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CAREER CONCERNS AND THE DYNAMICS OF ELECTORAL ACCOUNTABILITY

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ABSTRACT

Quantifying the value that legislators give to reelection relative to policy is crucial to understanding electoral accountability. We estimate the preferences for office and policy of members of the US Senate, using a structural approach that exploits variation in polls, position-taking and advertising throughout the electoral cycle. We then combine these preference estimates with estimates of the electoral effectiveness of policy moderation and political advertising to quantify electoral accountability in competitive and uncompetitive elections. We find that senators differ markedly in the value they give to securing office relative to policy gains: while over a fourth of senators are highly ideological, a sizable number of senators are willing to make relatively large policy concessions to attain electoral gains. Nevertheless, electoral accountability is only moderate on average, due to the relatively low impact of changes in senators' policy stance on voter support.

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1 Introduction

A core principle of representative democracy is that elections serve to discipline politicians in government. The basic idea is that if a politician were to deviate too much from the preferences of her constituency, voters would remove her from office (Barro (1973), Mayhew (1974), Ferejohn (1986)). Thus, politicians who value reelection will not stray far from voters' preferred policies.

In practice, however, the power of elections to make politicians accountable to voters rests on multiple preconditions, which vary across candidates and characteristics of each electoral race. In this paper, we propose an empirical approach that decomposes the determinants of electoral accountability into two components: politicians' *preferences* for office versus policy, and the effectiveness of position-taking and advertising on reelection prospects.

Disentangling preferences from electoral conditions is crucial to understanding electoral accountability because voters only affect politicians indirectly, through elections. Indeed, while incumbents who put a large value on reelection would not mind compromising their policy ideas to gain *any* electoral edge, those who put a larger weight on policy will be less willing to exchange policy concessions for electoral gains (see, e.g. Alesina and Cukierman (1990)). Since marginal expected electoral gains depend on the perceived competitiveness of the election, incumbents with different preferences for office and policy will have different degrees of responsiveness to voters in safe and competitive elections.

The second component of the electoral accountability mechanism consists of factors external to the politician. Independently of the tradeoffs that the politician might be *willing* to make, for this mechanism to have any chance to work voters must

be at least somewhat responsive to the choices politicians make while in office. If voters were to blindly follow partisan lines, for instance, politicians would not have incentives to cater their policy choices to voters' policy preferences. Similarly, if voters were easily persuadable through advertising, ideologically motivated politicians can be tempted to substitute policy concessions for TV ads. High powered incentives for electoral accountability require then, that voters are highly sensitive to politicians' policy choices, and relatively insensitive to non-policy means of persuasion, such as political advertising.

To capture the different components of electoral accountability in a unified framework, we model explicitly the dynamic problem of a legislator running for reelection. We estimate the model using data for over a hundred US senators who ran for reelection between 2000 and 2014 (132 electoral cycles).

The model captures the dynamic tradeoffs of the politician, as she responds to changing electoral conditions throughout the electoral cycle. In each period, the senator chooses a policy position and TV-ad buys after observing her standing in the polls. Both advertising and adopting policies that are in line with her constituency's interests affect polls in the next period, but are costly to the politician. In particular, a senator who is more heavily ideological has a higher cost of deviating from her ideal policy. Improving her standing in the polls within cycle doesn't contribute to the senator's payoffs directly, but puts her in a better electoral position as the election approaches. At election time, the senator gets an office payoff if she attains reelection and an additional payoff (possibly zero) from a large margin of victory.¹

¹ Previous research (see eg. Griffin (2006), Mian, Sufi and Trebbi (2010)) shows that *on average*, representatives are more responsive to voters in close elections. Whether and to what extent senators are responsive to voters in safe elections is

Identification of the model parameters relies on the *within-cycle dynamics* of position-taking and advertising in response to changing electoral conditions. There are two key ideas here. First, the level of “effort” exerted in various degrees of competitiveness of the election pins down the relative value of reelection versus lopsided wins: more ads, or larger policy moderation towards the voter in “safe” relative to “competitive” electoral states are consistent with larger values of lopsided wins relative to simply being reelected. Second, for any total level of effort, senators who care more about policy will tend to substitute policy responsiveness with political advertising. Thus, the relative responsiveness of policy and ads in competitive and safe electoral conditions pins down the relative weight of policy vs reelection concerns.

Our results provide various novel insights. First, we are able to quantify how each senator would trade policy concessions for electoral gains, if these were available to them. Here we measure senators’ preferences – the marginal rate of substitution between policy concessions and electoral gains – separately from the tradeoffs that are actually available to them. We find that most senators are willing to make significant policy concessions for a higher probability of retaining office. In particular, the senator at the median of the distribution is willing to give up 2.1% of the distance between party medians for a 1% increase in the probability of a close win, and 4.5% of the distance between party medians for a 1% increase in the probability of a safe win. We also document a substantial heterogeneity in the importance that senators give to reelection versus policy. More than a fourth of all senators in our sample are heavily ideological, and are not willing to give up large policy concessions for electoral gains.

an empirical question. Our model nests the model with no payoffs for lopsided wins, and allows us to capture heterogeneity in responsiveness across senators.

Second, we consider what tradeoffs are actually available to the politicians, by estimating the electoral return of position-taking and advertising. In doing this, we also rely on within-cycle variation, by exploiting the panel structure of our data. We find that increasing the incumbent’s TV ads, or reducing her challenger’s advertising, improves her advantage in the polls in the short-run, with an additional, albeit smaller, long-run effect that decays over time.² In particular, we find that policy *moderation towards the voters* increases senators’ advantage in the polls. Thus, extreme positions are penalized in moderate states, but rewarded in more heavily liberal or conservative ones.³ From a quantitative standpoint, however, gains and losses from changes in position-taking are only moderate in magnitude, weakening incentives for electoral accountability.

Third, by combining the estimates on senators’ preferences with the electoral effectiveness of position-taking and advertising, we are able to assess to what extent senators would accommodate the preferences of their voters, for varying degrees of

² Our short-run estimate of the effectiveness of political advertising is comparable in magnitude with previous findings in the literature. See Huber and Arceneaux (2007), Stratmann (2009), Gerber, Gimpel, Green and Shaw (2011), Gordon and Hartmann (2013), Spenkuch and Toniatti (2018).

³ These results complement the previous findings of Canes-Wrone, Brady and Cogan (2002), who show that incumbents are penalized for ideological extremity. Our results show that senators are punished for ideological extremity relative to their district, but that this doesn’t always mean that senators are punished for taking extreme liberal or conservative positions.

competitiveness of the election.

To obtain a comparable measure across senators, we construct an *electoral accountability index* (EAI), which measures senators' predicted policy positions as a percentage of the distance between their ideal policy and the vote-maximizing position in their state. We find that for the average senator, electoral accountability is only moderate, reaching a maximum of 26% in competitive elections, and a minimum of 14% in the presence of a large electoral advantage. Nevertheless, consistent with the heterogeneity in senators' preferences for office and policy, there is significant variation in how politicians respond to voters. In fact, in competitive elections, the EAI is around 73% for senators in the top quartile of career concerns, and lower than 5% for those in the bottom quartile. We also find that female senators are on average more responsive to voters than their male counterparts, that Democrats are on average more responsive than Republicans, and that more ideologically extreme senators – who observe a larger benefit of adjusting their policy position – are more responsive than moderate members.

Our results reconcile the general perception that senators typically do give a large value to being reelected, with the relatively low average levels of responsiveness to voters we observe in the data. We find that the moderate level of electoral accountability on average is due to three factors. First, over a fourth of senators in our sample are heavily ideological, and would only be willing to deviate from their policy preferences in exchange for a large electoral gain. Second, the electoral return of policy moderation is low, both in absolute terms and relative to the electoral return of political advertising. Third, the modal senator enjoys a significant advantage in the polls, making them less willing to respond to voters' preferences.

To further clarify the relative role of preferences and the electoral returns of policy

moderation we evaluate two counterfactual exercises: we consider (i) an increase in the electoral effectiveness of position-taking relative to what we observe in the data, and (ii) a ban of political advertisement. We find that even quadrupling the return of policy moderation from the levels observed in the data only increases the average EAI to about 50% in close elections. Similarly, eliminating political advertising leads to a moderate increase (less than 10 p.p.) in the level of electoral accountability for the typical senator. These results indicate that the weight most senators give to their own ideology is considerable, and emphasize the importance of adverse selection for voter welfare.

2 Related Literature

Our paper contributes to three distinct research lines. First, a prominent literature in political science focuses on understanding whether legislators are responsive to constituency preferences. The traditional approach in the empirical literature has been to model legislator voting behavior as a direct function of constituency preferences (Kalt and Zupan (1984), Peltzman (1984), Kalt and Zupan (1990), Bender (1991), Levitt (1996), Mian et al. (2010)).⁴ In our model, instead, voters' preferences enter indirectly, through their effect on electoral outcomes. Our estimates allow us to disentangle how the preferences of voters and politicians, the competitiveness of the race, and the effectiveness of policy and advertising to change voter support, affect

⁴ Lee, Moretti and Butler (2004) argue that selection, and not responsiveness to voters, explains voting outcomes in the US House of Representatives (see also Kau and Rubin (1979)).

legislators' behavior.

A key ingredient in this account (often implicit in the literature) is a degree of *voter* responsiveness to legislators' policy positions. The presence of this relationship is not at all guaranteed. In fact, a robust literature follows Campbell, Converse, Miller and Stokes (1980) in arguing that voters are driven by partisanship, and are largely unresponsive to legislators' policy stances. Contrary to this view, Canes-Wrone et al. (2002), Ansolabehere and Jones (2010) and Fowler et al. (2020) among others provide evidence that legislators' records affect voting behavior. Our results provide additional evidence supporting this view, but indicate that voters' relatively low sensitivity to senators' policy positions provides weak incentives for electoral accountability.⁵

At a broader level, our paper connects with a series of recent papers which have adopted a structural estimation approach to study how elected politicians respond to electoral incentives. In particular, Lim (2013) and Sieg and Yoon (2017) estimate the value of office vs. policy for trial court judges in Kansas and US governors respectively, assuming it is homogeneous across agents. A key innovation of our paper is to exploit within-cycle variation in polls, position-taking and advertising to estimate senators' preferences for office and policy. This allows us to obtain rich heterogeneity in our preference estimates, using the differential responsiveness of ads and position-taking to variation in the perceived level of voter support across the

⁵ Differently than previous literature, we estimate the effect of ads and position-taking on a panel, using monthly variation in polls, position-taking and advertising. This allows us to account for senators' fixed characteristics, as well as for potential confounders that vary over the electoral cycle.

electoral cycle. In contrast, the estimation approach in Diermeier, Keane and Merlo (2005) and Lim (2013) require observing dynamic tradeoffs over the long run, as induced by politicians' career decisions, to quantify electoral accountability. Likewise, Sieg and Yoon (2017), Avis, Ferraz and Finan (2018) and Aruoba, Drazen and Vlaicu (2019) exploit the dynamics across electoral cycles induced by term limits in models of electoral competition.⁶

3 Data

Our main data consist of monthly observations of voting support, roll-call votes, and TV advertising expenditures for 102 incumbent senators who ran for reelection at least once in the period 2000-2014, for a total of 132 (senator-congress) electoral cycles.⁷ We supplement these data with individual characteristics of the senators, as well as demographic and economic indicators at the state level.

Polls. To measure senators' advantage in the polls, we use public opinion data for each senate race, collected from *Polling Report*, *Real Clear Politics* and *Pollster*. The **pointlead** of each senator t months away from the election measures the average dif-

⁶ Sieg and Yoon (2017) and Aruoba et al. (2019) study US governors, Avis et al. (2018) focuses on municipalities in Brazil, and Lim (2013) studies elected and appointed judges in Kansas. Diermeier et al. (2005) quantify the monetary value of a seat in Congress.

⁷ We exclude the electoral cycle 2005/06 since advertising data is not available.

ference between the share of respondents in favor of the incumbent and the challenger in that month. We compute a weighted average of this measure over all available polls in each period, where the weights are inversely proportional to the number of survey respondents. Whenever possible, we fill gaps in senate races' opinion data with the predicted `pointlead` obtained from incumbent senators' approval rates, prediction market data, and national polls that contain individual voters' congressional approval (see page 3 of the Appendix for details).

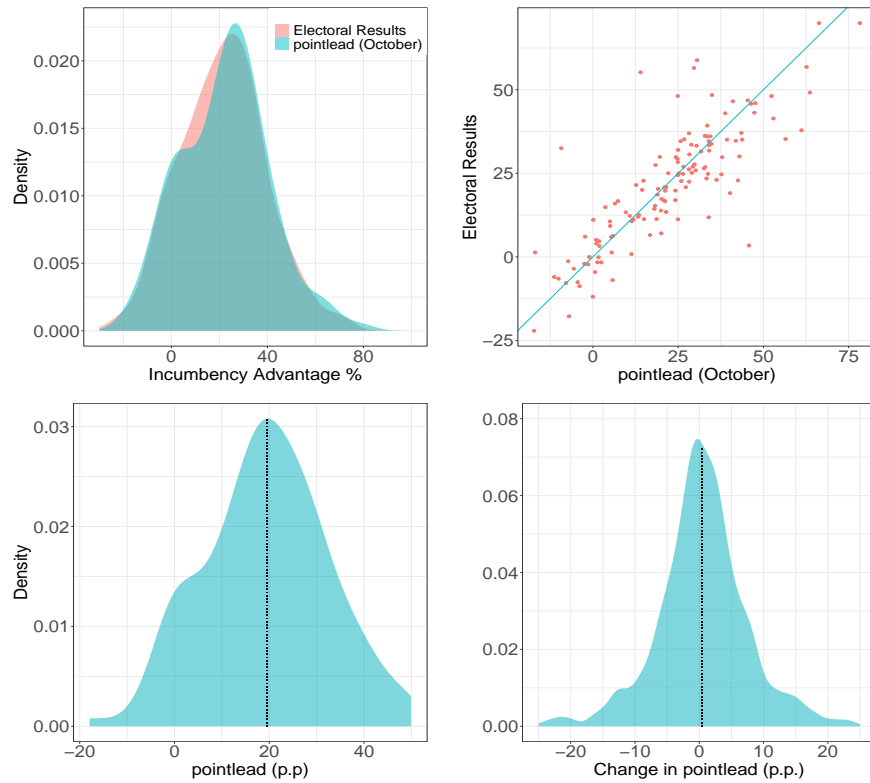


Figure 1: Polls and Electoral Returns

Note: the upper left panel plots the distribution of realized electoral returns and `pointlead` a month before the election. The upper right panel plots the corresponding crossplot. The lower left panel plots the distribution of the average `pointlead` per senator over the electoral cycle. The lower right panel plots the distribution of the monthly change in `pointlead` for each senator and time period.

Figure 1 illustrates three key facts about the evolution of voter support. First, polls

are informative throughout the electoral cycle. In fact, late realizations of `pointlead` are highly predictive of the observed incumbent advantage on election day (upper panel), and throughout the cycle, current values of `pointlead` are a good predictor of `pointlead` in the next period (lower right panel). Second, while on average incumbents enjoy an advantage of close to 20 p.p., there is significant heterogeneity in electoral security both across senators (lower left panel) and within senators throughout the electoral cycle (lower right panel).

Policy Positions. To quantify senators’ policy positions at each point in time, we use two alternative measures. In our benchmark specification, we use scaling techniques to obtain a one-dimensional measure capturing variability in senators’ voting records. Specifically, we define senator i ’s `position` in month t as her “ideal point” estimate from a Bayesian Quadratic Normal model (Clinton, Jackman and Rivers (2004)). We use `position` only as a summary of senators’ position-taking, and do not interpret it as a measure of policy preferences, which we then estimate as parameters of the model. Due to data limitations, scaling roll calls in a single month results in highly variable and imprecisely estimated positions. To overcome this problem, we estimate policy positions using a rolling window of roll call votes taken within the previous 12 months.⁸ Figure 2 plots the policy positions observed

⁸ In Appendix D.6. (page 23) we show that (i) restricting to periods in which positions can be reliably estimated at a monthly level, the month-to-month and smoothed measures are highly correlated, and that (ii) our main results are robust when using a shorter (6 month) scaling window size. We also compute an alternative measure of senators’ policy positions in each period, `partyvote`, defined as the percentage of party votes (votes for which a majority of Republicans opposes a majority of Democrats) in which the senator takes the Republican position.

in the data, for Democrat and Republican Senators, vis-à-vis their advantage in the polls.

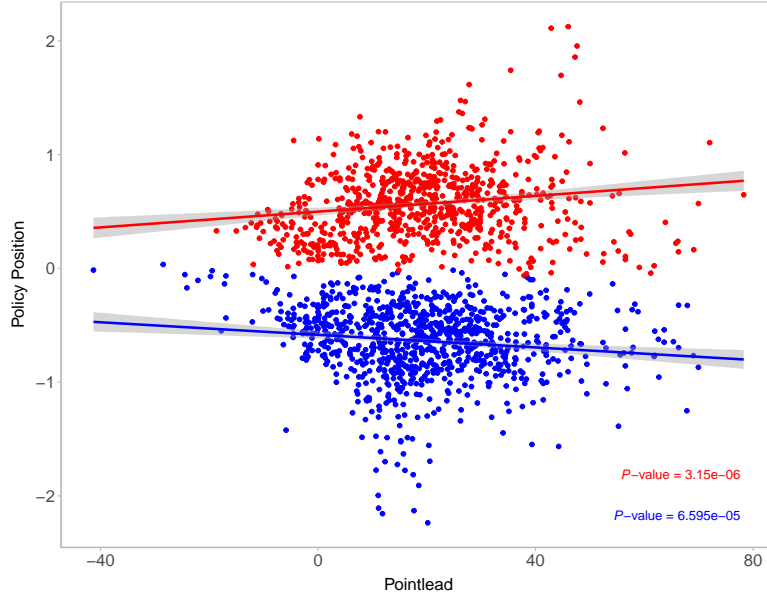


Figure 2: Senators' Policy Positions and Advantage in the Polls.

Note: the figure plots the observed policy position and advantage in the polls for each senator and time period in the sample, and best linear fit by party. Red indicates Republicans, blue denotes Democrats.

Advertising. Advertising data allows us to measure the *quantity* of TV ad buys directed to voters in each period, $\mathbf{tv}\text{-ads}$. To construct this measure, we first compute the monthly TV ad spending for each incumbent senator by adding the costs of all ads aired during each month on her behalf. We then measure the number of impressions, or gross rating points (GRPs), dividing TV ad expenditures by prices.⁹ We also use challengers' TV ad buys, sponsored by the challenger and third parties on her

⁹ We use SQUAD data on ad prices for the third quarter of each election year during the period 2002-2010, from Martin and Peskowitz (2015). Prices are weighted by the fraction of the population in each congressional district residing in a given

behalf.¹⁰

The left panel of Figure 3 plots the cumulative proportion of TV ad expenditures disbursed up to each month before the election. As the figure shows, senators tend to concentrate TV ad expenditures in the last 6 months before the election. The right panel of Figure 3 shows that senators tend to spend more in TV ads as elections become more competitive (no causal emphasis intended).

Additional Variables. We incorporate various senator and race-specific characteristics, including party, gender, seniority, committee service, leadership positions, and state-level presidential vote share. We also control for contested and uncontested primary elections for incumbents and challengers, demographic characteristics at the state level (median household income, education, % older population, % black population, % hispanic population), and economic indicators that vary both across states and within electoral cycles (unemployment, economic activity). To inform our measure of state ideology, we follow Canes-Wrone et al. (2002) and compute the average vote spread for the period 2000-2012 between the Republican and Democrat presidential candidates in each state. In Appendix D.7. (page 26) we assess the impact on our estimates of potential measurement error, which could be caused by high-frequency variation in prices, or price discrimination by TV stations.

¹⁰ In Appendix D.8. (page 28) we reproduce the analysis using total campaign expenditures. Using campaign expenditures has the benefit of including other electioneering activities, but fails to disentangle quantities from prices, and incorporates a significant fraction of indirect costs, which do not affect voters directly.

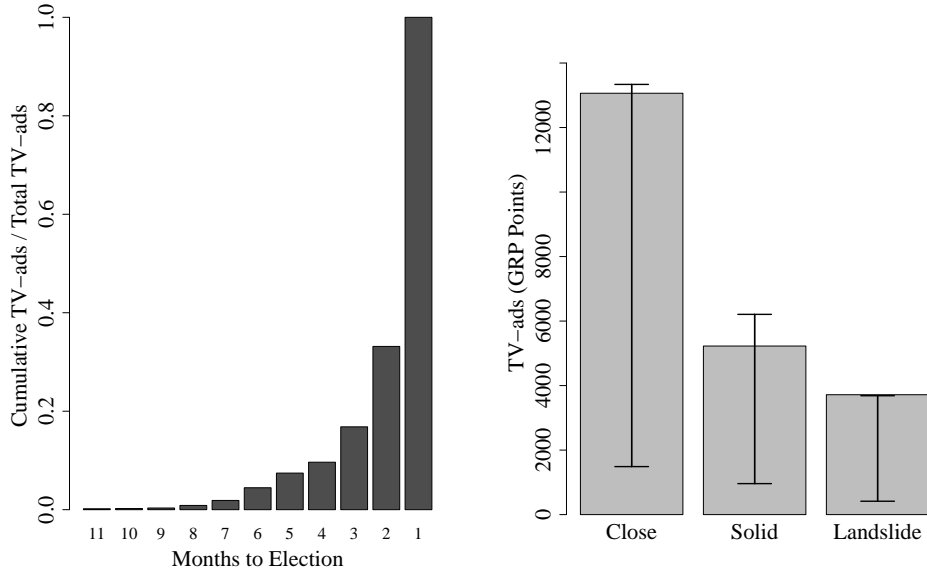


Figure 3: Average TV ad-buys by time to election and **pointlead**.

Note: Line segments represent the interquartile range of values in the data.

dential candidates in each state, `presrep.margin`, using data from Dave Leip’s *Atlas of U.S. Presidential Elections*. We refer the reader to Appendix A (page 2) for a description of these data, and descriptive statistics of all variables.

4 The Model

We consider the decision-making problem of an incumbent politician t months away from the election, $t = T, \dots, 1$. At the beginning of period t , the incumbent observes her advantage in the polls, $p_t \in \mathcal{P}$. After observing p_t , the incumbent decides (i) a policy position $x_t \in \Pi_x$ and (ii) the quantity of TV ads, $e_t \in \Pi_e$. Consistent with our estimation strategy, we let Π_x , Π_e and \mathcal{P} be finite sets. We let $y_t \equiv (x_t, e_t)$ denote the endogenous variables in period t , and $z_t \equiv (p_t, y_t)$.

Both position taking and TV ads affect next period polls. The incumbent’s advantage in the polls evolves stochastically, with conditional mean

$$E[p_{t-1}|z_t] = \pi_1 p_t + \pi_2 (x_t - \varepsilon)^2 + \pi_3 \sqrt{e_t} + C_t,$$

where ε denote voters’ preferred policy position, and C_t denotes senator and race-specific controls, including the challenger’s advertisement expenditures.

Deploying an amount e_t of TV ads in period t has an opportunity cost $C(e_t) = \gamma e_t^2$. Pandering to voters, in turn, is costly to the politician who cares about ideology. In particular, we assume that when the politician takes a position x_t in period t she gets a flow payoff $u(x_t, \theta) = -\lambda(x_t - \theta)^2$, where $\theta \in \mathbb{R}$ is the politician’s ideal point and λ is the importance of ideology vis-à-vis office. As is customary in the literature, to capture other factors that affect the decision of the politician but are unobserved by the researcher, we assume that a choice $y^j \equiv (x^j, e^j)$ also generates flow payoffs μ^j , where μ^j is known to the politician, but from the perspective of the researcher is an i.i.d. random variable with pdf $g(\cdot)$.

Voter support at election time, $t = 0$, determines the result of the election. We assume that the politician gets an office payoff $\omega \geq 0$ if she wins the election, and an additional benefit $\alpha \geq 0$ from a large margin of victory; i.e., $p_0 > \bar{p}$ for $\bar{p} \in [1/2, 1]$.¹¹ ¹² The payoff of losing the election is normalized to zero. Note that since the politician’s

¹¹ Our baseline specification nests the model with $\alpha = 0$. As we show in Section 6, the constrained model is rejected by the data for a large majority of senators in the sample. In Appendix D.2. (page 17) we present the estimates for the constrained model.

¹² In our main specification, we define a safe win as a margin of victory of at

beliefs are stochastically increasing in current polls p_t , this specification induces a continuous increasing continuation value. The Bellman equation for the incumbent is

$$W_t(p_t, \mu_t) = \max_{y_t} \{ \lambda(x_t - \theta)^2 - \gamma(e_t)^2 + E[\bar{W}_{t-1}(p_{t-1}) \mid z_t] + \mu(y_t) \}, \quad (4.1)$$

where $\bar{W}_t(p_t) \equiv E_\mu[W_t(p_t, \mu_t)]$, and

$$E[\bar{W}_0(p_0) \mid z_1] \equiv \Pr(1/2 < p_0 < \bar{p} \mid z_1)\omega + \Pr(p_0 > \bar{p} \mid z_1)(\omega + \alpha).$$

The solution to the politician's problem is a policy function $\{\chi_{T-r}^*(\cdot)\}_{r=0}^{T-1}$, where in each t , $\chi_t^*(p_t, \mu_t)$ solves (4.1) in state (p_t, μ_t) .

Identification: From Data to Model Parameters. Equation (4.1) makes clear the dynamic tradeoff of the politician in our model. At each t , the politician balances the additional cost of ads and position-taking with their marginal return in terms of increasing the probability of being in a more favorable state next period, and ultimately winning the election. Since senators with different preference parameters will resolve these tradeoffs differently, leading to different choices in each state, observing senators' choices over the electoral cycle allows us to recover these preference parameters. We illustrate this variation in Figure 4, for a liberal politician ($\theta = -0.6$) facing a relatively moderate electorate (with a poll-maximizing position at $\xi = -0.36$). In

at least 15 p.p.. For robustness, we recompute our estimates with alternative thresholds (Appendix D.3., page 19). We show that our parameter estimates and policy functions are qualitatively unchanged (see Figures D7 and D8).

the figure, we plot the predicted position-taking and TV-ad buys as a function of the advantage in the polls, $t = 1, \dots, 5$ periods before the election.

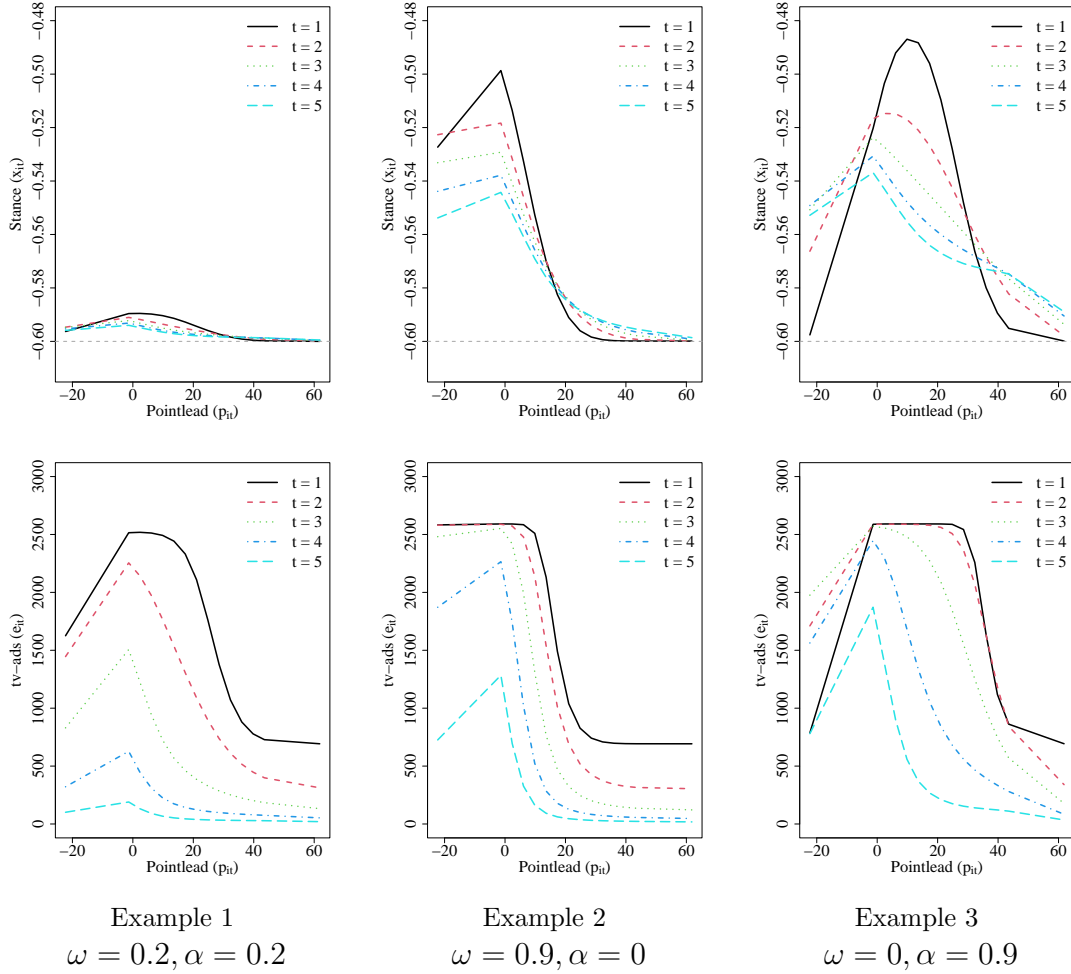


Figure 4: Optimal Position-Taking and TV-ad buys

Note: the figure plots the optimal position-taking (upper panel) and TV ad-buys (lower panel) of a hypothetical senator with ideal point $\theta = -0.6$ and poll-maximizing position at $\xi = -0.36$, as a function of her advantage in the polls and time to election. Results for alternative values of the career concern parameters are depicted in each column.

In the example illustrated in the left panel, we set $\omega = \alpha = 0.2$. Given the low willingness to compromise her policy position for electoral gains, the politician optimally maintains a policy position close to her ideal point regardless of her advantage in the

polls, with the brunt of her reelection effort falling on TV ads. In the center panel, we fix $\omega = 0.9$, $\alpha = 0$. In this case, the politician is much more willing to concede policy to attain reelection, but gives no value to safe wins. As a result, the politician holds a policy position close to her ideal point when she enjoys a large advantage in the polls, but significantly moderates her policy position towards the voters' preferred policy and increases TV ad expenditures as the election gets more competitive. In the right-hand panel, we consider the case where the politician gives a large value to office vis-à-vis policy, but puts significant value only on winning by a large margin ($\omega = 0, \alpha = 0.9$). In this example, the politician is responsive to voters even in safe races. Because the senator cares about winning by a large margin more than simply winning reelection, the degree of responsiveness towards the voters is not monotonic in electoral support.

The figure illustrates that larger changes in position-taking towards the voter and increased advertising expenditures in “safe” electoral states relative to “competitive” electoral states are consistent with lower values of ω/α , as in the left and right-hand panels. Similarly, larger changes in position-taking towards the voter and increased advertising expenditures in “competitive” electoral states relative to “safe” electoral states are consistent with larger values of ω/α , as in the center panel. Moreover, for any total level of effort, senators who care more about policy will tend to substitute policy responsiveness with political advertising. Thus, the relative responsiveness of policy and ads in competitive and safe electoral conditions pins down the relative weight of policy vs reelection concerns, ω/λ . The cost parameter γ/λ then rationalizes the overall level of ad expenditures.

Given ω, α, γ , we can compute the pattern of responsiveness to voters in each electoral condition. We then obtain the ideal policy θ as the policy chosen by the senator

in electoral states in which she is not responsive to voters. In the next section, we describe more formally how this basic intuition translates into our estimation strategy.

5 Estimation

We are interested in estimating the structural parameters of the model presented in Section 4: ideal points, relative weights of ideology vis-à-vis office rents, and cost parameters. Let $\rho_i \equiv \{\theta_i, \lambda_i, \omega_i, \alpha_i, \gamma_i\}$ denote these individual-specific parameters, with $\rho \equiv \{\rho_i\}_{i=1}^N$, and let ψ denote the parameters of the transition function, governing the evolution of the state as a function of current state and endogenous variables, $z_{i,t} \equiv (y_{i,t}, p_{i,t})$. Given panel data $\{z_{i,t}\}$ for senators $i = 1, \dots, N$, the likelihood of choices $y_{i,t}$ by senator i in period t can be written as the product of the transition probability $\Pr(p_{i,t}|z_{i,t+1}; \psi)$ and the conditional choice probability $\Pr(y_{i,t}|p_{i,t}; \rho_i, \psi)$:

$$L(\rho, \psi) = \prod_{i=1}^N \prod_{t=1}^T \Pr(y_{i,t}|p_{i,t}; \rho_i, \psi) \times \Pr(p_{i,t}|z_{i,t+1}; \psi), \quad (5.1)$$

Since the transition function of polls does not depend on either individual-specific parameters (ρ) or individual unobservable state variables μ_t^j , a consistent estimate of the transition function can be obtained by estimating it separately. Because this significantly reduces the computational burden, we estimate the parameters of the model in two steps. In the first step, we estimate the transition parameters ψ , pooling information across senators.¹³ In the second step, we estimate the individual-

¹³ Given estimates of ψ , we specify the transition function using a discretized normal distribution, letting $p_{i,t}$ take values in a finite set (see Tauchen (1986)).

specific parameters ρ given the estimated transition probabilities, using a version of the nested fixed point algorithm (NFXP) originally developed by Rust (1994) (see also Aguirregabiria and Mira (2010)).¹⁴

The challenge in estimating ρ directly from the likelihood in (5.1) is that the conditional choice probability $Pr(y_{i,t}|p_{i,t}; \rho_i, \psi)$ is not a known function of ρ_i . Instead, it is given by the optimal response of the politician with characteristics ρ_i in each state $(p_{i,t}, \mu_{i,t})$. To tackle this problem, the NFXP algorithm iterates along two steps. In an inner loop, we obtain the conditional choice probability $Pr(y_{i,t}|p_{i,t}; \rho_i, \psi)$ for each given trial parameter ρ_i , by solving the dynamic problem of the senator with preferences ρ_i . In the outer loop, we search over the parameter space to maximize the likelihood, with the conditional choice probabilities associated with each trial parameter given by the inner loop.¹⁵

¹⁴ Alternatively, one could use the approach of Hotz and Miller (1993) and Bajari, Benkard and Levin (2007), in which structural parameters are recovered from conditional choice probabilities (CCPs) without explicitly solving the optimization problem for each trial value of the parameters. In the absence of rich data, however, direct estimation of CCPs would require that we impose parametric assumptions to “pool” legislator data. This would impose arbitrary constraints on the mapping between structural parameters and equilibrium choices, which would carry over to structural parameter estimates, potentially introducing bias.

¹⁵ To implement this approach, we discretize the state and choice variables. We use a grid of 15 categories for our measure of polls (`pointlead`), 30 categories for our measure of policy position (`position`), and three categories for our measure of TV advertisement (`tv-ads`). We find that this binning captures the main features of the

To relate senator’s preference parameters to relevant observable attributes, while still allowing heterogeneity *conditional* on covariates, we model structural parameters as latent random variables drawn from distributions with parameters that are functions of senator characteristics. This allows the preference estimates to be informed by both their effect on conditional choice probabilities and observable characteristics (see Appendix B.1., page 4, for more details).

To estimate the parameters of the transition function, we estimate the linear model

$$\begin{aligned}
 p_{i,t-1} = & \pi_0 + \pi_1 p_{i,t} + \pi_2 (x_{i,t} - \varepsilon_i)^2 \\
 & + \pi_3 \sqrt{e_{i,t}} + \pi_4 \sqrt{e_{i,t}^{ch}} + Q'_{it} \beta + \zeta_c + \epsilon_{i,t}.
 \end{aligned}
 \tag{5.2}$$

Here $\psi = \{\pi, \beta, \phi, \zeta_c\}$ is the vector of first-stage parameters of interest, Q_{it} is a vector of senator and state specific characteristics that include senator characteristics and state socio-economic indicators, and ζ_c are party-Congress fixed effects, which capture all session-specific shocks to polls for each party. The specification in equation (5.2) allows the effect of **position** (x_{it}) on voter support to differ based on the incumbent’s state electoral preferences through the term $\varepsilon_i \equiv a + b \times (\text{presrep.margin})$, where a and b are coefficients to be estimated.¹⁶ In addition, it directly allows for decreasing data well. For details, see Appendix B.2. (page 6).

¹⁶ In eq. (5.2), we assume that the senators’ policy positions affect voter support through deviations from mean voter preference, as measured by the republican presidential margin in each state. This is of course a simplified model, that might not fully capture the richness of the electoral environment. In Appendix D.5. (page 21) we show that our conclusions are robust when using the survey-based estimates of the mean and standard deviation of state ideology obtained by Tausanovitch and

returns to `tv-ads` via the squared root transformation.¹⁷ The individual-specific covariates capture the effect of race characteristics on voter support, both fixed and time-variant within cycle. We cluster errors at the senator-congress level to account for heteroskedasticity and serial correlation at the electoral race level.

Differently than in a static model with observations at the electoral cycle level, equation (5.2) relies on within-cycle variation. The panel structure of the data allows us to control for the effect of potential time-varying confounders by controlling for past polls via a lagged dependent variable (LDV). We find similar estimated parameters when we estimate a version of equation 5.2 that also accounts for potential unobserved heterogeneity via “grouped fixed-effects” (Bonhomme and Manresa (2015)). This estimator controls for time-varying fixed effects within groups of senators, $\zeta_{g_i,t}$, where group membership, $g \in \{1, \dots, G\}$, is estimated from all possible clusters of legislators in the data based on an optimal grouping of legislators according to a least-squares criterion. Unlike legislator-specific fixed-effects, the “group-fixed effects” estimator is consistent in the presence of a lagged dependent variable (Nickell (1981)). In addition, it is more flexible, as it allows for changes over time in group heterogeneity. Table C2 in the Appendix shows the estimates for the “grouped fixed-effects” specification for $G \in \{1, 5, 10, 15, 20, 25\}$. As a robustness check, we re-estimate the model using

Warshaw (2013).

¹⁷ In Table C3 in the Appendix (page 11), we consider alternative specifications that yield similar estimated transitions: we directly allow for nonlinear effects of `position` and its interaction with `presrep.margin`, as well as with `tv-ads`. We also consider a log transformation to capture the nonlinear effect of `tv-ads`.

an IV strategy to estimate the transition function. With the IV, we find a larger effect of changes in policy position on voter support. Our career concerns and ideal policy estimates, however, are largely unchanged (see Appendix D.4., page 19, for more details).

We estimate equation (5.2) on a balanced panel dataset. To do this, we impute missing `pointlead` observations via the EM algorithm, which is a commonly applied method to efficiently analyze unbalanced panels. The estimates of the first-stage with an unbalanced panel are almost identical to our main specification. This result, along with diagnostics for the multiple imputations, indicate that the bias induced by the presence of missing `pointlead` observations is negligible.¹⁸

Model Fit. To assess model fit, we compare the predictions of the model relative to the data, in and out of sample. To evaluate out of sample fit, we exploit the fact that our data contains multiple instances in which senators run two or even three times for office. We re-estimate the model parameters using only the first instance in which a senator runs for office in the sample, and use the resulting estimates to predict their behavior in the second or third run. The results indicate that the model provides a good approximation to the data, both in and out of sample (see Figure C5 in the Appendix, page 12).

¹⁸ Results available upon request.

6 Results

In this section, we present our main results. We begin by describing our estimates of senators’ *preferences* for office and policy; i.e., the policy concession senators would be *willing to give* to attain a gain in the probability of being reelected. To facilitate intuition, suppose that we maintain a fixed policy position x in the final T periods before reelection. Letting π and π^+ denote the probability of a close and a lopsided win respectively, we can write senator i ’s payoff (ignoring TV advertisement costs) as

$$U_i = -\lambda_i T(x - \theta_i)^2 + \omega_i \pi + (\omega_i + \alpha_i) \pi^+. \quad (6.1)$$

Expression (6.1) makes clear that the relevant parameters determining how each politician trades-off policy concessions for electoral gains are ω_i/λ_i and α_i/λ_i . Figure 8 presents our estimates of $(\omega_i + \alpha_i)/\lambda_i$ for each senator in our sample, along with bootstrap confidence intervals. As the figure shows, there is a large degree of heterogeneity in preferences for office vs. policy among US senators. Senators at the bottom of the figure (e.g., Sessions, Grassley, Collins, Specter, Gregg, or Voinovich) give a large value to ideological congruence, and are not willing to make large policy concessions for electoral gains. On the other hand, senators at the top of the figure (e.g., Roberts, Boxer, Reed, Hatch, Leahy) are – according to our estimates – largely willing to make policy concessions to achieve electoral gains. Figure C1 in page 7 of the Appendix presents the estimates of ω_i/λ_i (in logs), which is relevant to evaluate the “willingness to pay” for close wins.

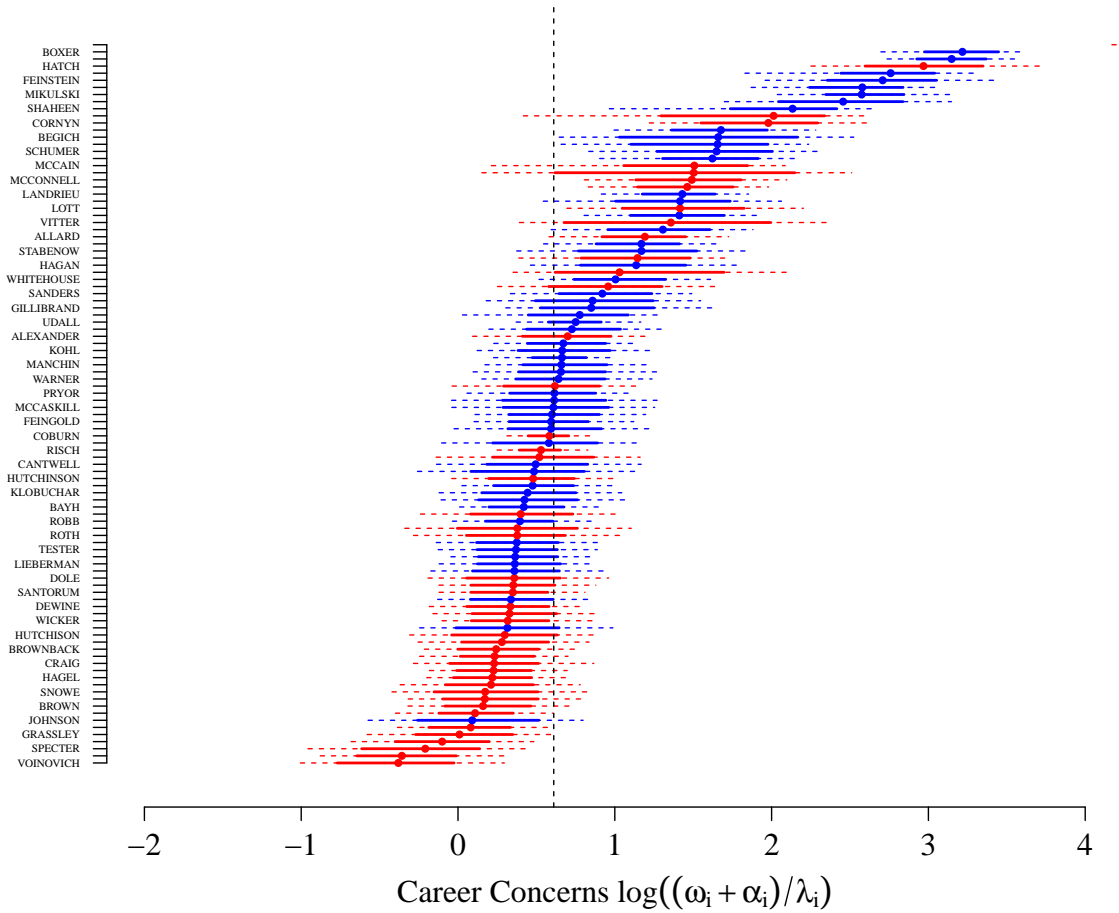


Figure 5: Career Concern Estimates, by Senator

Note: the figure depicts estimates of $\log(\omega_i + \alpha_i)/\lambda_i$ for each senator in the sample. Solid (dashed) lines represent 80% (90%) bootstrap confidence intervals. Labels on Y axis display a subset of Senators' last names.

To provide a more readily interpretable magnitude of senators' preferences for office vs policy, we compute the change in policy each senator would be willing to concede for a 1 p.p. increase in the probability of a safe or a close win. We refer to this quantities as the *compensating variation* for safe and close wins, CV_i^{safe} and CV_i^{close} respectively. From (6.1), if we consider the change from an initial policy position

$$x^0 = \theta_i,$$

$$CV_i^{safe} \equiv \left(\frac{1}{|\theta_{med}^D - \theta_{med}^R|} \right) \sqrt{\left(\frac{\omega_i + \alpha_i}{\lambda_i} \right) \frac{1}{T} \Delta\pi}, \quad (6.2)$$

where we have normalized the policy concession by the distance between party medians $|\theta_{med}^D - \theta_{med}^R|$, since the underlying space of policies is only identified up to an affine transformation. Similarly, CV_i^{close} is obtained using ω_i/λ_i . Figure 6 plots the empirical distribution of our point estimates of the compensating variation for safe and close wins, fixing $T = 6$.

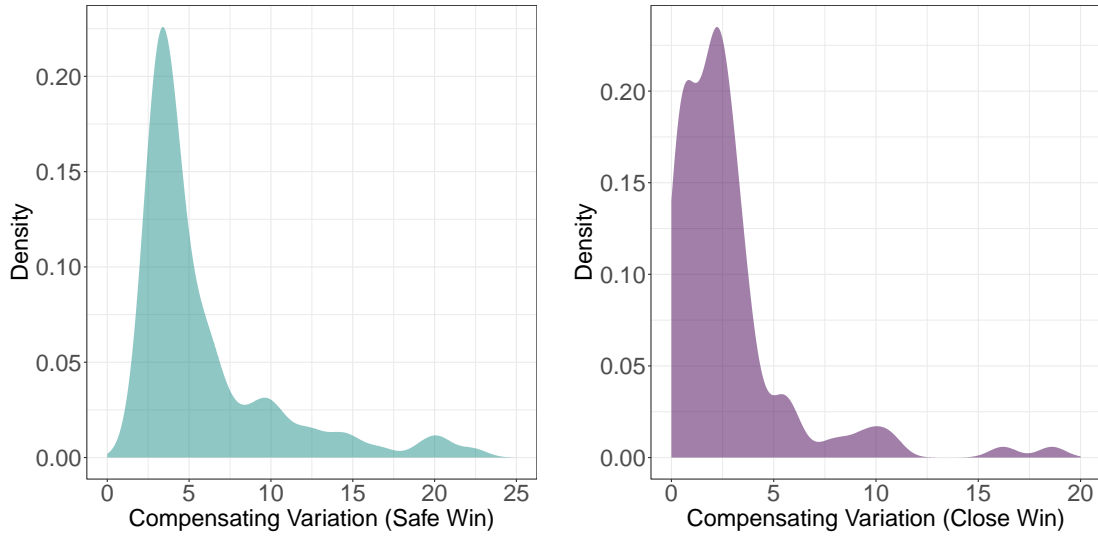


Figure 6: Compensating Variation

Note: the figure shows the policy sacrifice senators are willing to make in each of the last six months before the election for a 1 p.p. increase in the probability of a safe and a close win, as a proportion of the distance between party medians. Figure plots the distribution of estimates across senators.

We find that a majority of senators are willing to give up substantial policy concessions for an increase in their electoral prospects. In particular, the senator at the median of the distribution is willing to give up a policy concession of 2.1% of the distance between party medians for a 1% increase in the probability of a close win, and of 4.5% of the distance between party medians for a 1% increase in the probability of a

safe win.¹⁹ The difference in the two figures reflects our estimate of a non-negligible payoff for lopsided wins for a large fraction of senators in our sample. Indeed, the probability that $\alpha_i \geq 0.1$ is above 95% for 78% of the senators in our sample.²⁰

Efficacy of Advertising and Position-Taking. In our previous results, we discussed the policy concession senators would be willing to give to attain a gain in the probability of being reelected. In determining when to compromise in policy, or to what extent, however, senators must judge the effectiveness of the instruments at their disposal: how much would a TV ad or policy concession *actually* increase voter support. In this section, we describe our estimates of the effectiveness of ads and position-taking to change voter support.

Table 6 presents the key estimates (Table C1 in page 10 of the Appendix presents the full set of estimates). Column (1) presents the OLS estimates for a specification without lagged polls, senator and state-specific factors. Column (2) adds the effect of past polls. Column (3) – our main specification – adds senator-state controls and fixed effects for each party in each electoral cycle. Column (4) reproduces (3) with “grouped fixed-effects”. Column (5) maintains the specification in column (3), with our alternative measure of position-taking (partyvote).

¹⁹ For an alternative reference, 2.1% of the distance between party medians corresponds to about 5% of the average policy distance between politicians’ ideal points and the vote maximizing position in their state.

²⁰ Due to space considerations, we relegate the discussion of our ideal point estimates to Appendix C.1.1., page 8.

	<i>Dependent variable: $p_{i,t-1}$</i>				
	OLS	LDV	LDV	GFE	LDV(partyvote)
	(1)	(2)	(3)	(4)	(5)
$p_{i,t}$		0.818** (0.022)	0.764** (0.024)	0.759** (0.029)	0.763** (0.026)
$(x_{i,t} - \xi)^2$	-6.369** (2.299)	-1.491** (0.493)	-2.133** (0.812)	-2.250** (0.519)	
$(x_{i,t}^p - \xi)^2$					-8.086** (2.688)
$\sqrt{e_{i,t}}$	0.028 (0.017)	0.018** (0.007)	0.021** (0.007)	0.014* (0.006)	0.024** (0.008)
$\sqrt{e_{i,t}^{chall}}$	-0.137** (0.022)	-0.047** (0.009)	-0.049** (0.010)	-0.051** (0.007)	-0.046** (0.010)
Observations	1,584	1,584	1,584	1,584	1,347
Senator-State Controls	No	No	Yes	No	Yes
Congress-Party FE	No	No	Yes	Yes	Yes
Group FE	No	No	No	Yes (20)	No
Adjusted R ²	0.128	0.676	0.683	0.834	0.689
F Statistic	78.629**	827.425**	110.940**	32.015**	97.376**

Table 1: First Stage Results (Compact)

Note: †p<0.1; *p<0.05; **p<0.01. Robust standard errors clustered at the senator-congress level in parentheses.

We find that policy moderation towards the voters shifts the distribution of voter support, inducing different incentives for senators running for reelection in moderate, conservative and liberal states. The effect of position-taking on voter support can be seen in Figure 7. In this figure, we group states as liberal and conservative according to the distribution of state ideology, with liberal (conservative) states below (above) the median of `presrep.margin`. We then plot the immediate estimated change in `pointlead` in each state given a change in the senator's `position` from the 25th to the 75th percentile of observed policy positions in the group of liberal and conservative states.

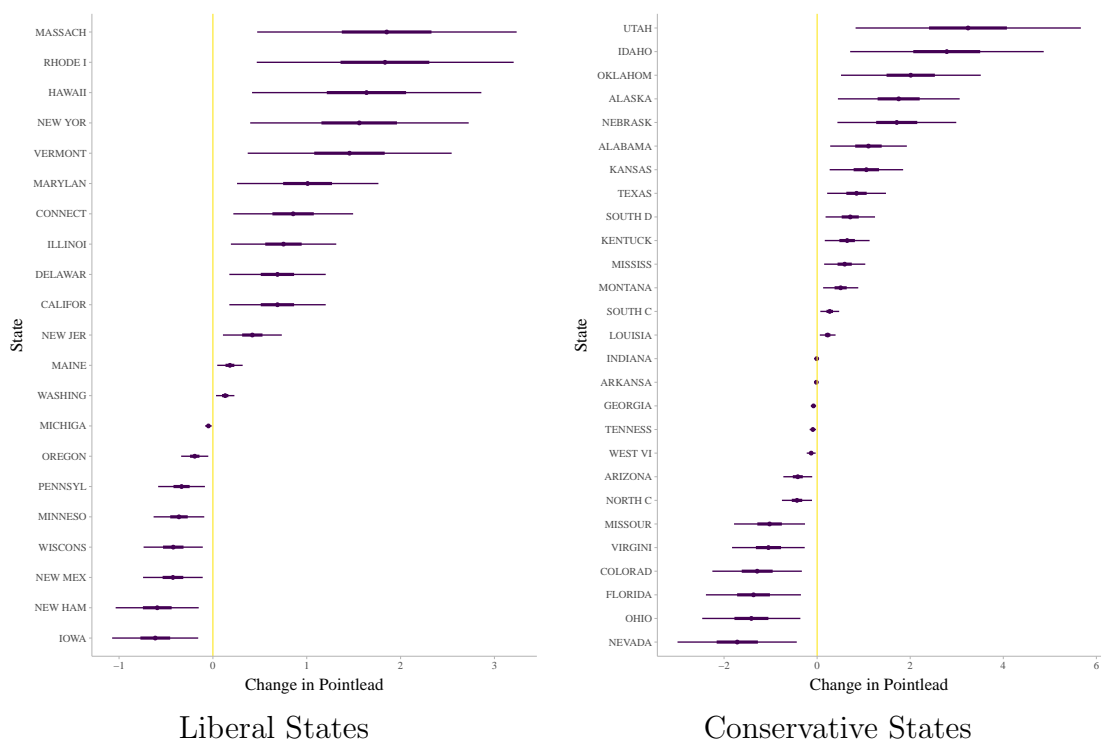


Figure 7: Effect of Position Taking on Voter Support.

Note: the figure plots the change in `pointlead` given a change in `position` from its 25th to its 75th percentile in the group of liberal (left panel) and conservative states (right panel). Thick (thin) lines represent 80% and 90% confidence intervals.

There are two key takeaways from the figure. First, extreme policy positions do not muster electoral support in all states. Indeed, taking extreme policy positions increases voter support in the most liberal or conservative states (Massachusetts, Rhode Island, Hawaii, New York; Utah, Idaho, Oklahoma, Alaska), but reduces voter support in more moderate states (Iowa, New Hampshire, New Mexico; Nevada, Ohio, Florida, Colorado). These results differ somewhat from the findings of the literature (see Canes-Wrone et al. (2002) and references therein), where the general finding is that incumbents are penalized for ideological extremity.²¹ Second, the effect of

²¹ This difference is due, in part, to the fact that in contrast to our model, specifications in extant work do not allow the effect of position-taking on voter support to

changes in policy positions on voter support is moderate in magnitude. A change in **position** from the 25th to the 75th percentile of observed policy positions in each group leads to an increase of under 2 p.p. in the most liberal states, and under 4 p.p. in the most conservative states.

Political advertising also shifts the distribution of voter support, for both incumbent and challenger. For instance, increasing incumbent's TV ads by 1,000 GRPs (or 200 ads in 5% rating shows) eight months before the election has an immediate impact of increasing next period **pointlead** by around 1.1 p.p. at the average ad buy. An increase of 1,000 GRP's in the challenger's TV ads decreases the incumbent's next period **pointlead** by around 2.9 p.p.²² The long run effect of ads persists up to election day, but is considerably smaller, since past advantages in the polls depreciate by about 25 percent per month (see Table 1).²³ The partial erosion of previous gains vary with the partisan leaning of each state.

²² Our short-run estimates are in line with comparable estimates. In House races, Stratmann (2009) finds that increasing incumbent's (challenger's) advertising by 1000 GRP's increases her pointlead by 2.4 p.p. (4.2 p.p.). For Presidential elections, Huber and Arceneaux (2007) estimate a comparable effect of 0.5 p.p. - 0.8 p.p. and Spenkuch and Toniatti (2018) find a comparable effect of 0.7 p.p., while Gordon and Hartmann (2013) estimate a larger effect, of about 3 p.p. for Republicans, and 3.4 p.p. for Democrats.

²³ In a field experiment on the 2006 Gubernatorial campaign in Texas, Gerber et al. (2011) find a large (5 p.p.) short run effect of ads on vote shares, but a pronounced decay, with advertisement effects vanishing after a couple of weeks.

induces a larger response in both ads and policy moderation as the election gets closer, as shown in Figure 4, and contributes to explain the “bunching” of ads in months closer to the election we observe in the data (see Figure 3).

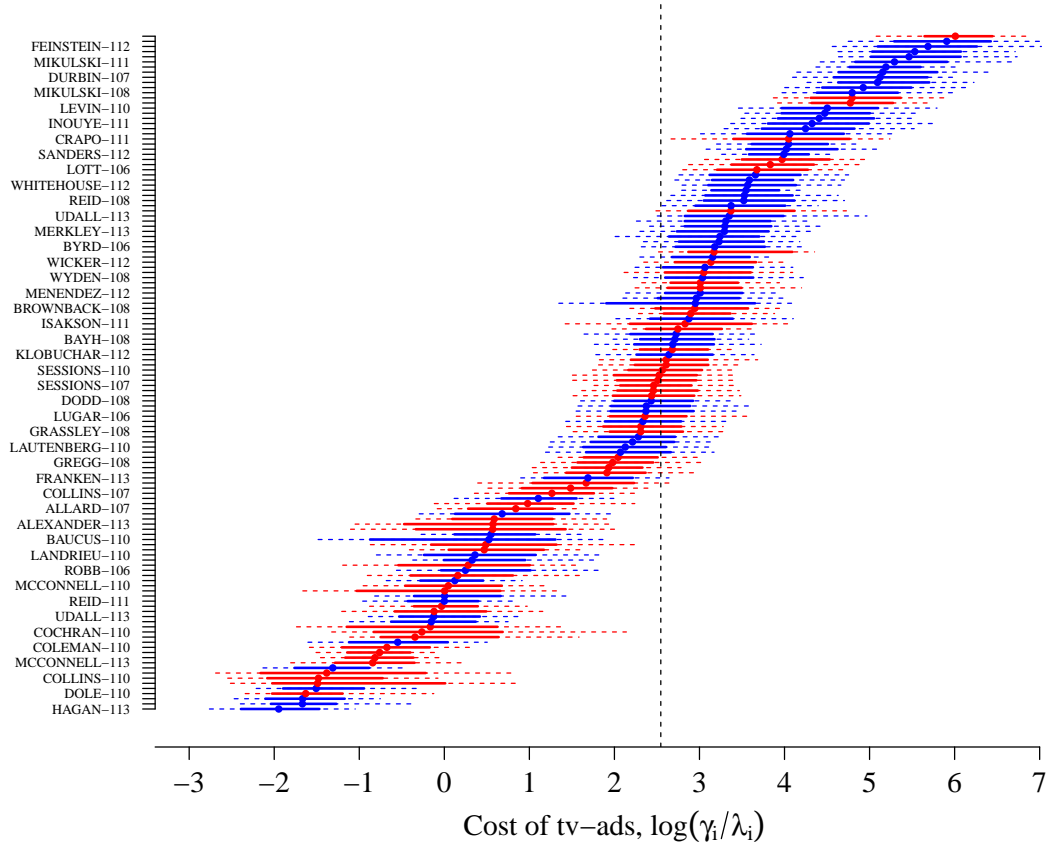


Figure 8: Implied Cost of TV ads, by Senator/Electoral Cycle

Note: the figure plots the estimates of the implied TV ad cost parameter γ by Senator/Electoral Cycle. Solid (dashed) lines represent 80% (90%) bootstrap confidence intervals. Y axis displays a subset of Senator/Electoral Cycle labels.

While the effect of ads on voter support is assumed to be equal across candidates, we allow cost parameters γ_i to vary at the individual level. This allow us to capture

persistent unobserved heterogeneity across senators, which may arise due to differences in the cost of advertising across media markets, or senators' fundraising ability. Indeed, as Figure 8 shows, our estimates imply a significant heterogeneity in costs, which contributes to explain the large differences in the level of advertising across senate races we observe in the data.

Electoral Accountability. We now turn to politicians' behavior in office, to address electoral accountability. To what extent do senators adjust their position away from their ideal points and towards the electorate they represent? How does this vary with their perceived electoral advantage? Answering these questions requires that we combine our estimates of senators' preferences for office and policy with the effectiveness of the instruments at their disposal. This is done through the policy function $\chi_t^{i*}(\cdot)$ estimated for each senator i , where in each t , $\chi_t^{i*}(p_t, \mu_t)$ gives the optimal response of senator i in state (p_t, μ_t) , given preferences ρ_i , and given the transition function parameter estimates ψ .

To summarize aggregate patterns of electoral accountability we compute an aggregate policy function. To do this, we construct an *electoral accountability index*, EAI_{it} , defined by the relative weight of voters' preferences in i 's optimal policy position at time t and poll advantage p , as given by i 's policy function,

$$\text{EAI}_{it} \equiv \frac{\chi_t^{i*}(p_t, \mu_t) - \theta_i}{(\xi_i - \theta_i)} \times 100, \quad (6.3)$$

where ξ_i denotes the policy position that maximizes i 's electoral support. An electoral accountability of 100 in state (p_t, t) means that the senator's predicted position is the one that maximizes voter support, $\chi_t^{i*}(p_t, \mu_t) = \xi_i$, while $\text{EAI} = 0$ means that

the senator is predicted to take a policy position equal to his preferred ideal policy $\chi_t^{i*}(p_t, \mu_t) = \theta_i$. We then compute the average EAI across individual senators, as a function of their advantage in the polls. In the left panel of Figure 9 we plot the mean EAI across senators, as well as for each quartile of the career concern distribution, as ranked by λ .

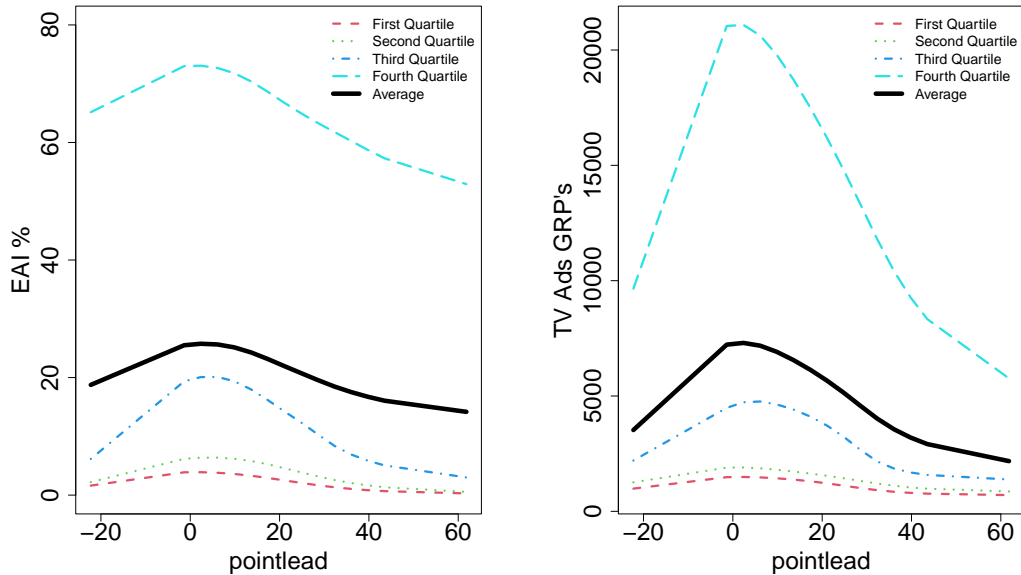


Figure 9: Electoral Accountability Index and TV advertising

Note: the left panel plots the Electoral Accountability Index as a function of senators' electoral advantage, by quartiles of the distribution of λ . The right panel plots optimal TV advertising as a function of senators' electoral advantage by quartile of the distribution of λ/γ .

There are three key takeaways from the figure. First, our results shed light on the mixed support in the literature for the *marginality* hypothesis, which asserts that legislators will tend to be more responsive to voters when their seat is in danger (see Bartels (1991), Ansolabehere, Snyder Jr and Stewart III (2001), Griffin (2006), Mian et al. (2010)). While individual senators *can* be equally or even more responsive when elections are not close, *on average* senators are more responsive to constituency

interests in competitive elections than when they anticipate they will win by a large margin. Second, even at its maximum level (in close elections), the average electoral accountability index is below 30%, and goes down to about 14% for a large electoral advantage. Thus, even at its peak, on average politicians' policy preferences have a much larger weight than constituency preferences in determining senators' policy positions. However (and third), there is a substantial amount of heterogeneity in politicians' responses to their voters. Senators in the top quartile of career concerns have an electoral accountability index close to 74% in close elections. On the other extreme, senators in the bottom quartile never exceed 5%. As a result, their policy positions are almost exclusively determined by their own policy preferences.

The right panel of Figure 9 shows a similar exercise with spending in TV ads. We find that average predicted TV ad-spending also follows a pattern consistent with the "marginality hypothesis": the average TV-ad buy is about 2200 GRPs for large leads (440 ads in 5% rating shows), but increases to about 7250 GRP's per month (1450 ads in 5% rating shows) in close elections. This change is much more pronounced for senators with high career concerns, who go from an average of less than 6000 GRPs when enjoying large leads, to about 21000 GRPs in close elections.

A natural question is how does electoral accountability vary with observable characteristics of the senators. In Figure 10, we explore variation related to senators' gender, party, and ideology. The left panel presents our electoral accountability index for male and female senators in our sample. We find that female senators are on average more responsive to voters than their male counterparts. The middle panel distinguishes between Republican and Democratic senators. Consistent with the individual preference estimates we presented in Figure 8, Democrats are on average more responsive to voters, for all levels of electoral advantage.

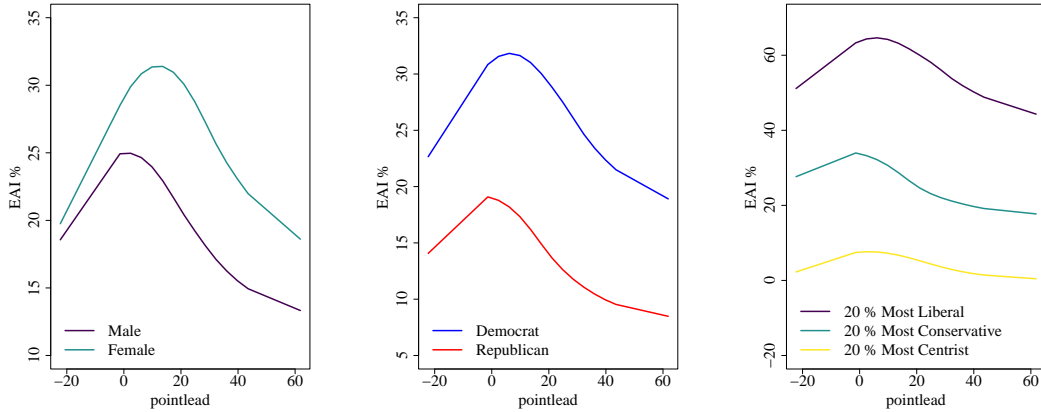


Figure 10: Electoral Accountability and Senators' Characteristics

Note: the figure plots the average Electoral Accountability Index conditional on senators' gender, party, and ideological position (20% most liberal, conservative and centrist senators by θ estimates).

In the right panel of Figure 10, we compute the average EAI for the 20% most liberal, conservative, and centrist senators in our sample. We find that ideologically extreme senators –both liberal and conservative – are more responsive to voters than moderates. The reason for this is that ideologically extreme senators have a larger electoral gain from moderating. This is clear from Figure 11, which shows that the distribution of the poll-maximizing positions in each state is concentrated in a smaller and more centrist range than that of senators' ideal policies.

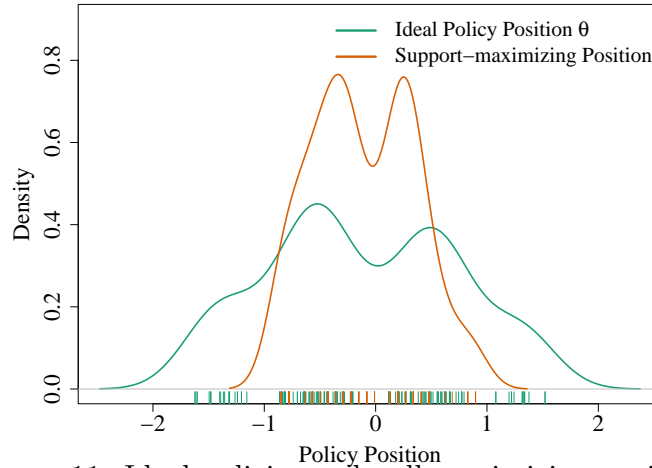


Figure 11: Ideal policies and poll-maximizing positions

Note: Distribution of senators' ideal point estimates and poll-maximizing position in each state.

Effectiveness of Policy Moderation and Accountability. As we have shown, the moderate levels of electoral accountability observed in the data can be explained by a combination of preferences, electoral return of ads and position-taking, and electoral conditions. In this section, we perform a counterfactual exercise to further clarify the extent to which the low returns of policy moderation hinder electoral accountability. To do this, we recompute senators' optimal choices (given the estimated preference parameters) doubling and quadrupling the effectiveness of position-taking from that estimated from the data.

Figure 12 shows the average electoral accountability index in the data and in the counterfactuals, for each quartile of the distribution of career concerns. Doubling the return of policy moderation increases the average EAI from 26% to 32% in close elections, and from 22% to 29% when the incumbent has an advantage of 20% in the polls. Quadrupling the electoral return of policy moderation, in turn, increases the average EAI to about 41% in close elections, and to more than 36% when the

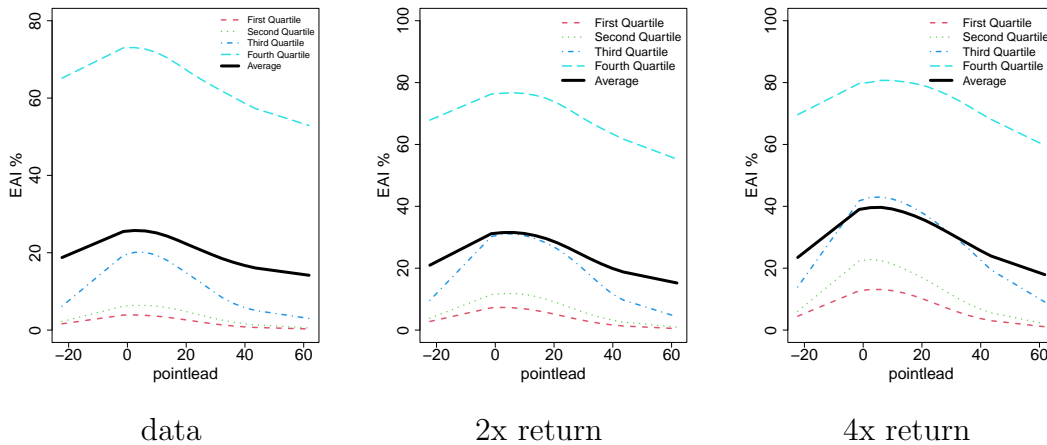


Figure 12: Counterfactual increase of the electoral return to policy moderation

Note: the figures plot the counterfactual Electoral Accountability Index given an increase (2x, 4x) of the electoral returns to policy moderation, by quartiles of the distribution of λ .

incumbent has an advantage of 20% in the polls. This is a substantial concession to voters, which represents a 57 p.p. in electoral accountability with respect to the baseline level of position-taking effectiveness, but is far from perfect accountability. This indicates that the weight most senators give to their own ideology is considerable, and emphasizes the importance of adverse selection on voter welfare.

7 Conclusion

One of the most basic and widely accepted assumptions in the study of electoral politics is that legislators have both policy and office motivations. In this paper, we show that the within-cycle dynamics of position-taking and advertising can be used to quantify how individual legislators value electoral gains relative to policy concessions, and how their preferences for office and policy feedback into their responsiveness to electoral incentives.

Our results illustrate the usefulness of disentangling politicians' preferences from the electoral conditions they face. The results reconcile the general perception that senators typically do give a large value to being reelected with the moderate levels of responsiveness observed on average. This is due to three factors. First, over a fourth of senators in our sample is heavily ideological, and would only be willing to deviate from their policy preferences in exchange for a large electoral gain. Second, the electoral return of policy moderation is low, both in absolute terms and relative to the electoral return of political advertising. Third, a number of senators generally face a significant advantage in the polls, making them less willing to respond to voters' preferences on average in the observed data. These results illustrate the pitfalls of conceiving of accountability as a constant. Responsiveness is best understood as a form of behavior that is contingent on attributes of the politician and the nature of the electoral landscape she faces.

In order to simplify the presentation of the problem and focus on the core issue of electoral accountability, throughout the paper we focused on the optimal dynamic behavior of the incumbent, fixing the challenger's spending at the levels we observe in the data. To assess the robustness of our estimates, in Appendix D.1. (page 13) we extend the model to endogeneize the behavior of the challenger in states that are not observed in the data, and estimate the parameters of the resulting dynamic game. We find that our estimates are essentially unchanged.

Endogeneizing the challenger's response allows us to compute a second counterfactual, which quantifies the extent to which advertising crowds-out electoral accountability. To do this, we quantify what policy choices senators would have made *in the absence* of advertising, and then compare electoral accountability in the counterfactual with the level of electoral accountability in the data. We find that banning advertisement

would increase electoral accountability in close elections by less than 10 p.p. for the average senator, and by about 20 p.p. for the senators in the top quartile of the distribution of office motivation. We conclude that while not being single-handedly responsible for breaking the electoral connection between politicians and voters, political advertising induces a substantial crowding-out effect of electoral accountability, in particular in close elections.

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