to the elected politician, affect both the willingness to spend during the campaign and the final policy. Campaign spending is a function of both expected final policy due to lobbying and also expected lobbying effort costs. We find that increased policy moderation often, but not always, accompanies decreased campaign spending. When extreme interest groups give campaign contributions in exchange for access, campaign spending decreases as policy becomes more extreme. Open-access lobbying is always best for the voter. We then show that caps on campaign contributions may have minimal effect on policy because of later lobbying efficacy. Finally, we highlight comparative statics that predict different empirical patterns of contributions depending on whether politicians grant lobbying access to all interest groups or only to ideologically-aligned groups. Our results demonstrate that interest-group and candidate polarization must be considered relative to one another; the effect of greater interest-group polarization depends to a large extent on whether it implies more or less ideological proximity to the group's aligned candidate.

1 Introduction

The Koch brothers' PAC Americans for Prosperity pledged to spend 400 million dollars on the 2018 U.S. midterm elections.[1] The campaign was designed to help their preferred candidates (mostly Republicans) win the elections. At the same, both brothers sit on the board of the American Legislative Executive Council (ALEC). ALEC writes model legislation for legislators to introduce, essentially a subsidy for adopting the preferred policy positions of the Kochs.

Seeking to affect policy through multiple channels is not unique to this one family. Tripathi et al. (2002) and Lake (2015) show that the most influential interest groups routinely engage in both campaign spending and on lobbying. Further, much of the ire towards *Citizens United v. FEC* tacitly presumes, correctly, that interest groups are engaged in both campaign spending and lobbying.[2]

Campaign spending and lobbying affect policy in different but interrelated ways. Interest groups use campaign spending to help elect ideologically aligned politicians. After the election, interest groups may lobby the winning candidate, increasing the affinity of aligned politicians and (potentially) moderating the policy of less aligned politicians.

We seek to understand the strategic relationship between campaign spending and lobbying, two alternative means by which to influence policy outcomes. We employ a two-stage model of two interest groups, two candidates, and one representative voter. In the first stage, interest groups may spend on the campaign for either or both of the two candidates. In the second stage, (a subset of) interest groups may then lobby the winning candidate to affect the politician's policy choice.

We interpret campaign spending as improving the electoral chances of a candidate. This may be through direct contributions, advertising, or other investments. The model captures

[1] `https://thehill.com/homenews/campaign/371069-koch-network-to-spend-400-million-during-2018-midterm-election-cycle`

[2] `https://www.nytimes.com/2010/01/22/us/politics/22donate.html`. The article also discusses the role of interest group extremism as increasingly important given the enhanced role interest groups would certainly be taking.

this by supposing interest group expenditures before the election increase a candidate's valence. The campaign stage operates as an all-pay contest,[3] and the candidate with the best (from the voter's perspective) combination of anticipated final policy and valence wins the election.

We assume lobbying represents help drafting bills, effort with administrative tasks, or assistance justifying a stance to voters. Through such efforts, lobbyists and politicians move policy closer to their own ideal points. Specifically, lobbying takes the form of a "tug of war" as developed in Duggan and Gao (2018). The interest groups and winning politician exert effort to pull policy towards their respective ideal points; the final policy is a convex combination of these ideal points, weighted by each player's effort. Effort thus subsidizes the politician's adoption of a given ideal point.

It is worth emphasizing that the politician is a strategic actor in the lobbying stage. Each interest group as well as the winning candidate may theoretically exert effort at this stage, though we consider several different lobbying environments. An alternative approach might have the politician set forth a rule at the start of the game by which she weights interest group efforts relative to a fixed effort and weighting she attaches to her own ideal policy. Since we do not model a repeated setting, such a rule would not be credible. We thus find the assumption that the politician acts strategically – under an exogenous rule translating efforts into final policy – to be the more compelling assumption for a two-stage model.

The more interest groups have to gain by electing an aligned politician, the higher is campaign spending. In equilibrium, interest groups anticipate the efforts to expect to exert lobbying and the effect of lobbying on final policy, and they spend accordingly. The questions asked of the second stage are thus: how does the difference in final policies under the two candidates depend on the distribution of preferences among the players, and how does the lobbying effort the groups exert depend on the spread of ideal points?

We are not just interested in the differences in final spending and policy within lobbying

[3]See Baye et al. (1996) for a general discussion of all-pay contests

regimes, but also across them. Bertrand et al. (2014) find that some lobbyists (particularly experts) have access to politicians from both sides of the isle, while some are seen lobbying only ideologically-aligned politicians. We thus consider three different lobbying environments – no access, partisan access, and open access – and generate predictions about how spending differs among the three regimes.

We first study campaign spending in the absence of any lobbying. If a candidate wins the election, she enacts her ideal point. The "no access" context enables us to explore the mechanics of the campaign stage and also serves as a baseline against which to evaluate how campaign spending depends upon the presence of lobbying. The latter exercise is of interest from both modeling and policy perspectives.

Recognizing that politicians likely mete out access selectively, we introduce lobbying by supposing an elected politician allows only ideologically-aligned interest groups to lobby her. We refer to this lobbying regime as "partisan access." In this environment, a group is only active in the second stage if its preferred candidate wins the election.

Under partisan-access lobbying, interest groups that are more extreme than politicians intensify differences in politician ideal points, pulling the policies each candidate would enact farther apart. If interest groups are relatively less polarized than politicians, however, lobbying exerts a moderating effect on the final policy. The *relative polarization* between interest groups and politicians is as important as the level of polarization of politicians or interest groups when it comes to comparing the welfare implications of different lobbying environments. Campaign spending and policy moderation (in any given lobbying regime) depend on the degree of alignment between the left (right) group and left (right) politician, as well as the degree of disagreement between opposing politicians and groups.

We then relax the requirement of alignment for groups to gain lobbying access to politicians. We suppose that both interest groups have the same ability to influence the politician in the lobbying stage. We call this regime "open access." Comparing the predictions under the two environments has implications for empirical work seeking to understand the role of

ideological alignment for access to politicians.

Under open lobbying, opposing interest groups moderate one another even if the groups are more extreme than the politicians. This is a boon for the median voter as she always prefers a more moderate policy. Despite an increase in lobbying efforts, campaign spending tends to be lower than in other lobbying environments.

In fact, we uncover an imperfect but strong inverse correlation between policy moderation and campaign spending across lobbying environments. The only exception occurs under partisan-access lobbying. As interest groups become more and more extreme than politicians, policy also becomes more extreme but spending starts to decrease. These extreme interest groups have to engage in increasingly costly lobbying, and this makes winning the election less attractive than when there is more ideological congruence between interest groups and politicians.

Finally, we analyze the effectiveness campaign contributions limits. We find that a strict limit does not affect policy at all. Interest groups spend less in the campaign stage, but act exactly the same in the lobbying stage. Within lobbying environments, introducing limits on campaign contributions does not change lobbying behavior and therefore does not change policy.

The rest of the paper proceeds as follows. First we review the relevant literature. Then we describe the model and solve the baseline case with no lobbying. Next we analyze the partisan-access lobbying environment and its implications for the campaign equilibrium. We then turn to the open-access equilibrium and compare the three lobbying regimes. We discuss policy implications and related extensions, such as the effect of imposing of spending limits in the campaign stage, before concluding with a summary of the empirical implications and several suggestions for further research.

2 Related Theoretical and Empirical Research

Prior work has generally considered campaign spending or lobbying in isolation, rather than jointly. While Felli and Merlo (2007) allow interest groups to both support campaigns and lobby elected politicians, interest groups never use both tactics in equilibrium. Our paper shows how both campaign spending and lobbying on behalf of the same politician can occur, exploring conditions under which they respond similarly or differently to changes in exogenous factors. As stated above, the empirical literature shows that interest groups spend money on both campaigns and lobbying for the same politicians (Tripathi et al., 2002; Lake, 2015), which is consistent with our model.

One way to conceptualize our model is with the inside/outside lobbying dynamic of Wolton (2019). Campaign spending (perhaps best thought of as advertising in this model) influences the public as *outside* lobbying. The lobbying in the second stage of our model, however, directly influences the politician and would thus be an example of *inside* lobbying.

Other models that use the all-pay contest framework for campaigns include Meirowitz (2008) and Ashworth and Bueno de Mesquita (2009). However, these papers let politicians themselves make campaign investments. We depart by modeling campaign contributions from interest groups, not politicians, as well as by adding a subsequent lobbying stage. Morton and Myerson (2012) do allow interest groups and politicians to contribute to campaigns, although they also do not analyze a second, lobbying stage. While we do not include politicians as strategic actors in the first stage, we do conceive of politicians as strategic actors in the second, lobbying stage.

Our model differs from previous models that focused on informational campaign contributions and lobbying (Cotton, 2012; Dahm and Porteiro, 2008; Schnakenberg and Turner, 2018; Bennedsen and Feldmann, 2006). We specifically focus on policy-location motivated interest groups, and not information. Instead of only connecting lobbying to campaign spending through access, we analyze multiple types of post-election lobbying. This allows us to identify distinct but interrelated linkages between both campaign spending and lobbying

and voter welfare.

Other papers model both contributions and lobbying, but purely within a contributions-as-access framework (Cotton, 2009; Judd, 2019). Our approach allows us to compare a variety of lobbying regimes and not focus solely on the direct contributions-as-access paradigm. Future work, however, ought to consider a combination of these approaches. In particular, adopting the approach discussed above in which a politician sets forth a rule that specifies lobbyist influence in the second stage, the weight that interest group efforts in the second stage carry in determining the final policy (i.e., the access each group is granted) could depend upon contributions in the first stage.

This paper also contributes to the small but growing literature on interest group ideology and its policy implications. Bonica (2013, 2014) develops a procedure to measure interest group ideology, while McKay (2010) and Thieme (2019) show that more extreme interest groups spend more than moderate groups on campaigns. Brunell (2005) shows that while interest groups often give to both parties, their sincere giving is only targeted to one party. We propose that the empirical studies consider another factor: the ideological distance between interest groups and candidates.

The empirical literature has been mixed with regards to the effectiveness of political spending.[4] Ansolabehere et al. (2003), for example, advance the notion that contributions are not particularly effective, but may instead be a form of consumption. Our model helps rationalize the fact of relatively low amounts of observed money in politics (often known as Tullock's Paradox), even when money is very effective, due to a cancelling out effect under some lobbying regimes.

[4]While we focus mostly on the U.S. setting, the effects of political money are of interest world wide. Titl and Geys (2019), for example, show how donations to winning politicians increases a firm's chances of receiving procurement contracts in the Czech Republic.

3 Model Preliminaries

Three distinct groups of players interact within the model: interest groups (G), politicians/candidates (P), and voters. For simplicity, we consider a single representative voter, often referred to as the median voter or simply the voter (M). All players have an ideal point on the real line. No platform commitment is possible by politicians.

The two candidates, one left-leaning candidate (P_L) and one right-leaning (P_R), have ideal points $\hat{x}_{P_R} = -\hat{x}_{P_L} = \pi > 0$. Similarly, there are two interest groups, one left-leaning (G_L) and one right-leaning (G_R), with ideal points $\hat{x}_{G_R} = -\hat{x}_{G_L} = \gamma > 0$. We set the voter's ideal point as $\hat{x}_M = 0$. The assumptions of symmetry in ideal points receive discussion below, alongside the interpretation of the parameters. We call P_j and G_i aligned if $i = j$.

The relative polarization/extremism of interest groups and politicians is of central interest. The only assumption on the relative magnitude of π and γ is that each aligned politician and group is closer ideologically than the groups are to one another. We define the concept of relative polarization and state the assumption explicitly. The assumption merely ensures that the interest groups would not ally together against the politicians to moderate policy beyond its final location in equilibrium. In fact, we only invoke the assumption when studying the open-lobbying environment.

Definition (Relative polarization)**.** *If $\gamma > (<)\pi$, the interest groups are more (less) polarized than the politicians.*

Assumption (Genuinely opposed interest groups)**.** *Let $\gamma > \pi/3$.*

The model has two distinct stages: an election stage and a policymaking stage. In the first stage, the interest groups simultaneously make their campaign spending decisions, where $s_{G_i,P_j} \geq 0$ is the contribution of interest group G_i to P_j. The voter then chooses a candidate. After the election, the winning politician P_j and both interest groups simultaneously make their policymaking/lobbying effort decisions, $e_{P_j}, e_{G_i}, i = L, R$. Finally, policy is implemented and outcomes are realized.

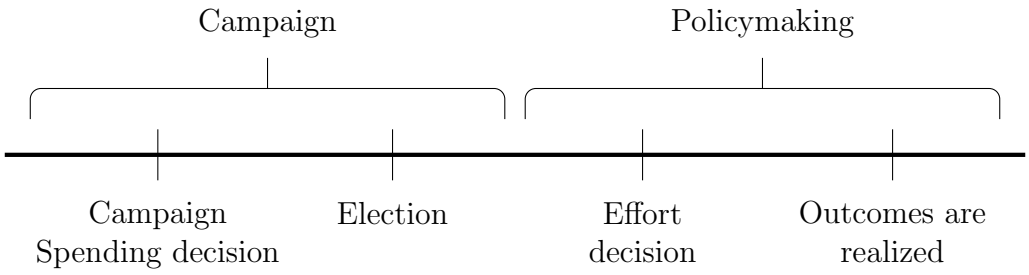

Figure 1: Sequence of Play

In addition to policy, the voter cares about politician valence. The total utility she receives if politician j wins the election with valence v_{P_j} and implements x_{P_j} is given by

$$U_M\left(x_{P_j}, v_{P_j}; \hat{x}_M\right) = -\left|x_{P_j} - \hat{x}_M\right| + v_{P_j} = -\left|x_{P_j}\right| + v_{P_j}.$$

Interest groups care about money spent on campaigns in addition to effort expended on lobbying and the policy that is ultimately implemented. Campaign spending converts into valence linearly with P_j's valence being equal to:

$$v_{P_j} = \mu \cdot s_{P_j}, \tag{1}$$

where $\mu > 0$ and $s_{P_j} = \sum_{i=L,R} s_{G_i,P_j}$. The cost of lobbying enters quadratically into players utility functions. Group i's total utility from policy x_{P_j} being implemented, any campaign contributions it made, and the lobbying effort it exerted is given by:

$$U_{G_i}\left(x_{P_j}, s_{G_i,P_L}, s_{G_i,P_R}, e_{G_i}; c, \hat{x}_{G_i}\right) = -\left|x_{P_j} - \hat{x}_{G_i}\right| - s_{G_i,P_L} - s_{G_i,P_R} - c \cdot e_{G_i}^2.$$

Politicians only care about policy and effort put forth in the policymaking stage, such that politician j's utility from putting forth effort e_{P_j} and adopting final policy x_{P_j} is:

$$U_{P_j}\left(x_{P_j}, e_{P_j}; c, \hat{x}_{P_j}\right) = -\left|x_{P_j} - \hat{x}_{P_j}\right| - c \cdot e_{P_j}^2.$$

Lobbying takes the form of a tug of war game as presented in Duggan and Gao (2018) with (up to) three players. The winning politician and both interest groups make effort choices e_i. The final policy, denoted $\tilde{x}_{P_j}$, arises according to:

$$\tilde{x}_{P_j}(e_{G_L}, e_{G_R}, e_{P_j}; \hat{x}_{G_L}, \hat{x}_{G_R}, \hat{x}_{P_j}) = \frac{e_{P_j}\hat{x}_{P_j} + e_{G_L}\hat{x}_{G_L} + e_{G_R}\hat{x}_{G_R}}{e_{P_j} + e_{G_L} + e_{G_R}}. \tag{2}$$

A few comments are in order by way of interpretation. The multiplier on campaign spending, μ, measures the effectiveness of campaign spending; the higher μ is, the cheaper valence is to produce. The final policy is a convex combination of the winning candidate's and both interest groups' ideal points, weighted by the effort each put forward. Exerting more effort in the policymaking stage, then, pulls policy closer to one's ideal point (at a cost of $c \cdot e^2$).

The opportunity cost of money spent during the campaign stage or effort exerted in the lobbying stage includes all manner of other activities in which interest groups engage; for example, they may fund raise, conduct membership drives, or increase salaries. The translation of efforts in the policymaking supposes diminishing returns to lobbying. Again, we conceive of lobbying less as a monetary favor but rather as a legislative subsidy in the sense of Hall and Deardorff (2006). This is in contrast to the campaign contributions which are simply money coming out of the interest groups' pockets.

We treat the politician as a strategic player in the second stage, treating the winning candidate as a lobbyist, essentially. Of course, the politician could enact whichever policy she wants, but we suppose that she must exert effort to marshal the resources necessary to counteract the interest groups and implement a policy closer to her ideal point than theirs. The tug-of-war technology is meant to capture just this. While we use the terms implement/enact, the politician need not be an executive. We may think of lobbyists vying to affect the policy position a legislator adopts.

We use the tug-of-war technology instead of a simple contracting scheme because of its

applicability to more settings. The contest function allows us to analyze more than two players (i.e., one politician and one interest group) at the same time in a tractable way. The results with a linear contract scheme are qualitatively similar for the results in the partisan-access environment, but the contracting model would not have also been amenable to analyzing the open-access lobbying regime, as well.

The reader will likely notice the strong symmetry assumptions around the ideal points of the candidates as well as the those of the interest groups. These effectively assume each pair (politicians, interest groups) are balanced ideologically around the median voter. These assumptions allow us to parsimoniously use relative polarization to discuss the polarization of each pair as well as the extent to which a same-side politician and group are aligned.

With a setting of full information, the appropriate equilibrium concept is subgame perfect Nash equilibrium (hereafter just equilibrium). While this suggests the analysis proceed via backwards induction, it is instructive to first examine the campaign stage in the absence of subsequent lobbying, as it provides a baseline from which to compare campaigns with lobbying afterwards. Further, this approach highlights the most important features to focus on when studying the second stage, viz., the difference in utility for interest groups under their preferred and less-preferred candidates.

4 The Campaign Stage (the No-Access Lobbying Equilibrium)

We model the campaign stage as an all-pay contest, with the two interest groups simultaneously making valence investments. The voter then picks the candidate she prefers given each candidate's valence, ideal point, and the knowledge of what policy the candidate will implement in the second stage. In this section, we consider campaign spending absent lobbying in the second stage.

Remark 4.1. *In the absence of lobbying in the second stage, the winning politician imple-*

ments her ideal point in the policymaking stage, i.e., the policy enacted will be $\hat{x}_{P_R} = \pi$ *if the voter elects* P_R *and* $\hat{x}_{P_L} = -\pi$ *if the voter elects* P_L*.*

Interest groups spend on campaigns during the election and must pay regardless of whether their candidate wins. In line with intuition, then, our first result establishes that interest groups only contribute to aligned campaigns. This result serves us throughout the paper, as the premise that a candidate implements a policy closer to the aligned interest group's ideal point continues to hold when we introduce lobbying.[5]

Lemma 4.1. *If the policy implemented by an aligned candidate will always be closer to an interest group's ideal point than the policy implemented by the unaligned candidate, then interest groups only contribute to the campaigns of aligned candidates.*[6]

A few definitions will be helpful for the further analysis. We say an interest group is the *winner (loser)* if their ideologically-aligned candidate wins (loses) the election. Let $\overline{V}^L_{G_i}$ be the interest group's utility of winning the election in lobbying regime L and similarly let $\underline{V}^L_{G_i}$ be the interest group's utility of losing the election in lobbying regime L. Denote the difference $\overline{V}^L_{G_i} - \underline{V}^L_{G_i}$ with $\Delta^L_{G_i}$, which we will often refer to as the value of winning for an interest group.[7]

Because the politicians' ideal points are symmetric around 0, the two groups share the same value of winning. Indeed, this will continue to be true in subsequent sections because of the symmetry of the interest groups' ideal points around 0. As such, we will suppress the subscript for the winning value.

The symmetry of implemented policies around 0 also has implications for the voter's decision, as the next result makes clear. Because the voter is equidistant from both possible policies, she is indifferent between the two candidates from a policy perspective. Therefore

[5] If, in addition to augmenting a candidate's valence and thus chance of winning, campaign contributions bought access to that candidate if elected, it may be the case that groups would contribute to both campaigns. While certainly interesting, this is beyond the scope of this analysis. We discuss this avenue for further research in our conclusion.

[6] All proofs may be found in the appendix.

[7] $L \in \{N, A, O\}$. N is no lobbying, P is partisan lobbying, and O is open lobbying.

she votes purely based on valence.

Lemma 4.2. *If the policies implemented by the two candidates are symmetric around the voter's ideal point, the candidate with the highest valence wins the election.*

No pure-strategy equilibria exist in this game. If, for example, the left interest group was going to spend Δ for sure, then the right interest group's best response is to spend nothing. If the right interest group was always going to spend 0, however, then the left interest group should clearly spend less than Δ and still win. Instead, the groups randomize over spending in equilibrium, and the distribution of spending has support from 0 up to the full benefit of winning the election. Such results are standard in the literature on (symmetric) all-pay auctions.

4.1 The No-Access Lobbying Equilibrium

Without lobbying, the value of winning the election is the based on the polarization of groups (politicians) if they are relatively less polarized than politicians (groups). In fact, when the interest groups are more extreme than the politicians, the value of winning is simply the difference between the politicians' ideal points. If the politicians are more extreme, however, the value of winning is instead the difference between the groups' ideal points.

Lemma 4.3. *With no lobbying in the second stage, the value of winning the election is given by:*

$$\Delta^N = \begin{cases} 2\gamma & \text{if } \gamma \leq \pi \\ 2\pi & \text{if } \gamma \geq \pi. \end{cases}$$

The starkness of this result stems primarily from the absolute-loss policy component of utility functions, but it nicely highlights the central logic animating campaign spending without lobbying. When interest groups are less polarized than politicians, some of the distance to their aligned candidate's ideal point cancels out the distance to the less-aligned candidate's ideal point, leaving interest group extremism as the only driver of the value of

winning the election. When interest groups are more polarized than politicians, the distance to their more aligned candidate's ideal point is shared by the distance to the less-aligned candidate's ideal point, again washing out in the calculation of the value of winning the election.

Proposition 4.1. *With no lobbying in the second stage, the equilibrium spending of both interest groups is distributed uniformly over the interval* $[0, \Delta^N]$*. Expected spending for each interest group is* $\frac{\Delta^N}{2}$*, leading to expected total spending of* Δ^N*.*

While the multiplier μ does not appear in the expression for expected spending, we may easily observe that the expected total valence produced in equilibrium will be $\mu\Delta^N$. We discuss the interpretation of valence in greater depth below, in the section on voter welfare. To preface, however, we view valence as representing behavioral concerns. The role of these non-policy considerations in the election increases in μ or whatever changes may lead to increases in Δ^N. The next result addresses the latter.

Corollary 4.1.1. *With no lobbying in the second stage, expected spending is increasing in politician polarization* (π) *when interest groups are more polarized than politicians. When interest groups are relatively less polarized than politicians, increasing politician polarization has no effect on expected spending.*

With no lobbying in the second stage, expected spending is increasing in interest group polarization (γ) *when interest groups are less polarized than politicians. When interest groups are relatively more extreme than politicians, increasing group polarization has no effect on expected spending.*

When groups are less polarized than candidates, increasing candidate polarization makes both candidates worse from the point of view of a group. These effects cancel out, leaving spending unchanged. But when groups are more polarized than candidates, increasing candidate polarization makes the aligned candidate better and the non-aligned candidate worse.

This increases expected spending. [8]

Increasing the polarization of interest groups or politicians increases expected spending only if it increases the alignment of groups and politicians. Increasing polarization but decreasing alignment leads to no change in the value of winning. Turning to consider the lobbying stage, our analysis of the campaign stage highlights that the most relevant consideration is how lobbying affects the value of winning for an interest group.

5 The Partisan-Access Lobbying Equilibrium

> "We had a hierarchy in my office in Congress. If you're a lobbyist who never gave us money, I didn't talk to you. If you're a lobbyist who gave us money, I might talk to you." – Mick Mulvaney[9]

In the lobbying stage, some subset of interest groups and the winning politician may expend effort to minimize the distance from the final policy – as given by Equation 2 – to their ideal points, taking into account the cost of effort, $c \cdot e^2$. Recall, we see such effort as representing more than just spending money. Instead, it also encompasses writing legislation, assigning staff, having meetings, justifying stances to constituents, and other effort-intensive legislative activities. Duggan and Gao (2018) develop and thoroughly explore this model of lobbying. Their results allow us to quickly establish several statements about the policy under each candidate, effort choices, and ultimately the value of winning for interest groups in equilibrium.

A plausible reading of the Mick Mulvaney quotation above is that contributions are a necessary but not sufficient condition for access to a politician, with ideological alignment being a likely additional necessary condition. In accordance with this view, we first explore an environment we refer to as "partisan-access lobbying." In this setting, only the interest

[8] The gain in utility would change if players were not risk neutral, but any such change is clearly not robust to the functional form of policy loss.

[9] https://www.vox.com/policy-and-politics/2018/4/25/17279244/mick-mulvaney-cfpb-lobbyist-donations-banks

group aligned with the winning candidate may participate (along with the candidate herself) in lobbying. McKay (2018b) and Kalla and Broockman (2016) present more systematic evidence that campaign contributions buy access, showing that politicians do not just implement policies favored by supported interest groups but also use language specifically written by groups that hosted fundraisers. Further, Fouirnaies and Hall (2018), Powell and Grimmer (2016), and McKay (2018a) show that interest group prioritize contributions for candidates that will hold positions on relevant committees.

The lobbied policy in the partisan-access equilibrium is a convex combination of the winning politician and her aligned interest group's ideal points, weighted by their efforts. Specifically, in equilibrium the final policy splits the difference of these ideal points. We superscript key terms in this section with P.

Lemma 5.1. *If the right-leaning candidate wins the election, the final, equilibrium policy is* $\tilde{x}^P_{P_R} = \frac{\gamma+\pi}{2}$.

If instead the left-leaning candidate wins the election, the policy enacted in equilibrium is $\tilde{x}^P_{P_L} = -\frac{\gamma+\pi}{2}$.

Figure 2 shows that extreme interest groups pull the final policy away from median voter, as there is no counterweight from the losing interest group.

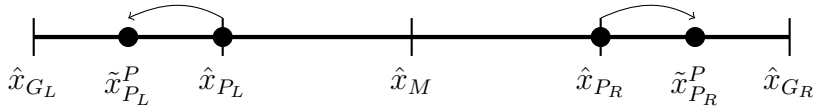

Figure 2: Lobbying Difference for Extreme Interest Groups

Moderate interest groups moderate an aligned but relatively extreme politician vis-à-vis the policy the politician would implement without any lobbying, as in Figure 3.

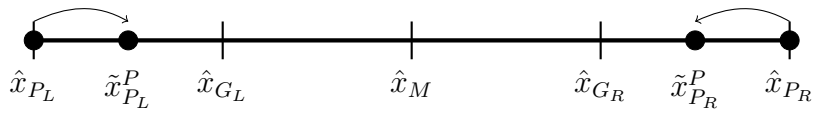

Figure 3: Lobbying Difference for Moderate Interest Groups

Proposition 5.1. *Under partisan-access lobbying, interest group equilibrium spending levels are distributed uniformly with support* $[0, \Delta^P]$ *such that expected total campaign spending is* Δ^P*, where*

$$\Delta^P = \begin{cases} \pi + \gamma - \frac{\gamma - \pi}{8} & if\ \pi \leq \gamma \\ 2\gamma - \frac{\pi - \gamma}{8} & if\ \pi \geq \gamma \end{cases}.$$

Note that the expression for Δ^P again depends on whether the interest groups are relatively moderate or extreme. When the interest groups are more polarized than politicians, the absolute polarization between the politicians plays almost as large a role in the value of winning the election as absolute polarization of the interest groups. However, if the politicians are relatively extreme instead, the interest group polarization accounts for the lion's share of the value of winning. The mechanism underlying this difference is as follows: when interest groups are less polarized than politicians, the anticipated final policies straddle each interest group's ideal point, leaving the distance between the interest groups as the primary determinant of the value of winning the election. The next result makes precise the way that equilibrium campaign spending depends on the polarization of interest groups and politicians.

Corollary 5.1.1. *Expected campaign spending under partisan-access lobbying increases in the polarization of interest groups. The rate of increase is lower when interest groups are relatively more polarized than politicians.*

Expected campaign spending under partisan-access lobbying increases in the polarization of the candidates when politicians are less polarized than interest groups. When interest groups are relatively less polarized, spending falls in politician polarization

When politicians are relatively less polarized than interest groups, greater politician polarization has two effects. One, it makes policies more extreme, so there is a greater value to winning the election for the interest groups. Two, the politicians grow more aligned with interest groups and, therefore, equilibrium lobbying effort costs decrease, further increasing the value of winning.

Suppose now that politicians are relatively more polarized than interest groups and growing more so. Policies are again becoming more extreme. The decreased desirability of having one's aligned candidate win the election is exactly offset by the increased disutility from having the opposing candidate win, such that there is no policy effect on the value of winning. Lobbying costs do increase as politicians and groups become less aligned, however, which exerts downward pressure on the value of winning. Expected campaign spending starts to drop.

We perform below a more full comparison of campaign spending under partisan-access lobbying and in the absence of lobbying. It is worth noting here, though, that strategic campaign spending must take into account subsequent lobbying. To consider campaign spending independently of lobbying risks mischaracterizing the effect of political ideology on both spending and policy.

6 The Open-Access Lobbying Equilibrium

We now consider open-access lobbying, in which we assume both interest groups are able to (and will) lobby the winning candidate, regardless of her ideological alignment. This analysis of open-access lobbying serves multiple purposes. First, there may be other ways to buy access than through campaign contributions. These other ways (such as donating to philanthropic causes as shown in Bertrand et al. (2018)) are often used by interest groups from both sides of the aisle. Letting both interest groups lobby in the second stage may capture scenarios in which access is granted from activities other than contributions. Second, there may also be different sets of lobbyists available to the interest group. For example, Bertrand et al. (2014) shows that expert lobbyists attract bipartisan business while connections based lobbyists are only employed by one party. Open-access lobbying may capture the expert-lobbyist scenario. Finally, given the interpretation of lobbying as legislative subsidy, there is no reason to believe that the politician could credibly commit to excluding such

subsidization from any particular group. Given that we do not model a repeated setting, it does not seem justified to assume the politician only accepts helpful effort from ideologically-aligned groups. Open-access lobbying seems as plausible an assumption, if not more, than partisan-access lobbying from a theoretical viewpoint.

The results herein demonstrate that a more contested lobbying environment need not imply higher campaign spending. Indeed, we find the opposite holds. The policy moderation induced under open-access lobbying leads to a sharp decrease in campaign spending. This difference between partisan- and open-access lobbying provides a way to empirically test which lobbying regime best represents the realities of money in politics. We employ the superscript O in this section.

Lemma 6.1. *Under open lobbying, the equilibrium policy if the voter elects the right-leaning candidate is*

$$\tilde{x}^O_{P_R} = \pi + 2\gamma - 2\sqrt{\gamma(\gamma+\pi)} \in (0, \min\{\gamma, \pi\}). \tag{3}$$

If the left-leaning candidate wins the election, the equilibrium policy is given by

$$\tilde{x}^O_{P_L} = 2\sqrt{\gamma(\gamma+\pi)} - 2\gamma - \pi \in (\max\{-\gamma, -\pi\}, 0). \tag{4}$$

Equilibrium policies lie in between the politicians' ideal points as well as in between the interest groups' ideal points. This is guaranteed because of the assumption of genuinely-opposed interest groups. The tug of war over the final policy results in policy moderation vis-à-vis politician or interest group ideal points. Figure 4 shows the anticipated final policies under the each of the potential candidates are now closer together as well as closer to the voter's ideal point. This significantly reduces the policy benefit of winning the election for the interest groups, though it remains positive. Because the losing group exerts more effort on policy than the winning group in equilibrium, the overall value of winning the election under open lobbying (Δ^O) is still ensured to be positive.

Note that the polarization of interest groups has a different effect than polarization of

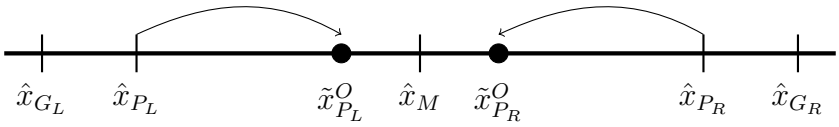

Figure 4: Location of policy after open lobbying

politicians (Figures 5 and 6). This is because interest groups participate in the lobbying stage regardless of whether their allied candidate wins the election. However, politicians only participate if they win the election.

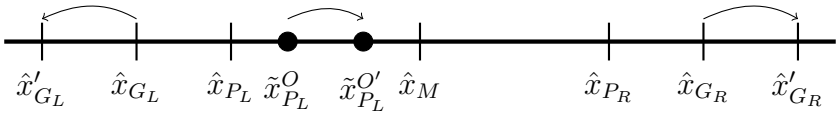

Figure 5: Change in open-lobbied policy location as γ increases

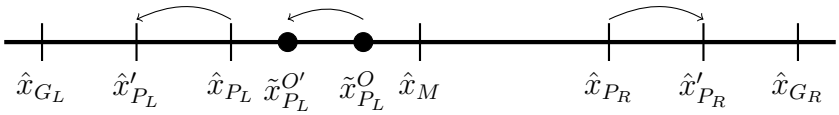

Figure 6: Change in open-lobbied policy location as π increases

Proposition 6.1. *Both groups' spending in the first stage is distributed uniformly over* $[0, \Delta^O]$. *Total expected campaign spending is thus* Δ^O, *where*

$$\Delta^O = (\sqrt{\pi + \gamma} - \sqrt{\gamma})^2 \left[2 + \frac{\sqrt{\gamma}}{\sqrt{\pi + \gamma}}\right]. \tag{5}$$

Corollary 6.1.1. *Under open lobbying, expected campaign spending is increasing in politician polarization,* π, *and decreasing in group polarization,* γ.

Opposing interest groups have the effect of moderating the final policy. The effort the opposing interest group exerts increases at a faster rate than the effort the aligned interest group exerts as the groups become more polarized. Therefore the more polarized the interest groups, the more moderate the open-lobbied policy will be, and the more similar the effort each group will need to exert in equilibrium regardless of the winning politician. As such,

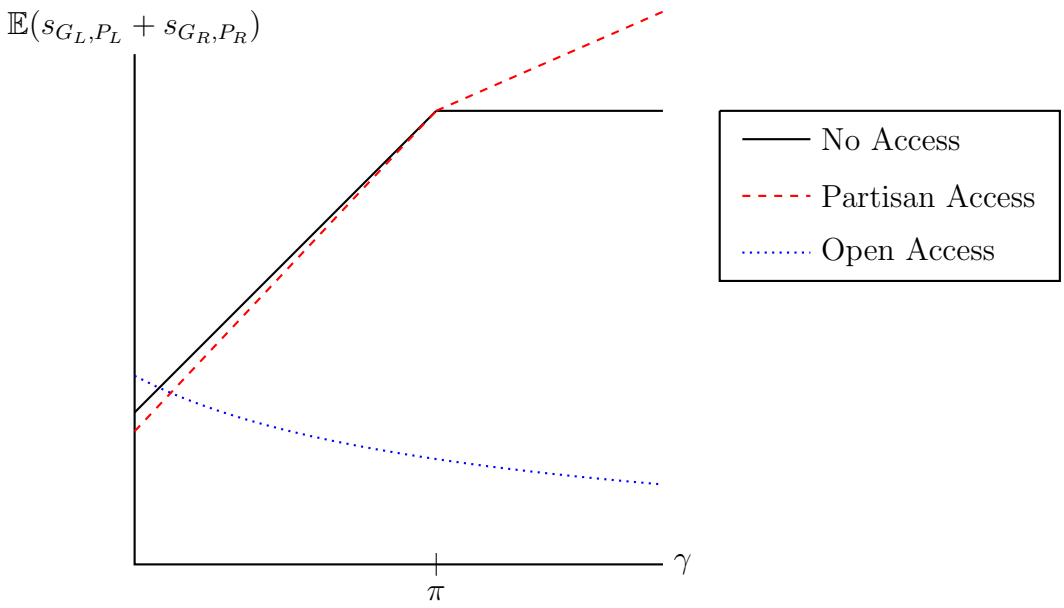

Figure 7: Expected Campaign Spending by Group Polarization

the value of winning the election falls in the extremism of interest groups, leading campaign spending in the first stage to fall.

No opposing politician moderates policy in the lobbying stage. Therefore, as politicians grow more extreme, the lobbied policies anticipated under the two candidates pull away from each other. Additionally, interest groups will exert less effort in equilibrium if their aligned candidate wins than if the opposing candidate wins. These two effects of increased politician polarization increase the value of winning for interest groups and thus lead to increased campaign spending in the first stage.

7 Lobbying Regime Comparisons

In this section we compare the three lobbying regimes considered above – open, partisan, and no-access lobbying – along two outcomes: campaign spending in the first stage and the moderation of policies implemented in the second stage. Figures 7, 8, 9, and 10 visually depict the above results. For each outcome, we consider changes in relative polarization first holding politician polarization fixed and then holding interest group polarization fixed.

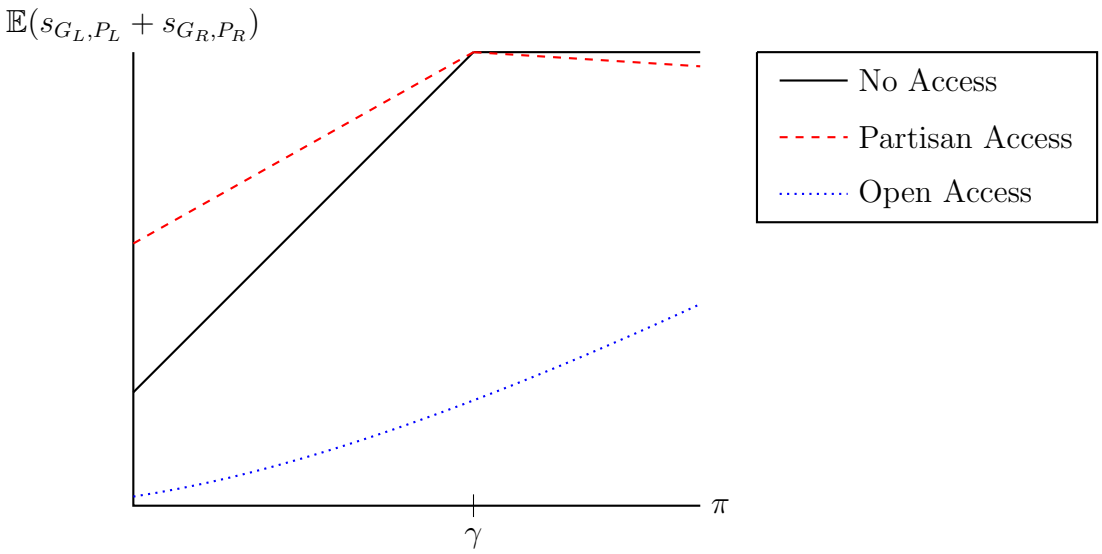

Figure 8: Expected Campaign Spending by Politician Polarization

The most policy-relevant question pertains to the comparison of partisan-access lobbying and no access. Limits on lobbying are a more plausible counterfactual to a reality of partisan-access lobbying than open-access lobbying. It is hard to imagine a policy that required legislators to grant meaningful access to lobbyists of all stripes; it is easier to imagine a (call for a) reduction on lobbying activity.

While technically campaign spending (times the multiplier μ) and policy moderation both contribute positively to a voter's utility, we analyze these features separately. Policy moderation is clearly a boon for the voter. The use of valence in the model is less to capture actual voter well-being as much as a shorthand for behavioral or non-policy factors that play into voter decision making. On the whole, and in line with common narratives, we view campaign spending on valence (vis-à-vis the concept of informative campaign spending) as fundamentally inefficient. It is reasonable to suppose the voter benefits from greater policy moderation and less campaign spending. Regardless of the particular stance, however, analyzing these two outcomes separately allows us to generate insights about each as its own phenomenon of interest.

The first result below states that when interest groups are less polarized than politi-

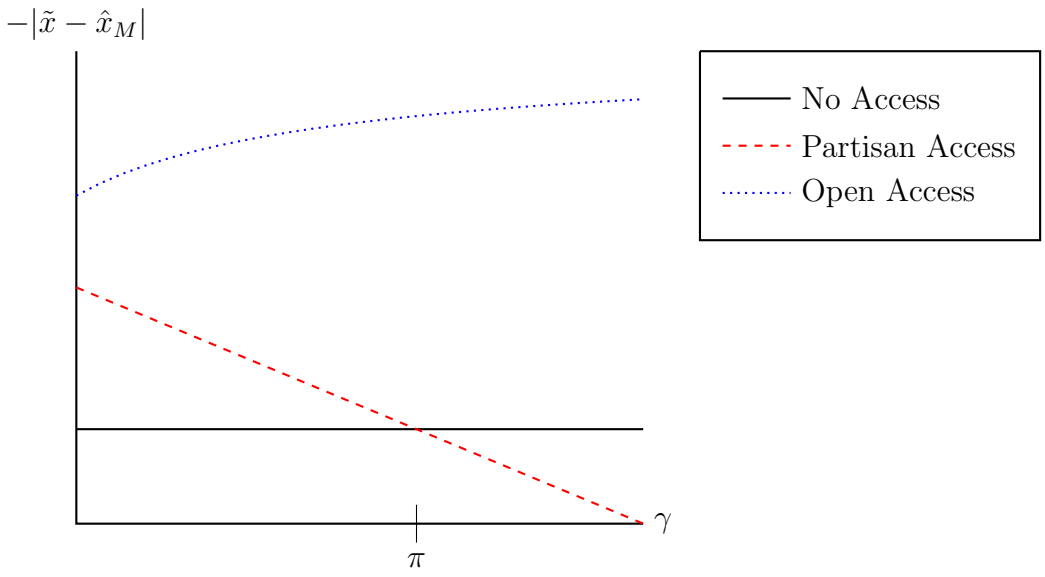

Figure 9: Voter Policy Utility by Group Polarization

cians, no lobbying produces higher campaign spending and less moderate policies, with the opposite being true when interest groups are more extreme than politicians. Two notable insights arise: first, there is not a trade-off between lower campaign spending and policy moderation – they go hand-in-hand, but, second, which institution achieves lower spending and greater policy moderation changes across the parameter space. If politicians are relatively more polarized than the relevant interest groups, partisan-access lobbying offers more moderation and reduces inefficient spending. If groups are relatively more extreme, however, a prohibition on lobbying would reduce spending and increase moderation.

Proposition 7.1. *If $\gamma < \pi$, policy moderation is greater and campaign spending is lower under partisan-access lobbying than if no lobbying occurs in the second stage.*

If $\gamma > \pi$, policy moderation is greater and campaign spending is lower if no lobbying occurs in the second stage than under partisan-access lobbying.

While partisan-access lobbying displays lower campaign spending than no lobbying when politicians are relatively more polarized than interest groups, it is relatively less of a reduction than no lobbying provides over partisan-access lobbying when groups are more polarized than politicians. It is only the increasing cost of lobbying effort that drives expenditures down as

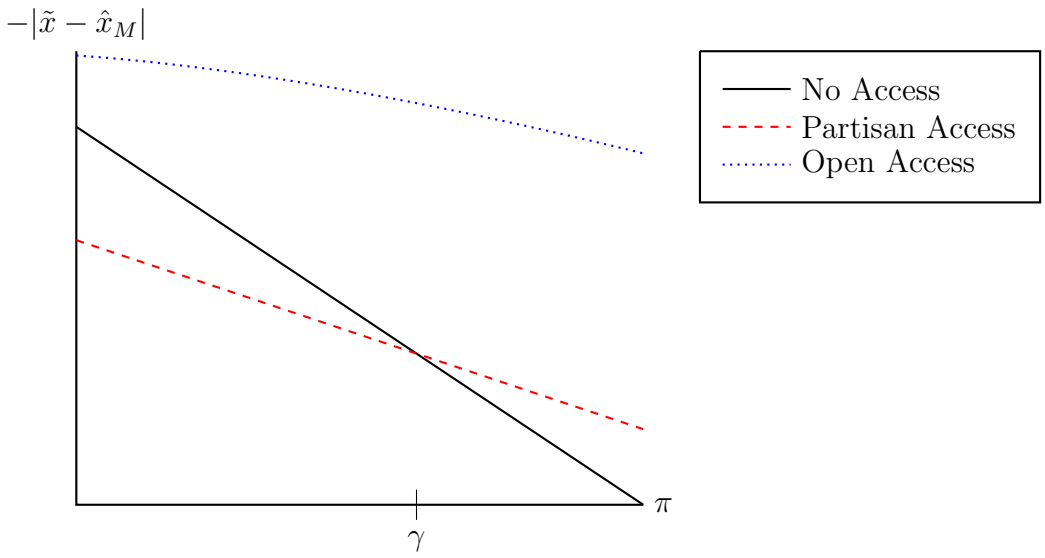

Figure 10: Voter Policy Utility by Politician Polarization

politicians grow more polarized than interest groups under partisan-access lobbying. Banning lobbying would seem, on the whole, to lead to lower campaign spending than partisan-access lobbying. No such (weak) conclusions may be drawn with regards to policy moderation. Partisan-access lobbying is preferable to no lobbying for policy moderation when groups are less extreme than politicians as no lobbying is preferable to partisan-access lobbying when groups are more polarized than politicians.

The second result indicates that open-access lobbying entails less campaign spending in equilibrium than no lobbying or partisan-access lobbying as long as politician polarization is less than or not too much larger than interest group polarization. Further, open-access lobbying always produces the most policy moderation of the three environments we consider. This further drives home that a given institution may induce both policy moderation and lower spending. Indeed, because policy moderation tends to reduce the value of winning (even net of lobbing effort costs), spending will often be lower as anticipated policies moderate. As with the result above, however, a single (viable) institution may not be the best choice for all values of relative polarization.

Proposition 7.2. *There exists a value of politician polarization* $\overline{\pi}(\gamma) > \gamma$ *such that if*

politicians are not more polarized this level, i.e., $\pi < \overline{\pi}(\gamma)$, campaign spending is lower under open-access lobbying than partisan-access lobbying or no-access lobbying environments.

Policy moderation is always greater under open-access lobbying than under the partisan-access lobbying or no-access lobbying regimes.

Most interesting about open-access lobbying, perhaps, are the comparative statics that differ from those of partisan-access lobbying. These could be used shed light on whether politicians in fact limit access to ideologically-aligned groups or whether they allow groups from across the spectrum to influence their policy positions. Specifically, policies grow less extreme as groups become more polarized under open-access lobbying but more extreme as groups become more polarized under partisan-access lobbying. Similarly, expected spending falls as groups grow more extreme under open-access lobbying but rises as groups grow more extreme under partisan-access lobbying. Certainly a more full consideration of open-access lobbying would consider the requirements for politicians to grant access to less aligned groups as well as aligned groups. Based on the results presented herein, however, evidence on spending discussed above suggests the lobbying environment in practice more closely resembles partisan-access lobbying than open-access lobbying.

7.1 Spending Caps

The preceding section shows how changes in expected spending correlate with changes in policy location. However, conditional on a specific candidate winning, the actual realized spending does not affect the final policy at all. This is true for all three lobbying regimes. Moreover, our predictions about spending pertain to expected spending – actual spending may be low or high.

As an example, consider partisan-access lobbying with extreme politicians (that is $\pi \geq \gamma$) and the right-leaning candidate winning the election. In this case, total expected spending is $2\gamma - \frac{\pi-\gamma}{8}$. Each candidate will spend some quantity in the interval $\left[0, 2\gamma - \frac{\pi-\gamma}{8}\right]$. Since the right-leaning candidate wins, the final policy will be $\frac{\gamma+\pi}{2}$.

However, the actual spending that gives this outcome may be anything as long as the right candidate spends more money. The left interest group could spend 0, and the right group could spend γ. The left group could spend $\frac{\gamma}{2}$, and the right group could again spend γ. The left group could spend $2\gamma - \frac{\pi-\gamma}{16}$ while the right group spends $2\gamma - \frac{\pi-\gamma}{8}$.

These three cases have very different amounts of total spending. However, they all result in the exact same policy of $\frac{\gamma+\pi}{2}$. After determining the election winner, the final policy is the same regardless of the realized campaign spending. We can then take this logic further by analyzing strict campaign spending limits.

Proposition 7.3. *Let there be a limit κ on the amount interest groups can spend on the campaign. Then, if $\kappa \leq \Delta$, both interest groups always spend κ and win with probability $\frac{1}{2}$.*

When the spending limit is low enough, winning half of the time gives a positive expected utility (this is true for all three lobbying regimes). Therefore, both interest groups simply spend to the limit. However, the implemented policies are exactly the same as before the spending limits. The voter's policy utility hasn't changed at all even though there is now no association between campaign spending and policy outcomes. This serves as another demonstration that the money spent in the election may be a poor predictor of whether final policy is moderate or extreme.

8 Conclusion

8.1 Policy Implications

This paper demonstrates first and foremost that different means of political influence are not strategically independent decisions. Our results highlight how lobbying in the future affects the campaign contributions today. Specifically, interest group campaign contributions increase as the benefit of having an ideologically aligned politician in office rather than her opposition increases. Furthermore, polarization between candidates is not enough to explain

campaign spending or equilibrium policy location. Candidate polarization relative to interest group polarization is a quantity as important to understanding campaign spending and lobbying effort as the absolute polarization of politicians or groups.

We considered the inter-dependency of campaign spending and lobbying under three different stylized lobbying regimes: 1) no-access lobbying, 2) partisan-access lobbying (in which only the aligned group may influence the politician's policy choice), and 3) open-access lobbying (in which aligned and unaligned interest groups have equal ability to influence the winning politician after the election). Our analysis suggests U.S. politics today may, in fact, suffer from too little lobbying, as we find open lobbying improves policy for the median voter and (nearly always) lowers campaign spending when compared to the other regimes. In this sense, one might wish to enable a wider spectrum of influence on politicians.

If facilitating a greater diversity of viewpoints to influence politicians is not feasible, then the optimal lobbying regime depends upon the relative polarization of interest groups and politicians. Banning lobbying may produce more or less extreme policies and lower or greater campaign spending than allowing partisan-access lobbying would. If groups are moderate relative to politicians, partisan-access lobbying moderates policies and lowers campaign spending. If instead politicians are relatively less extreme, no lobbying would obtain more moderate policies and lower expected campaign spending. As the latter situation may be more descriptive of the present political system, our best option may be no lobbying if it is impossible to usher in an environment resembling open-access lobbying. We may think of no lobbying and open-access lobbying as being corner solutions, of sorts.

8.2 Empirical Implications

The comparative statics also have important implications for empirical research. First, we show how spending is conditional on the *relative* polarization between interest groups and politicians. Therefore studies that look only at politician ideology or just at interest group ideology may have an omitted variable problem. Researchers must consider interest

group and politician ideology jointly to understand how they affect campaign spending. For instance, previous studies such as McKay (2010) and Thieme (2019) show that more extreme interest groups contribute more to campaigns. While our model predicts such effects, it comes with the additional prediction that this relationship may attenuate once groups are more polarized than politicians, when further group polarization entails less alignment with the group's preferred politician.

Second, the nature of access is hard to test for; most papers have to find creative ways to infer access from contribution schedules. For example, Fouirnaies and Hall (2018) looks at how interest groups change contribution patterns based on committee assignments and committee seniority. Another example, Powell and Grimmer (2016) analyzes how money flows away from legislators who leave committees. Our model, however, suggests ways in which one might test among different types of lobbying regimes. Specifically, increasing polarization of interest groups has the exact opposite predictions for spending under partisan-access and open-lobbying. Under partisan-access lobbying, contributions increase in polarization while they decrease under open-access lobbying. These leads to a stark empirical test for which lobbying regime is actually in place. The evidence seems to suggest partisan-access lobbying is the more prevalent environment in which interest groups find themselves.

Third, the lobbying effect on policy has a downstream effect on campaign spending. Therefore when considering the effect of campaign spending on policy, researchers must make sure they are not capturing the lobbying effect instead. These may be related, but distinct phenomenon. For example, just measuring spending against policy outcomes would miss that the final outcome is also a function of the lobbying regime. As we show with the extension on spending caps, the same policy outcome may result from multiple different spending levels.

8.3 Future Work

A number of potentially fruitful avenues for related work presented themselves throughout our analysis. Future work may wish to extend the model to speak to different limitations on spending, beyond the limit on campaign contributions analyzed above. Two additional such limitations come to mind. The first is a limit on lobbying expenditures, though presumably this would interpolate between the no lobbying and the access lobbying regimes. The second would consist of a finite budget, such that interest groups face a potential trade-off between spending limited resources in the pre-election and post-election stages.

We did not allow politicians to make campaign investments in their own campaigns, instead focusing on interest group decision making. Certainly this comes at a loss of some verisimilitude. How does interest group spending and lobbying change when politicians adopt a strategic role in the first stage? We also do not explicitly model the way in which campaign spending may purchase access. How might spending and the number of active lobbyists in the second stage change if contributions purchased a degree of access in addition to improving electoral chances of the receiving politician?

A final suggestion is to consider multiple political offices. Large interest groups give to multiple races at once. How does future lobbying of coalitions of politicians affect the distribution of spending across many simultaneous campaigns? The strategic interrelation of campaigns and lobbying points towards many avenues of interesting and worthwhile future research. This list comprises but a small sample of these.

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A Proofs

Lemma A.1. *For all lobbying regimes, interest group equilibrium spending levels are distributed uniformly with support* $[0, \Delta^L]$.

Proof of Lemma A.1. This is a special case of Theorem 1 from Baye et al. (1996), where $m = n = 2$ and $\Delta^L = v_1 = v_2$. ■

Proof of Lemma 4.1. Contributing to the misaligned candidate would reduce probability the aligned candidate wins. This reduces utility in the second stage compared to only giving to the aligned candidate. ■

Proof of Lemma 4.2. This follows immediately from the voter's utility function. She incurs the same loss of utility from policies symmetric around her ideal point, $\hat{x}_M = 0$. Her best choice of candidate, then, is the one with the highest valence. ■

Proof of Lemma 4.3. If the interest groups are more polarized than the politicians, $\Delta^N = -(\gamma - \pi) - [-(\gamma) - (-\pi)] = \pi - \gamma + \gamma + \pi = 2\pi$.

If interest groups are relatively less polarized than politicans, then $\Delta^N = -(\pi - \gamma) - [-(\gamma) - (-\pi)] = \gamma - \pi + \gamma + \pi = 2\gamma$. ■

Proof of Proposition 4.1. From Lemmas 4.3 and A.1 we have that spending is distributed uniformly over the interval $[0, \Delta^N]$.

It follows from the uniformly distributed spending that the expected campaign expenditures for each interest group are $\frac{\Delta^N}{2}$. With two candidates spending independently, total expected expenditures are simply Δ^N. ■

Proof of Corollary 4.1.1. If the interest groups are more polarized than the politicians, $\Delta^N = -(\gamma - \pi) - [-(\gamma - -\pi)] = \pi - \gamma + \gamma + \pi = 2\pi$.

If interest groups are relatively less polarized than politicans, then $\Delta^N = -(\pi - \gamma) - [-(\gamma - -\pi)] = \gamma - \pi + \gamma + \pi = 2\gamma$.

The first derivative with respect to π is positive when interest groups are more polarized than politicians and 0 when groups are less polarized than politicians.

The first derivative with respect to γ is positive when politicians are more polarized than politicians and 0 when politicians are less polarized than groups. ■

Proof of Lemma 5.1. In the tug-of-war game with absolute-value policy utility, the final policy minimizes the sum of squares between all ideal points. With two players, this is the midpoint between the two ideal points. See Duggan and Gao (2018, p. 14). ■

Lemma A.2. *Under partisan-access lobbying, the cost of effort is* $\frac{|\gamma=\pi|}{8}$ *for the winning interest group and* 0 *for the losing interest group*

Proof. From Duggan and Gao (2018, p. 12), equilibrium effort is

$$e_i^* = \frac{|\hat{x}_i - \tilde{x}|}{\sqrt{2c\sum_i |\hat{x}_i - \tilde{x}|}}.$$

With two players, this reduces to

$$e^* = \frac{\frac{|\gamma-\pi|}{2}}{\sqrt{2c \cdot 2\frac{|\gamma-\pi|}{2}}}.$$

Therefore the cost for the winning interest group is

$$c \cdot e^2 = \frac{|\gamma - \pi|}{8}$$

■

Proof of Proposition 5.1. When there are only two groups, the difference in final policies is

$$\frac{\pi+\gamma}{2} - \left(-\frac{\pi+\gamma}{2}\right) = \pi + \gamma$$

. The difference in utility must account for the lobbying cost incurred when granted access

and also the possibility that the final policies are more extreme than the interest groups' ideal points. When interest groups are more extreme than politicians, the difference in policy utility for the right interest group is (the left is the same by symmetry:

$$\gamma - \frac{\pi + \gamma}{2} - \left(\gamma - \left(-\frac{\pi + \gamma}{2}\right)\right) = \pi + \gamma.$$

When politicians are more extreme, (i.e., $\pi > \gamma$), the difference in policy utility is

$$\frac{\pi + \gamma}{2} - \gamma - \left(\gamma - \left(-\frac{\pi + \gamma}{2}\right)\right) = 2\gamma.$$

Combining the policy loss with the effort costs from Lemma A.2, the value of winning is therefore

$$\Delta^P = \begin{cases} 2\gamma - \frac{|\gamma - \pi|}{8} & \text{if } \pi > \gamma \\ \gamma + \pi - \frac{|\gamma - \pi|}{8} & \text{if } \pi < \gamma. \end{cases}$$

Appealing to Lemma A.1 completes the proof. ■

Proof of Corollary 5.1.1. The comparative statics follow from signing the derivatives of Δ^P with respect to γ and π, noting that increases in each variable holding fixed the other eventually toggles between the two cases. The difference in policy utilities is increasing in γ even as the function changes. ■

Proof of Lemma 6.1. The equilibrium policies follow immediately from Duggan and Gao (2018, p. 14). Specifically, the final policy equalizes the sum of squared distance of ideal points to the right of it and to the left of it. The final policy under the left politician, $\tilde{x}_{P_L}$, is such that

$$(\hat{x}_{P_L} - \tilde{x}_{P_L})^2 + (\hat{x}_{G_L} - \tilde{x}_{P_L})^2 = (\hat{x}_{G_R} - \tilde{x}_{P_L})^2.$$

The final policy under the right politician, $\tilde{x}_{P_R}$, is given according to

$$(\hat{x}_{G_L} - \tilde{x}_{P_R})^2 = (\hat{x}_{G_R} - \tilde{x}_{P_R})^2 + (\hat{x}_{P_R} - \tilde{x}_{P_R})^2.$$

Assumption 1 ensures that both groups' squared distance to the policy are not together set equal to a politician's squared distance to the policy, i.e., that $\tilde{x}^{O}_{P_R} \in \{0, \min\{\gamma, \pi\}\}$ and $\tilde{x}^{O}_{P_L} \in \{\max\{\gamma, \pi\}, 0\}$. ■

Lemma A.3. *Equilibrium effort costs are*

$$\frac{\sqrt{(2\gamma)(\gamma+\pi)}}{\sqrt{2}} - (\gamma+\pi) + \frac{\gamma+\pi)^2}{2\sqrt{2}\sqrt{2\gamma)(\gamma+\pi)}}$$

for the aligned interest group and

$$\frac{\sqrt{(2\gamma)(\gamma+\pi)}}{\sqrt{2}} - ((\gamma+\pi)+(2\gamma)) + \frac{((\gamma+\pi)+(2\gamma))^2}{2\sqrt{2}\sqrt{(2\gamma)(\gamma+\pi)}}$$

for the misaligned interest group

Proof. From Duggan and Gao (2018, p. 12), equilibrium effort is

$$e_i^* = \frac{|\hat{x}_i - \tilde{x}|}{\sqrt{2c\sum_i |\hat{x}_i - \tilde{x}|}}.$$

For the aligned right group, this reduces to

$$\begin{aligned}
c\left(\frac{|x_{G_R} - x^*(P_R)|}{\sqrt{2c\sum_i |x_i - x^*(P_R)|}}\right)^2 &= \frac{[\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{P_R}-x_{G_L})} - (x_{P_R}-x_{G_L})]^2}{2\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{P_R}-x_{G_L})}} \\
&= \frac{\sqrt{(x_{G_R}-x_{G_L})(x_{P_R}-x_{G_L})}}{\sqrt{2}} - (x_{P_R}-x_{G_L}) \\
&+ \frac{(x_{P_R}-x_{G_L})^2}{2\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{P_R}-x_{G_L})}} \\
&= \frac{\sqrt{(2\gamma)(\gamma+\pi)}}{\sqrt{2}} - (\gamma+\pi) + \frac{\gamma+\pi)^2}{2\sqrt{2}\sqrt{2\gamma)(\gamma+\pi)}}
\end{aligned}$$

and for the misaligned right group, this reduces to

$$
\begin{aligned}
c\left(\frac{|x_{G_R}-x^*(P_L)|}{\sqrt{2c\sum_i |x_i-x^*(P_L)|}}\right)^2 &= \frac{\left((x_{G_R}-x_{P_L})+(x_{G_R}-x_{G_L})-\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{G_R}-x_{P_L})}\right)^2}{2\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{G_R}-x_{P_L})}} \\
&= \frac{\sqrt{(x_{G_R}-x_{G_L})(x_{G_R}-x_{P_L})}}{\sqrt{2}} - ((x_{G_R}-x_{P_L})+(x_{G_R}-x_{G_L})) \\
&+ \frac{((x_{G_R}-x_{P_L})+(x_{G_R}-x_{G_L}))^2}{2\sqrt{2}\sqrt{(x_{G_R}-x_{G_L})(x_{G_R}-x_{P_L})}} \\
&= \frac{\sqrt{(2\gamma)(\gamma+\pi)}}{\sqrt{2}} - ((\gamma+\pi)+(2\gamma)) + \frac{((\gamma+\pi)+(2\gamma))^2}{2\sqrt{2}\sqrt{(2\gamma)(\gamma+\pi)}}
\end{aligned}
$$

The left group is the same by symmetry. ■

Proof of Proposition 6.1. First, we compute the value of Δ^O. We set $A := (x_{G_R} - x_{G_L}) = 2\gamma$ and $B := (x_{P_R} - x_{G_L}) = \pi + \gamma = (x_{G_R} - x_{P_L}) =: C$, working in terms of A, B, C so as not to wash over effects with symmetry before necessary.

We first verify the open-lobbied policies are symmetric, i.e., the difference in voter utility from each of the potential, anticipated policies is zero:

$$
\begin{aligned}
&-(x^*(P_R)+x^*(P_L)) = \\
&-(x_{P_R}+x_{P_L})+\sqrt{2A}(\sqrt{B}-\sqrt{C}) = \\
&-(\pi-\pi)+\sqrt{2A}(\sqrt{B}-\sqrt{B}) = 0.
\end{aligned}
$$

We then calculate the distance between the anticipated, open-lobbied policies, noting

that both will lie on the same side of a given interest group's ideal points.[10]

$$\begin{aligned}
x^*(P_R) - x^*(P_L) =& x_{P_R} + x_{G_R} - x_{G_L} - \sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{P_R} - x_{G_L})} \\
&-(\sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{G_R} - x_{P_L})} - x_{G_R} + x_{G_L} + x_{P_L}) \\
=& (x_{G_R} - x_{G_L}) + (x_{P_R} - x_{G_L}) + (x_{G_R} - x_{P_L}) \\
&- \left(\sqrt{2(x_{G_R} - x_{G_L})(x_{P_R} - x_{G_L})} + \sqrt{2(x_{G_R} - x_{G_L})(x_{G_R} - x_{P_L})}\right) \\
=& A + B + C - \sqrt{2AB} - \sqrt{2AC} \\
=& A + 2B - 2\sqrt{2AB} \\
=& (\sqrt{A} - \sqrt{2B})^2 \\
=& (\sqrt{2\gamma} - \sqrt{2(\pi + \gamma)})^2 \\
=& (\sqrt{2}(\sqrt{\pi + \gamma} - \sqrt{\gamma}))^2 \\
=& 2(\sqrt{\pi + \gamma} - \sqrt{\gamma})^2
\end{aligned}$$

The difference in costs (from Lemma A.3) for a group from electing an aligned candidate

[10] We need only do this calculation for one of the groups – the other is identical by symmetry.

rather than the unaligned candidate is given by:

$$\begin{aligned}
c \cdot a^*_{G_R}(P_L)^2 - c \cdot a^*_{G_R}(P_R)^2 =& \frac{\left((x_{G_R} - x_{P_L}) + (x_{G_R} - x_{G_L}) - \sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{G_R} - x_{P_L})}\right)^2}{2\sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{G_R} - x_{P_L})}} \\
& - \frac{\left(\sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{P_R} - x_{G_L})} - (x_{P_R} - x_{G_L})\right)^2}{2\sqrt{2}\sqrt{(x_{G_R} - x_{G_L})(x_{P_R} - x_{G_L})}} \\
=& \frac{(A + C - \sqrt{2AC})^2}{2\sqrt{2AC}} - \frac{(\sqrt{2AB} - B)^2}{2\sqrt{2AB}} \\
=& \frac{A^2 + 2AB - 2A\sqrt{2AB}}{2\sqrt{2AB}} \\
=& \frac{(A - \sqrt{2AB})^2}{2\sqrt{2AB}} \\
=& \frac{A(\sqrt{A} - \sqrt{2B})^2}{2\sqrt{2AB}} \\
=& \frac{2\gamma(\sqrt{2\gamma} - \sqrt{2(\pi + \gamma)})^2}{2\sqrt{2(2\gamma(\pi + \gamma))}} = \frac{\sqrt{\gamma}}{\sqrt{\pi + \gamma}}(\sqrt{\pi + \gamma} - \sqrt{\gamma})^2
\end{aligned}$$

Finally, we put the policy and cost components together for the value of winning the election under open lobbying.

$$\begin{aligned}
\Delta^O = u_{G_R}(P_R) - u_{G_R}(P_L) =& (\sqrt{A} - \sqrt{2B})^2 + \frac{A(\sqrt{A} - \sqrt{2B})^2}{2\sqrt{2AB}} \\
=& (\sqrt{A} - \sqrt{2B})^2 \left[1 + \frac{A}{2\sqrt{2AB}}\right] \\
=& (\sqrt{2B} - \sqrt{A})^2 \left[1 + \frac{\sqrt{A}}{2\sqrt{2B}}\right] \\
=& 2(\sqrt{\pi + \gamma} - \sqrt{\gamma})^2 \left[1 + \frac{\sqrt{2\gamma}}{2\sqrt{\pi + \gamma}}\right] \\
=& (\sqrt{\pi + \gamma} - \sqrt{\gamma})^2 \left[2 + \frac{\sqrt{\gamma}}{\sqrt{\pi + \gamma}}\right]
\end{aligned}$$

Appealing to Lemma $A.1$ completes the proof. ■

Proof of 6.1.1. The comparative statics follow from signing the derivatives of Δ^O with re-

spect to γ and π.

$$\frac{\partial \Delta^O}{\partial \gamma} = -\frac{(\sqrt{\pi+\gamma}-\sqrt{\gamma})^2(\gamma+2\sqrt{\gamma}\sqrt{\pi+\gamma}+3(\gamma+\pi))}{2\sqrt{\gamma}\sqrt{\pi+\gamma}(\pi+\gamma)}$$

The two terms in the numerator are positive, as is the denominator, so the entire expression is negative.

$$\frac{\partial \Delta^O}{\partial \pi} = \frac{(\sqrt{\pi+\gamma}-\sqrt{\gamma})(\gamma+\sqrt{\gamma}\sqrt{\pi+\gamma}+4(\gamma+\pi))}{2\sqrt{\gamma}\sqrt{\pi+\gamma}(\pi+\gamma)}$$

Again, both expressions in the numerator are positive, but without a leading minus sign, the entire expression remains positive. ■

Proof of Proposition 7.1. If groups are less (more) polarized than politicians, then they moderate (make more extreme) policies under partisan-access lobbying.

If groups are less (more) polarized than politicians, then $\Delta^P < \Delta^O$ and vice versa. ■

Proof of Proposition 7.2. Spending under open-access lobbying is less than under no lobbying or partisan-access lobbying when $\gamma = \pi$.

$$\begin{aligned}
(\sqrt{2\gamma}-\sqrt{\gamma})^2\left[2+\frac{\sqrt{\gamma}}{\sqrt{2\gamma}}\right] = \\
\gamma(\sqrt{2}-1)^2\left(2+\frac{1}{\sqrt{2}}\right) < \\
\gamma(\sqrt{2}-1)\left(2+\frac{1}{\sqrt{2}}\right) < \\
\gamma(\sqrt{2}-1)(\sqrt{2}+1/2)\sqrt{2} < \\
\gamma(\sqrt{2}-1)(\sqrt{2}+1)\sqrt{2} = \\
\sqrt{2}\gamma < 2\gamma
\end{aligned}$$

From Corollaries 4.1.1, 5.1.1, and 6.1.1, when politicians are more polarized than interest groups, campaign spending is increasing under open-access lobbying but constant under no lobbying and decreasing under partisan-access lobbying, so there exists a level of politician

polarization relative to interest group polarization, $\overline{\pi}(\gamma)$, at which spending under open-access lobbying is greater than under the other two regimes. This is true when open-access lobbying spending is greater than spending under the prospect of no lobbying:

$$(\sqrt{\pi+\gamma}-\sqrt{\gamma})^2\left[2+\frac{\sqrt{\gamma}}{\sqrt{\pi+\gamma}}\right]\geq 2\gamma$$
$$\pi\geq\gamma\frac{1+\sqrt{5}}{2}$$

As long as the ratio of politician to interest group polarization is not larger than the golden ratio, then open-access lobbying leads to the lowest expected campaign spending of the three regimes we consider.

Because the final policy is strictly closer to zero, the median voter's ideal point, than any of the three ideal points, it is clear that the open-lobbied policy is more moderate than either the politician's ideal point (under no lobbying) or the mid-point between the ideal points of an aligned politician and interest group (under partisan-access lobbying). ■

Proof of Proposition 7.3. Let κ be the maximum amount interest groups are allowed to spend on the campaign. Further, let Δ be the difference in utility between winning and losing for each interest group. Finally, assume $\kappa\leq\frac{\Delta}{2}$.

Consider a strategy profile where one groups spends κ and the other group spends $s_i<\kappa$. Then the losing group always loses and has an expected utility of less than $-s_i<0$. They can then deviate to κ and get an expected utility of $\frac{\Delta}{2}-\kappa>0$. A similar argument holds for deviations from κ to $s_i<\kappa$.

Now consider a mixed strategy profile where each interest group bids uniformly on the interval $[\underline{s},\kappa]$. Each group wins with probability $\frac{1}{2}$ and has an expected utility of $\frac{\Delta}{2}-\frac{\kappa+\underline{s}}{2}$. However, an interest group can deviate to κ and win for sure. Then their expected utility is $\Delta-\kappa$ which is greater than $\frac{\Delta}{2}-\frac{\kappa+\underline{s}}{2}$.

Therefore both interest groups will play the pure strategy κ. ■