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. **Word Count: 9,863**

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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 electoral accountability is not assured, or universal, but varies across legislators depending on preferences and tradeoffs that are specific to each politician. In this paper, we estimate a model that decomposes the determinants of legislative behavior into two components: legislators’ preferences for office versus policy, and the effectiveness of position-taking and advertising on reelection prospects. We implement our approach in the US senate. We show that while over a fourth of senators in our sample are heavily ideological, a sizable number of senators are generally willing to make relatively large policy concessions to attain electoral gains. In spite of this, electoral accountability is only moderate on average, because voters are not highly responsive to position-taking.

Quantifying the value that senators give to reelection relative to policy gains is crucial to understanding electoral accountability, because politicians with different preferences for office and policy have different incentives to cater to voters’ interests. 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)). Moreover, since marginal expected electoral gains depend on the perceived competitiveness of the election, incumbents with dif-
ferent preferences for office and policy will have different degrees of responsiveness to voters in safe and competitive elections.

Our approach to estimation exploits variation in polls, position-taking and advertising expenditures throughout the electoral cycle. To do this, we model explicitly the dynamic problem of senators running for reelection, and estimate the model using data for 102 incumbent senators who ran for reelection at least once 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. Improving her standing in the polls within cycle doesn’t contribute to the senator’ 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 – to allow the possibility that some senators could also be responsive to voters even when anticipating large victory margins, as in Bartels (1991) – an additional benefit from a large margin of victory.\footnote{Whether legislators are differentially responsive when having a large electoral advantage is an empirical question. Bartels (1991) shows that incumbents in safe districts can be as responsive to public opinion as incumbents in competitive districts. On the other hand, Griffin (2006) and Mian, Sufi, and Trebbi (2010) show that legislators become more responsive to constituency ideology as the district becomes more competitive.}
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. 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 a policy sacrifice 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. These figures indicate that a majority of senators are willing to give up substantial policy concessions for an increase in their electoral prospects. We also document, however, that there is 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.

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\textsuperscript{2}. Our more novel results, in this regard, are on the electoral return of position-taking. We find that policy \textit{moderation towards the voters} increases senators’ advantage in the polls. Thus, extreme positions are penalized in moderate states (Iowa, New Hampshire, New Mexico; Nevada, Ohio, Florida, Colorado), but rewarded in more heavily liberal or conservative ones (Massachusetts, Rhode Island, Hawaii, New York; Utah, Idaho, Oklahoma, Alaska). Gains and losses from changes in position-taking, however, are moderate in magnitude\textsuperscript{3}.

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 competitiveness of the election. To obtain a comparable measure across senators, we construct an \textit{electoral accountability index} (EAI), which measures senators’ predicted


\textsuperscript{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.
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, given 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 illustrate the usefulness of disentangling politicians’ preferences from the electoral conditions they face. In particular, they 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, a number of senators generally face a significant advantage in the polls, making them less willing to respond to voters’ preferences.
2 Related Literature

Our paper complements a large literature centered on understanding the direct impact of constituency preferences on a legislator’s voting behavior (Kalt and Zupan (1984), Peltzman (1984), Kalt and Zupan (1990), Bender (1991), Levitt (1996), Mian, Sufi, and Trebbi (2010)). The general finding of this literature is that, on average, legislators are responsive to constituency preferences. On the other hand, Lee, Moretti, and Butler (2004) argue that selection, and not responsiveness to voters, explains the voting behavior in the US House of Representatives (see also Kau and Rubin (1979)). We contribute to this literature by estimating senator specific preferences for office versus policy, and by quantifying how these preferences feedback into heterogeneous responsiveness under different electoral conditions. Our results are consistent with the view that, on average, senators are (indirectly) responsive to constituency preferences. We show, however, that the extent of responsiveness varies across legislators and electoral conditions.

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. 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 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 (2018) exploit the dynamics across
electoral cycles induced by term limits in models of electoral competition.

To implement our approach, we estimate the effectiveness of advertising and position-taking to increase senators’ advantage in the polls. In doing this, we build on a vast empirical literature measuring the effect of advertising (Green and Krasno (1988), Gerber (1998), Huber and Arceneaux (2007), Stratmann (2009), Gerber, Gimpel, Green, and Shaw (2011), Gordon and Hartmann (2013), Spenkuch and Toniatti (2018)) and position-taking (Canes-Wrone, Brady, and Cogan (2002), Ansolabehere and Jones (2010)). 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.

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. We supplement these data with individual characteristics of the senators, as well as demographic and economic indicators at the state level.


5 We exclude the electoral cycle 2005/06 since advertising data is not available.
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 difference 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 Appendix A for details).

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...
Figure 1: The Dynamics of Polls and Electoral Returns. 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.

(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. To smooth out the variability of our measure, we use a rolling window of roll call votes taken within the previous 12 months. Figure 2 plots the policy positions observed in the data, for Democrat and Republican Senators, vis-à-vis their advantage in the polls. For robustness, 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. The correlation between the two measures is 0.83.

Figure 2: Senators’ Policy Positions and Advantage in the Polls. Red indicates Republicans, Blue denotes Democrats.

**Advertising.** To measure the expenditure in tv-ads of senator $i$ during month $t$ before the election we use micro data on TV advertisements (*Wisconsin and Wesleyan Advertisement Project*). We 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 quantity of TV-ad buys in gross rating points (GRPs) using SQUAD data on ad prices (in dollars per rating point) for the third quarter of each election year during the period 2002-2010. We also use challengers’ TV ad buys, sponsored by the challenger and third parties on her behalf.

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6 Advertising price data comes from Martin and Peskowitz (2015). Prices are weighted by the fraction of the population in each congressional district residing in a given media market. We take the average across districts within a state as our
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).

Figure 3: Average TV ad buys by Time to Election and pointlead. Line segments represent the interquartile range of values in the data.

**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 popu-

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11
lation, % 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, Brady, and Cogan (2002) and compute the average vote spread for the period 2000-2012 between the Republican and Democrat presidential candidates in each state, \texttt{presrep.margin}, using data from Dave Leip’s \textit{Atlas of U.S. Presidential Elections}. We refer the reader to Appendix A 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, \( t = T, \ldots, 1 \). 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) expenditure in TV ads, \( e_t \in \Pi_e \), where we assume for simplicity that \( \Pi_x \) and \( \Pi_e \) are 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. In particular, we assume that 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 \( \varepsilon \) denote voters’ preferred policy position, and \( C_t \) denotes senator and race-specific controls, including the challenger’s advertisement expenditures.

Investing \( e \) dollars in 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 $\lambda$ 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 $\mu^j$, where $\mu^j$ 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. To consider the possibility that some senators could also be responsive to voters even when anticipating large victory margins, as in Bartels (1991), we assume that the incumbent obtains an additional benefit $\alpha \geq 0$ from a large margin of victory (a safe win). The payoff of losing the election is normalized to zero. We let $L = \{p_0 \in \mathcal{P} : p_0 < 1/2\}$ denote the event in which the politician loses the election, $M = \{p_0 \in \mathcal{P} : p_0 \in [1/2, p]\}$ denote a close win, and $H = \{p_0 \in \mathcal{P} : p_0 \geq p\}$ denote a safe win, for $p \in [1/2, 1]$.

Note that since the politician’s beliefs are stochastically increasing in current polls $p_t$, this specification already induces a continuous increasing continuation value.

In the main specification, we define a safe win as a margin of victory of at least 15 p.p.. In Section 7 we show that the parameter estimates and policy functions are qualitatively identical with alternative thresholds.
The Bellman equation for the incumbent is

\[ W_t(p_t, \mu_t) = \max_{y_t} \left\{ \lambda (x_t - \theta)^2 - \gamma (e_t)^2 + E [W_{t-1}(p_{t-1}) \mid z_t] + \mu (y_t) \right\} \]  

where \( W_t(p_t) \equiv E_\mu [W_t(p_t, \mu_t)] \), and

\[ E [W_0(p_0) \mid z_1] \equiv \Pr(p_0 \in M \mid z_1)\omega + \Pr(p_0 \in H \mid z_1)(\omega + \alpha). \]

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

**Identification: From Model Parameters to Data.** 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 the figure, we plot the predicted position-taking and TV-ad buys as a function of the advantage in the polls, \( t = 1, \ldots, 5 \) periods before the election.

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.
(ω = 0, α = 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 the estimation of 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 parame-
ters, with \( \rho \equiv \{\rho_i\}_{i=1}^N \), and let \( \psi \) 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 \( i = 1, \ldots, N \), 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 \( \Pr(y_{i,t}|p_{i,t}; \rho_i, \psi) \):

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

Since the transition function of polls does not depend on either individual-specific parameters (\( \rho \)) or individual unobservable state variables \( \mu_{i,t} \), 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 \( \psi \), pooling information across senators\(^9\). In the second step, we estimate the individual-specific parameters \( \rho \) given the estimated transition probabilities (see Rust (1994), Aguirregabiria and Mira (2010)).

The challenge in estimating \( \rho \) directly from the likelihood in \( \text{(5.1)} \) is that the conditional choice probability \( \Pr(y_{i,t}|p_{i,t}; \rho_i, \psi) \) is not a known function of \( \rho_i \). Instead, it is given by the optimal response of the politician with characteristics \( \rho_i \) in each state \( (p_{i,t}, \mu_{i,t}) \). To tackle this problem, we use a version of the nested fixed point algorithm (NFXP). 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 \( \rho_i \), by solving the dynamic problem

\(^9\)Given estimates of \( \psi \), we specify the transition function using a discretized normal distribution, letting \( p_{i,t} \) take values in a finite set (see Tauchen (1986)).
of the senator with preferences \( \rho_i \). 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.\(^\text{10}\)

To relate senator’s preference parameters to relevant observable attributes, while still allowing heterogeneity \textit{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 for more details).

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

\[
    p_{i,t-1} = \pi_0 + \pi_1 p_{i,t} + \pi_2 (x_{i,t} - \varepsilon_i)^2 + \pi_3 \sqrt{e_{i,t}} + \pi_4 \sqrt{e_{i,t}^{ch}} + Q_{it}^\prime \beta + \zeta_c + \epsilon_{i,t}. 
\]

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 senator with preferences \( \rho_i \). 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.\(^\text{10}\)

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\]

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Alternatively, one could use the approach pioneered by Hotz and Miller (1993), and later developed further by Bajari, Benkard, and Levin (2007), in which value functions and structural parameters are recovered from conditional choice probabilities (CCPs) without explicitly solving the optimization problem for each trial value of the parameters. Given our data, however, any viable estimation of CCPs capturing heterogeneity across senators would require that we impose substantial parametric assumptions to “pool” legislator data. This would impose arbitrary constraints on legislators’ predicted behavior, leading to significant bias in the resulting estimates.
state socio-economic indicators, and $\zeta_c$ 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. In addition, it directly allows for decreasing returns to tv-ads via the squared root transformation.\(^\dagger\) 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, $\zeta_{g,t}$, where group membership, $g \in \{1, \ldots, G\}$, 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,\(^\dagger\) 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.
tion, it is more flexible, as it allows for changes over time in group heterogeneity. As a robustness check, we re-estimate the model using 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 Section 7 and Appendix E.1 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 (see Appendix C.1 for details and a comparison with the first-stage estimates on the unbalanced panel).

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 $\pi$ and $\pi^+$ 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 senator adjusts their policy position to maximize their expected payoff.
politician trades-off policy concessions for electoral gains are $\omega_i/\lambda_i$ and $\alpha_i/\lambda_i$. Figure 5 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 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 D4 in Appendix D presents the estimates of $\omega_i/\lambda_i$ (in logs), which is relevant to evaluate the “willingness to pay” for close wins.).
Figure 5: Estimates of $\log (\omega_i + \alpha_i)/\lambda_i$ for each senator in the sample. Solid (dashed) lines represent 80% (90%) bootstrap confidence intervals.

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, $CV^{safe}_i$ and $CV^{close}_i$ respectively. From (6.1), if we consider the change from an initial policy position...
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, $CV_{close}^i$ is obtained using $\omega_i/\lambda_i$. 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**: Policy sacrifice senators are willing to give 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.

The senator at the median of the distribution is willing to give up a policy sacrifice 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. These figures indicate that a majority of senators are willing to give up substantial policy concessions for an increase in their electoral
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 C3 in Appendix C 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).

\[13\] For an alternative reference, 2.1% of the distance between party medians corresponds to around 5% of the average policy distance between politicians’ ideal points and the vote maximizing position in their state.

\[14\] For space considerations, we relegate the discussion of our ideal point estimates to Appendix D.1.
Table 1: First Stage Results (Compact)

<table>
<thead>
<tr>
<th>Dependent variable: $p_{i,t+1}$</th>
<th>OLS</th>
<th>LDV</th>
<th>LDV</th>
<th>GFE</th>
<th>LDV(partyvote)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>$p_{i,t}$</td>
<td>0.816***</td>
<td>0.763***</td>
<td>0.765***</td>
<td>0.763***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.025)</td>
<td>(0.026)</td>
<td>(0.028)</td>
<td></td>
</tr>
<tr>
<td>$(x_{i,t} - \xi)^2$</td>
<td>-6.497***</td>
<td>-1.533***</td>
<td>-2.199***</td>
<td>-2.272***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.311)</td>
<td>(0.507)</td>
<td>(0.829)</td>
<td>(0.517)</td>
<td></td>
</tr>
<tr>
<td>$(x_{i,t}^v - \xi)^2$</td>
<td></td>
<td></td>
<td></td>
<td>-8.291***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2.707)</td>
<td></td>
</tr>
<tr>
<td>$\sqrt{\mathcal{e}_{i,t}}$</td>
<td>0.027</td>
<td>0.017***</td>
<td>0.020***</td>
<td>0.013**</td>
<td>0.023***</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.008)</td>
</tr>
<tr>
<td>$\sqrt{\mathcal{e}_{i,t}^{hall}}$</td>
<td>-0.137***</td>
<td>-0.047***</td>
<td>-0.049***</td>
<td>-0.049***</td>
<td>-0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.009)</td>
<td>(0.010)</td>
<td>(0.007)</td>
<td>(0.010)</td>
</tr>
</tbody>
</table>

| 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*** |

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. 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, Brady, and Cogan (2002) and references therein), where the general finding is that incumbents are penalized for ideological extremity.15 Second, the

15 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
effect of 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. The long run effect of ads persists up to Election Day, but is considerably smaller, due to the estimated decay in the effectiveness of ads, which depreciates around one fourth per month (see Figure C2 in the Appendix).

\[\text{vary with the partisan leaning of each state.}\]


\[\text{17 This depreciation is consistent with the findings of Gerber, Gimpel, Green, and Shaw (2011), in a field experiment on the 2006 Gubernatorial campaign in Texas.}\]
**Electoral Accountability.** We now turn to politicians’ behavior in office, to address electoral accountability. To what extent 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 $\chi_{i}^{\ast}(\cdot)$ estimated for each senator $i$, where in each $t$, $\chi_{i}^{\ast}(p_{t},\mu_{t})$ gives the optimal response of senator $i$ in state $(p_{t},\mu_{t})$, given preferences $\rho_{i}$, and given the transition function parameter estimates $\psi$.

To summarize aggregate patterns of electoral accountability we compute an aggregate policy function. To do this, we construct an *electoral accountability index*, $\text{EAI}_{it}$, 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,

$$\text{EAI}_{it} \equiv \frac{\chi_{i}^{\ast}(p_{t},\mu_{t}) - \theta_{i}}{(\xi_{i} - \theta_{i})} \times 100,$$

where $\xi_{i}$ 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, $\chi_{i}^{\ast}(p_{t},\mu_{t}) = \xi_{i}$, while $\text{EAI} = 0$ means that the senator is predicted to take a policy position equal to his preferred ideal policy $\chi_{i}^{\ast}(p_{t},\mu_{t}) = \theta_{i}$. We then compute the average EAI across individual senators, as a function of their advantage in the polls. In the left panel of Figure 8 we plot the mean EAI across senators, as well as for each quartile of the career concern distribution, as ranked by $\lambda$. 

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28
Figure 8: Predicted Electoral Accountability Index and TV advertising as a function of electoral advantage. Quartiles of the distribution of $\lambda$ (policy) and $\lambda/\gamma$ (ads).

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, Sufi, and Trebbi (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 8 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 varies with observable characteristics of the senators. In Figure 9 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 the individual preference estimates we presented in Figure 5, Democrats are on average more responsive to
voters, for all levels of electoral advantage.

In the right panel of Figure 9, 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 D8 in the Appendix, 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 (i.e., voters are more moderate than politicians).

**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 10 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 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 Model Fit and Robustness

Model Fit. To assess model fit, we compare the predictions of the model relative to the data, in and out of sample. Within sample, the model fits the data remarkably well (see Figure 11, top panel). A more demanding test is to evaluate how the model fits the data out of sample. To do this, 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 are presented in the lower panel of Figure 11.
Overall, we conclude that the model provides a good approximation to the data, both in and out of sample.

![Graph showing goodness of fit for in-sample and out-of-sample data.]

**Figure 11: Goodness of Fit, Within and Out of Sample**

**Instrumental Variables.** In our benchmark estimates of the transition function, we control for the effect of potential time-varying confounders by controlling for past polls via a lagged dependent variable (LDV). For robustness, we estimate a version of equation [5.2] that also accounts for potential unobserved heterogeneity via “grouped fixed-effects” (Bonhomme and Manresa (2015)). As an additional robustness check,
we re-estimate the model using an IV strategy to estimate the transition function. We describe the IVs and main results in Appendix E.1. In the IV specification, we find a considerably larger effect of position-taking on voter support, and a moderately larger effect of ads on voter support (see Table E7). Our estimates for ideal points ($\theta$), cost of tv. ads ($\gamma$), and value of a close win $\omega$ remain largely similar. However, we obtain a more concentrated distribution of the estimates for the value of a safe win $\alpha$, with fewer mass on large values (see Figure E9). Similarly, we obtain qualitatively similar results for electoral accountability, with a moderately larger value of electoral accountability in the IV specification: 30 p.p. relative to 25 p.p. in close elections (see Figure E10).

**Strategic Challenger.** In our benchmark specification, we focused on the optimal dynamic behavior of the incumbent, fixing the challenger’s spending at the levels we observe in the data. This specification simplified the presentation of the problem, and allowed us to focus on the core issue of electoral accountability. The cost of this simplification is that the model does not take into consideration the strategic responses of the challenger in states $(p_t, t)$ that are not observed in the data. To assess the robustness of our estimates, we extend the model to endogeneize the behavior of the challenger, and estimate the parameters of the resulting dynamic game (see Appendix E.2 for details). We find that the incumbent’s parameter estimates of the benchmark model remain essentially unchanged (see Figure 12). We also compute our electoral accountability index in the extended model (see Figure E12 in the Appendix). The results are qualitatively unchanged.

Endogeneizing the challenger’s response allows us to compute a second counterfactual, which quantifies the extent to which advertising crowds-out electoral accountability.
We find that while advertising is not responsible for breaking the electoral connection between politicians and voters, it does significantly crowd-out policy accountability in close elections, specially for career-concerned politicians (see Figure E13).

![Graphs showing parameter estimates in the Dynamic Game and Baseline Model](image)

**Figure 12: Parameter estimates in the Dynamic Game and Baseline Model**

**Thresholds for Safe Wins.** In our main specification, we define a safe win as a margin of victory of at least 15 p.p.. For robustness, we recompute our estimates with alternative thresholds (Appendix E.3). We show that our parameter estimates and policy functions are qualitatively identical with alternative thresholds (see Figures E14 and E15).

**Finer Spending Discretization.** In our benchmark specification, we discretize spending levels into three categories. For robustness, we recompute our estimates with six spending categories (see Appendix E.4). We show that the fit remains good with this finer partition (see Figure E16), and that the electoral accountability index remains qualitatively unchanged (see Figure E17).
8 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.

The 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. The exercise in this paper contributes to a better understanding of this mapping.
References


