

# ...And Keep Your Enemies Closer: Building Reputations and Deterring Challengers in the U.S. House of Representatives\*

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## Abstract

Legislators engage in a multitude of activities aimed at enhancing their reputations prior to reelection, yet constituents are notoriously ignorant of these activities. For what audience, then, are these reputations meant? We argue that the intended audience is not constituents directly but rather potential electoral challengers. Our formal model of deterrence indicates that the reputation legislators build deters the challenger they most fear either in the primary or the general election. Furthermore, we find evidence that these strategies are successful – legislators who target their reputation building correctly are least likely to face a difficult challenge in the next election. We test the model using legislative cosponsorship patterns, heretofore considered unrelated to reelection goals. However, we find evidence that the compositional nature of cosponsorship portfolio is not only a predictable response to election results, but also that the quality of the portfolio has implications for challenges in the next election.

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Legislators spend their time building reputations they think will help them win the next election. They cast votes, participate in committee meetings, and sponsor and cosponsor bills all with the next election in mind. Yet constituents are notoriously ignorant of even the most obvious activities of their government, a point that has been non-controversial since Campbell et al. (1960). If voters are not paying attention, for whose benefit are legislators building these reputations? We argue that legislators create their reputations for the informational benefit of potential electoral challengers. They try to build reputations that render the task of running against them as difficult as possible. Using the results of their last primary and general election as predictors of future challenges, we show that legislators build reputations that make it difficult for their toughest challengers to cast them as distant or extreme. Furthermore, we find that this strategy is successful. Those legislators who build reputations targeted at their toughest previous challenge face easier future reelections than those who are not as careful in the building of their reputations. These results bode well for the relationship between constituent preferences and legislative behavior, through the lens of challenger deterrence, despite the well-documented ignorance of constituents.

To make this argument, we take seriously Fenno (1978)'s idea of two constituencies. A successful bid for reelection requires legislators to win both a primary and a general election. In other words, legislators must not only deter general election challengers but also challengers from within their own partisan ranks. Some legislators face their greatest challenge from within their own party at the primary stage. Others are most concerned about a challenge from a member of the other party at the general election stage. We consider how the location of legislators' greatest challenges affects their decisions about with whom they wish to share a reputation. We reason that if an incumbent is able to build a reputation shared with his or her strongest challenger, that challenger's ability to distinguish himself or herself is diminished in the future. At the same time, our arguments requires little actual monitoring by constituents, since challengers serve as conduits of information about the incumbent's reputation. When potentially tough challengers determine the legislator's actions are congruent with the wants and needs of the legislator's two constituencies, they do not run. Constituents need never know that the check by the potential challenger even occurred. Underlining this point about voter ignorance, we test our theory using legislators' patterns of cosponsorship, something about which the average constituent is unlikely to have any information, but which a quality challenger might scour for evidence of a disconnect

with constituent preferences.

Furthermore, these reputation-building activities provide an additional benefit to those inattentive constituents, increasing “policy congruence” or the connection between voters’ preferences and the actions of their representatives. The question of how voter preferences translate into legislative behavior has been debated since Miller and Stokes (1963) famously argued that there was no congruence between public opinion polls and legislators’ voting behavior. Although later scholars took issue with Miller and Stokes’ measurement choices (Achen, 1977, 1978; Erikson, 1978) or their focus on individual districts (Weissberg, 1978), there remains little evidence of so-called “policy congruence” (Arnold, 1990). But from the perspective of an office-seeking legislator, representation is a means to an end rather than an end in itself. A legislator’s goal is to win reelection (Mayhew, 2004), not to meet some ambiguous or vague standard of representation. In most cases in the United States, winning an election means winning two separate elections: a primary election and a general election. These elections have two overlapping, but distinct, electorates: primary voters are all eligible to vote in the general election, but not all general election voters cast ballots in the same primary election. But most stories of representation consider the representation of the district as a whole, often considering defections from the median voter of the district toward the legislator’s party to be an offense punishable by an electorate that may turn out those legislators who do not adequately represent them (see, for example, Erikson, 1971; Ansolabehere, Snyder and Stewart, 2001; Canes-Wrone, Brady and Cogan, 2002).

But the first-primary, then-general election process can have real effects on representation, since legislators are thinking about two elections and two median voters, rather than one for the district as a whole. The idea that primary elections matter for the behavior of legislators is not new. For example, we know that primaries affect the voting behavior of legislators at both the national (Gerber and Morton, 1998; Kanthak and Morton, 2001) and state (Alvarez and Sinclair, 2010) levels. Primaries can also affect both who votes (Kaufman, Gimpel and Hoffman, 2003) and who runs (Geer, 1986; Norrander, 1989) in primary elections. Prospective challengers are strategic. Previous vote margins affect challenger entry decisions (Jacobson and Kernell, 1983; Jacobson, 1989)<sup>1</sup> and the requirements of challenger deterrence prompt legislators to work harder

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<sup>1</sup>Other factors, such as national (Jacobson and Kernell, 1983) and local (Krason and Green, 1988) political tides, and campaign warchests (Goldenberg, Traugott and Baumgartner, 1986; but see Goodliffe, 2001) also deter challengers.

(Ragsdale and Cook, 1987).

Unlike the existing literature, we consider these two stages of the electoral process – the primary and the general – in tandem. We show that the relative risk of facing a tough primary versus that of facing a tough general influences the cosponsorship strategies used by legislators to deter their strongest challengers, and that failing to implement these deterrence plans has immediate, negative electoral consequences for legislators. In other words, the type of representation the district receives – as captured by the bills its member stands behind – is a function of *two* constituencies, and if those constituencies are not properly attended, the representative is punished by facing a tougher challenger from the constituency that is most displeased. We identify these effects by constructing a formal model of challenger deterrence, the implications of which we test using data from the U.S. House of Representatives. In particular, we study 1) the effect of the previous electoral challenges, primary and general, on cosponsorship patterns; and 2) the effect of cosponsorship patterns on future electoral challenges, primary and general.

To our knowledge, previous literature has not typically found a similar relationship between electoral conditions and cosponsorship patterns. In fact, previous studies have presented evidence suggesting general election outcomes are uncorrelated with cosponsorship patterns (e.g. Campbell, 1982; Krehbiel, 1995). In general, cosponsorship has not been thought of as a practice meant to signal voters (but see Koger, 2003, who stands alone in finding evidence that legislators consider their constituents when deciding whether or not to cosponsor), and there has been no evidence that voters would even be aware of such a signal if it was sent. At best, the conventional wisdom is that cosponsorship is a signal to *other* legislators (Kessler and Krehbiel, 1996) – and a weak signal at that (Wilson and Young, 1997) (unless the signaller has institutional power (Woon, 2008)).

Yet we argue that this lack of evidence for a connection between cosponsorship patterns and elections is due to the fact that the extant literature does not take into account the dual nature of the reelection task. Legislators must deter both primary and general election challengers, and actions that effectively deter one type of challenger may actually encourage the other type to enter the electoral arena. Each bill sponsorship, then, has the capacity to enhance or damage the reputation of the legislator. For example, choosing to cosponsor a bill with a group made up entirely of copartisans will shore up partisan *bona fides*, thus deterring a primary challenge.

Yet that same cosponsorship could provide fodder for a general election challenger who wishes to paint the legislator as being a party shill and out of touch with the district's general election constituency. This is a relationship that may be overlooked if one fails to consider the *relative challenges* presented by the primary versus the general, as opposed to focusing exclusively on general election, constituency-related cosponsorship behavior.

Thus, our paper represents a departure from the extant literature on cosponsorship patterns simply because we model for and, in fact, find an empirical link between constituency characteristics – the prior challenge posed at the party primary stage and at the general election stage – and cosponsorship behavior of legislators. Our model is further supported by empirical tests confirming that a failure to implement the appropriate deterrence strategy in the form of the “right” cosponsorship portfolio results in greater future opposition at the electoral stage in which the legislator was most vulnerable in the previous election. Further, our work represents a conceptual and methodological contribution because it marks the first time legislators' cosponsorship patterns have been viewed as allocations of workload to be carried out alone, with co-partisans, or with members of the opposition in a compositional manner. In testing the empirical validity of our theoretical model, we make use of several methodological techniques, including a recently developed multinomial model for compositional data and a bayesian multivariate normal model.

First, we develop an indicator for capturing reputation building in the form of a cosponsorship portfolio. Then we present a formal model of those cosponsorship portfolios as strategies for challenger deterrence in the US Congress. The model is followed by two empirical tests of its implications: the effects of past electoral challenges on subsequent cosponsorship portfolios as well as the current cosponsorship portfolio's effect on future electoral challenges. Prior to each test we explicitly lay out the empirical strategy we have adopted to test each of our model's implications. We conclude by discussing the implications of our paper and by suggesting avenues for future research.

## **Capturing Cosponsorship Portfolios as Reputations**

When considering the introduction of a bill, a member of congress has to decide whether to work alone or as part of group. If as part of a group, the member must decide what share of the credit

for the bill should belong to members of his or her own party and what proportion to the opposition. These options are interdependent: if legislators choose to work alone, it is impossible for them to have cosponsors. Less trivially, if they choose to work with a relatively greater number of copartisans, it is necessarily the case that they will be sharing credit (cosponsoring) with proportionally fewer members of the opposition. In fact, sponsorship/cosponsorship decisions must live on the decision space created by the three mutually exclusive alternatives of working alone, sharing credit (cosponsoring) exclusively with copartisans, and sharing credit (cosponsoring) exclusively with members of the opposition.

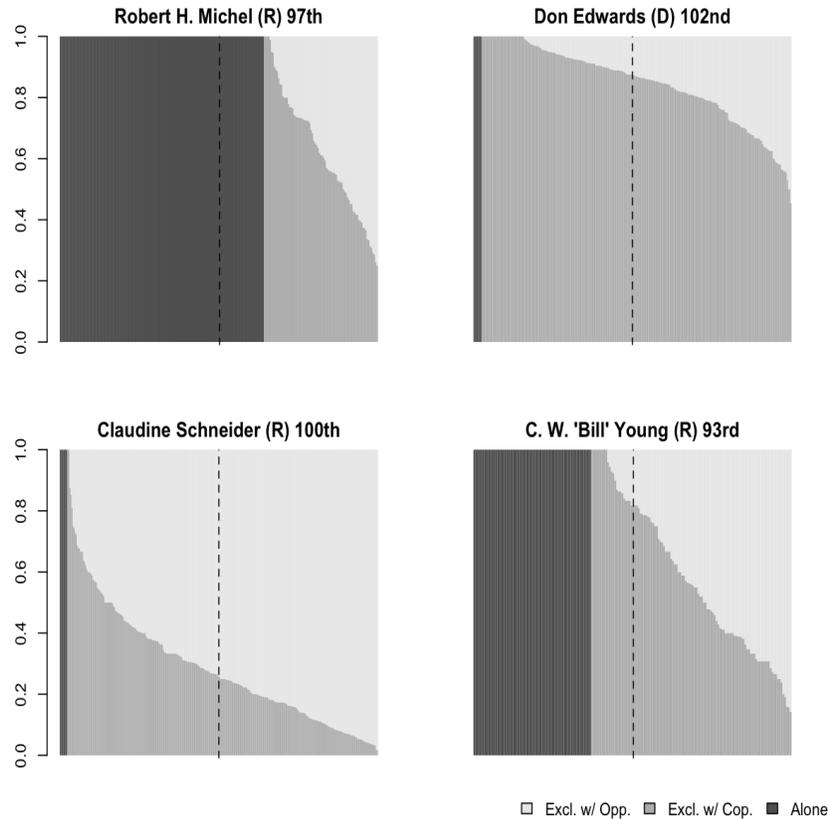
The zero-sum nature of the relationship among the choices is a characteristic of *compositional data*, i.e. data that comprises parts that must combine to a fixed whole (Aitchison, 1982). Considering cosponsorship in the U.S. congress, the three parts comprising the composition are the absence or presence of cosponsors; the share of cosponsors, assuming there are some, who belong to one's own party; and the share of cosponsors, assuming there are some, who belong to the opposing party.<sup>2</sup>

Considering each congressperson's set of sponsored bills over the course of a congress, the compositional approach allows us to distinguish different types of sponsorship portfolios, such as the ones depicted in Figure 1. Each panel contains all the bills sponsored by a member of congress during a particular congress. Each vertical bar is a bill and the vertical dashed line marks the median cosponsorship pattern. The height of the stacked sections that make up each bar illustrates the cosponsorship profile of that bill (from this member's perspective). If a bill is sponsored solely by the member, the entire bar is solid black – a reputation shared with no one. Assuming the bill was cosponsored, the height of the dark gray portion of each bar captures the relative number of copartisans cosponsors and the light gray portion of each bar the relative number of opposition members.

The top left panel presents the portfolio of a congressperson who frequently preferred to work alone, as opposed to working with any balance of copartisans and members of the opposition. In

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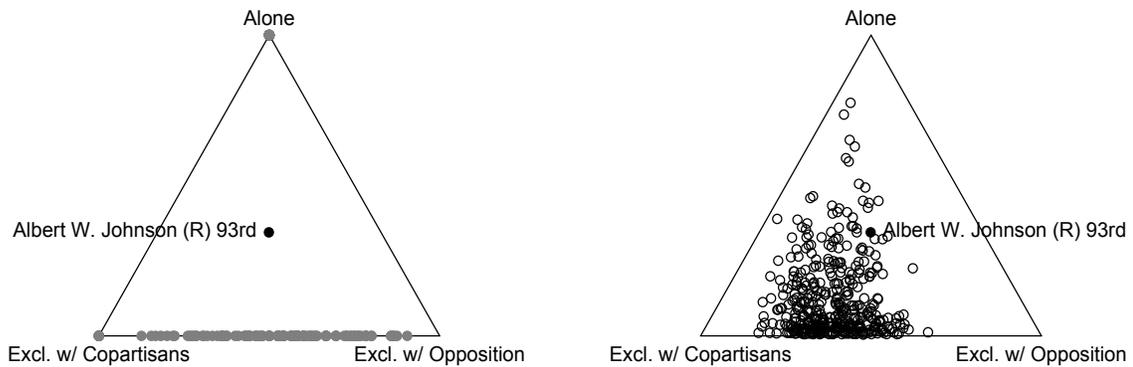
<sup>2</sup>Although it is the case that once we have chosen a positive value for any of the alternatives in the composition we can determine the values of the other two (suggesting the reduction to a single dimension), this is not the case when we allow for the possibility of non-negative compositional values. Hence, although knowing that on a particular bill a congressperson worked with 30 % copartisans in the cosponsor slate means we know that 70% of same slate is comprised of opposition members – and that the congressperson is not working alone, we cannot make the same kind of inference if all we know is that that the same congressperson chose to work with no copartisans at all – this could either mean working alone or working entirely with opposition members.



**Figure 1.** Stacked barplots of example complete cosponsorship profiles. The four panels depict different types of profiles, based on how the cosponsorship slate is usually formed

this example, the panel shows the profile of then newly appointed minority leader Bob Michel from Illinois. The top right and bottom left panels depict the radically opposed profiles of congresspeople who work almost exclusively with copartisans and almost exclusively with members of the opposing party, respectively. They present the profiles of California Democrat Representative Don Edwards and Rhode Island Republican Representative Claudine Schneider – both of whom cosponsor preponderantly with Democratic members. The convex nature of the dark gray area for Edwards depicts his choice to work predominantly with copartisans. The concave nature of the dark gray area for Schneider means she is working primarily with relatively large groups of opposition members. Finally, the bottom right panel depicts a member profile in which roughly the same amount of bills are sponsored alone, with primarily copartisans, and with primarily members of the opposition – the profile of the sophomore Republican Bill Young is shown.

The easiest way to obtain a summary measure for an individual member for the kind of information displayed in Figure 1 is to determine the arithmetic mean of the parts (i.e. dimensions) of

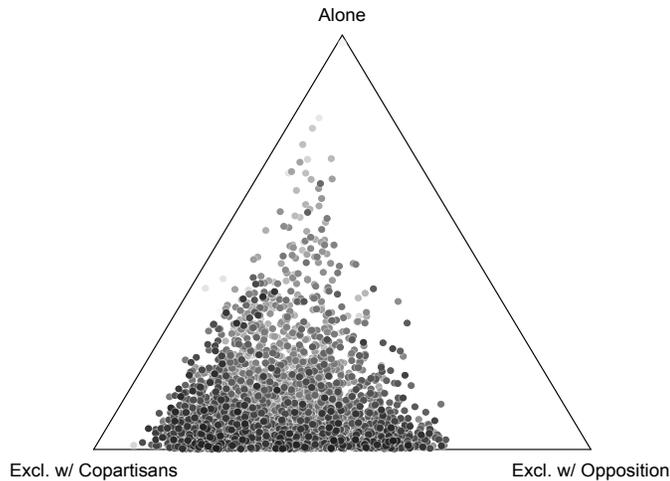


**Figure 2.** Example of aggregation to the congressperson-congress level

the composition we used to define individual bills. By calculating this average over the bills sponsored by a congressperson throughout a term in office, we can create a single point that must perforce lie on the simplex defined by the three “pure” categories we discussed earlier. For instance, the left panel of Figure 2 presents the disaggregated (i.e. equivalent to the barplots of Figure 1) and aggregated ternary plots of Albert W. Johnson’s set of cosponsored bills in the 93<sup>rd</sup>-congress. The light gray dots in the left panel are the bill cosponsorship profiles of each bill he cosponsored (the number of bills with the exact same cosponsorship pattern is not obvious as they are stacked on one another in our 2-dimensional space),<sup>3</sup> and the centrality of his overall portfolio’s aggregated position on the ternary plot (i.e. the black dot in the middle of the plot) indicates that he managed to distribute the types of relationship he “shared” roughly equally across the three possible types – with no one, primarily with copartisans, and primarily with the opposition. The right panel in Figure 2 presents the relative location of the summary measure of Johnson’s portfolio in the context of the whole 93<sup>rd</sup>-Congress by displaying the aggregated portfolios of every other representative in that congress.

We have thus constructed a dataset comprising a single composition per Congressperson per Congress, constructed using the averaging process just described, and which we have called a

<sup>3</sup>Johnson actually sponsored alone almost 30% of the bills onto which he signed during that Congress.



**Figure 3.** Ternary plot containing all cosponsorship portfolios in our dataset

cosponsorship portfolio for that term in office.<sup>4</sup> Each such member-congress portfolio (composition) can be visualized as a point on the 2-simplex. Figure 3 shows every member-congress portfolio in our dataset, containing 6285 observations of member cosponsorship portfolios spanning from the 93<sup>rd</sup> to the 108<sup>th</sup> congresses.<sup>5</sup> Each dot, then, represents a Member of Congress. The shade of each dot indicates the number of bills in that member’s portfolio, with dark dots indicating members who cosponsored frequently and light dots indicating members who cosponsored relatively infrequently.

Notice that the bulk of the portfolios concentrate toward the “exclusively with copartisans” edge of the ternary plot, conveying the intuitively-expected idea that most Members of Congress in the 30 years under study have chosen to cosponsor bills primarily with other members of their own party.<sup>6</sup> Notice also how little information is actually conveyed by those portfolios that tend to

<sup>4</sup>The data were constructed using Fowler (2006) House of Representatives cosponsorship dataset, available from J. Fowler’s website at <http://jhfowler.ucsd.edu/cosponsorship.htm>

<sup>5</sup>Although the complete dataset ought to contain around  $435 \times 16 = 6960$  observations, we were forced to drop some members due to missing electoral data and outlying electoral systems, such as the one in place in Louisiana. Our complete empirical model will require us to further drop 615 observations due to missing values on one important covariate or another.

<sup>6</sup>An interesting route for expanding our current work, which we must leave for future research, would be to track changes in the center of mass of the cosponsorship portfolio cloud *across time*, in an effort to capture the trends in

allocate a great deal of resources to sponsoring alone. Not only are such cosponsorship portfolios rare, but they are also small (light dots), comprising as few as 6 sponsored bills throughout a legislature.<sup>7</sup> This will prove crucial in the empirical estimation that follows, because a model that does not take this fact into account would most likely overfit the data by weighting these outliers heavily.

In sum, we have an intuitive means of capturing reputation building through cosponsorship portfolios. We can create a single measure to capture the totality of a member's actions between elections, and this measure can distinguish among the locations of every member based on their reputation-building strategy. Let us turn now to our model of reputation building for challenger deterrence.

## A Formal Model of Challenger Deterrence and Cosponsorship Portfolios

The model depicts legislators as attempting to minimize their chances of facing tough challenges in both the primary and the general election. Legislators do not care if they draw a challenger, per se, but rather, they care if they draw a *winning* challenger. Drawing a challenger who is not a threat is of no consequence. Therefore, when we refer to “drawing a challenger,” we mean drawing a challenger who will actually defeat you. We assume that the probabilities of drawing a challenger in the primary is unrelated to the probability of drawing a challenger in the general election. Furthermore, we define the terms we use in the model as follows:

- $P_o$  is the prior probability of drawing an opposition challenger
- $P_p$  is the prior probability of drawing a primary challenger
- $\pi_p$  is the proportion of work the legislator puts in to working with members of her own party
- $\pi_o$  is the proportion of work the legislator puts in to working with members of the opposition party

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bipartisanship and party polarization in the House.

<sup>7</sup>Consecutive roll-call vote record holder W. H. Natcher appears to have sponsored a surprisingly small number of bills during the 32 years included in our study, and it is he who appears to have sponsored a total of 6 bills during the 93rd congress, most of them alone.

- $\pi_a$  is the proportion of work the legislator puts in to working alone
- $\alpha$  is the value of working alone

Note that because drawing an opposition challenger and drawing a primary challenger are independent events, they do not necessarily sum to one. The values for the amount of work, however, do sum to one, i.e.  $\pi_p + \pi_o + \pi_a = 1$ . Furthermore,  $0 \leq \alpha \leq 1$ , where 0 means there is no value associated with working alone and 1 means that working alone is just as valuable as working with members of the opposition or copartisans. This assumption implies that working with others is always at least as valuable as working alone when one is building a reputation as a legislator. Furthermore, we can think of the “prior probability of drawing a challenger” to be the legislator’s belief about whether or not a successful challenger is likely to emerge. This could be based on whether or not a challenger has already identified him/herself, or more likely, whether or not the incumbent has previously shown some vulnerability to a challenge (thus, in the empirical section we will use the margin of victory over the previous challenger as an inverse indicator of the likelihood a winning challenger will emerge). This is in line with the extant literature on challenger entry, which indicates that potential challengers consider previous vote margins when deciding whether or not to enter a race (Jacobson and Kernell, 1983).

We assume that work with the legislator’s own party decreases the threat of drawing a challenger in the primary, but increases the threat of drawing a challenger in the general election, although these effects are not equal. Similarly, work with the opposition party decreases the threat of drawing a challenger in the general election, but increases the threat of drawing a challenger in the primary. Taken together then, the threat of drawing a (successful) challenger in the primary election, taking into account the amount of work the legislator did with copartisans ( $\pi_p$ ) and opposition members ( $\pi_o$ ) is:

$$P_{\hat{o}}(1 - \pi_o + \pi_p^2)$$

By the same logic, the threat of drawing a (successful) challenger in the general election, taking into account  $\pi_p$  and  $\pi_o$  is:

$$P_{\hat{p}}(1 - \pi_p + \pi_o^2)$$

At the same time, working alone decreases the threat of drawing a (successful) challenger at all, but the amount of the effect decreases based on the value of  $\alpha$ . We therefore model the effect

of working alone on drawing a challenger as:

$$-\alpha\pi_a$$

Taking all three of these factors together, then, yields a value of the threat of drawing a challenge of any kind that is equal to:

$$P_{\hat{o}}(1 - \pi_o + \pi_p^2) + P_{\hat{p}}(1 - \pi_p + \pi_o^2) - \alpha\pi_a$$

We then minimize that expression taking into account the constraint  $\pi_o + \pi_p + \pi_a = 1$ . Doing so implies a set of propositions about the cosponsorship behavior of legislators. First, the model implies that when  $a$  is not sufficiently large, the legislator ought not expend any effort working alone, as the following proposition demonstrates:

*Proposition 1:* When  $\alpha < \frac{(P_{\hat{o}} - P_{\hat{p}})^2}{P_{\hat{o}} + P_{\hat{p}}}$  is true, the legislator will sponsor no bills alone.

*Proof:* See appendix.

Intuitively, it is clear why this might be the case. Essentially, the value above is a measure of the difference between  $P_{\hat{o}}$  and  $P_{\hat{p}}$ . When these two values are very different, it makes more sense to work more closely on mitigating the greatest threat, by working, depending on the threat, either with members of one's own party or members of the opposition, than to work alone.

When the inequality above is true legislators ought not sponsor legislation alone, but rather should sponsor based on minimizing the following expression:

$$P_{\hat{o}}(1 - \pi_o + \pi_p^2) + P_{\hat{p}}(1 - \pi_p + \pi_o^2)$$

subject to the following constraint  $\pi_o + \pi_p = 1$ .

Regardless of whether or not legislators sponsor alone, the amount they sponsor with copartisans or members of the opposition will be based on the relative threat of facing a primary or a general election threat, a relationship that is clear in the following propositions.

*Proposition 2:* As the threat posed by drawing a primary challenger increases, the legislator will sponsor bills with relatively more copartisans.

*Proof:* See appendix.

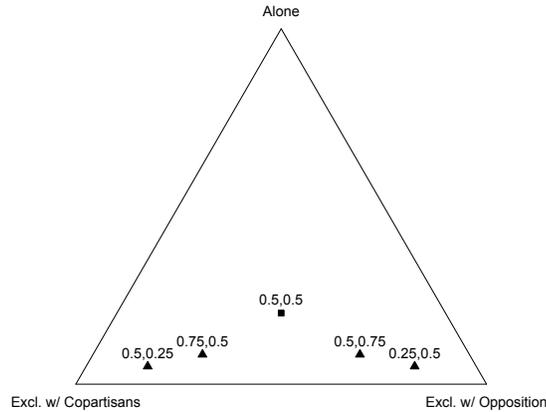
*Proposition 3:* As the threat posed by drawing a general election challenger increases, the legislator will sponsor bills with relatively more members of the opposition.

*Proof:* See appendix.

Taken together, furthermore, these propositions indicate that legislators will not have monolithic cosponsorship patterns – always sponsoring with only one type of legislator – unless one type of challenger poses a much larger threat than the other. Indeed, as the proofs show, legislators should implement a mix of strategies in all cases except when the threat posed by one type of challenger (either primary or general election) is three times greater than the threat posed by the other type of challenger. It is clear intuitively why this might be the case. Since working with the opposition increases the threat of drawing a primary challenger, and working with copartisans increases the threat of drawing a general election challenger, legislators would do well not to entirely neglect one type of challenger in pursuit of protection against the other. Worrying too heavily about one type of challenge merely serves to increase the threat the other type poses.

To better understand these relationships, consider the graph in Figure 4, which depicts the relationship between probabilities of drawing a particular type of winning challenger and the cosponsorship portfolio that would build the best reputation for responding to those challengers. The value for  $\alpha$  is set at 0.10. Each marker is labeled with the probability of drawing a successful primary challenger and the probability of drawing a successful general challenger that produced it. In other words, the markers are labeled as follows: P(Drawing a primary challenger), P(Drawing a general election challenger). For example, the square marker in the middle of the graph is labeled (0.5, 0.5) because this is the position of the cosponsorship portfolio that should result if there is a 0.5 probability of drawing a winning primary challenger and a 0.5 probability of drawing a winning general election challenger.

The position of the cosponsorship portfolio that is the best response to the 0.5, 0.5 pattern of primary and general challenges indicates of workload of sponsoring with the opposition 0.4 of the time, with copartisans 0.4 of the time, and alone 0.2 of the time. Let us consider the effects on cosponsorship portfolios of challenges distinct from the 0.5, 0.5 probabilities that are depicted with the square marker. What happens when one type of challenge is much more likely than



**Figure 4.** The Theoretical Effect of Changes in the Probability of Drawing a Challenger on Workload

the other? We can explore this possibility by considering the relative positions of the triangular markers in Figure 4. When a legislator knows one type of challenge is much more of a threat than the other, then she ought to concentrate on shoring up support against that type of challenger rather than sponsoring alone (see Proposition 1). Notably, as the probability of drawing any type of challenger decreases but the differences between the probabilities remain high, the likelihood of working alone decreases. This is made clear in figure 4 because decreasing the chance of the *less* likely challenger from 0.5 to 0.25 results in a decrease in working alone. In other words, as the threat of drawing one type of challenger decreases, the legislator can concentrate on shoring up support against the other type of challenger without fear of backlash.

At the same time, Figure 4 also provides a graphical representation of the effects of Propositions 2 and 3. As the triangular markers indicate, an increased threat of one type of challenger prompts the legislator to concentrate more heavily on guarding against the relatively likely threat. For example, when the probability of facing a primary challenge is 0.5 and a general election challenge is 0.25, the legislator concentrates more heavily on working with members of her own party, at the expense of both working alone and working with the opposition. Indeed, legislators under these circumstances work with their copartisans fully 0.65 of the time, reserving only 0.27 for opposition colleagues and an even smaller 0.08 for working alone. Note that the mirror is true for the

case in which the probability of facing a general election challenge is 0.5 and primary challenge is 0.25. In that case, the legislator works with opposition colleagues 0.65 of the time, copartisans 0.27 of the time.

These theoretical effects, then, have clear empirical implications. Assuming that the challenges faced in the last election are the best indicators of the challenges likely in future elections barring efforts at deterrence, our model implies the following empirically testable hypotheses regarding cosponsorship portfolios:

*Hypothesis 1:* Controlling for  $((P_{\hat{p}} - P_{\hat{o}})^2)$ , as the prior probability of having drawn a primary election challenger ( $P_{\hat{p}}$ ) increases, bills sponsored with relatively more members of the legislator's own party ( $\pi_p$ ) increase as a proportion of the entire cosponsorship portfolio.

*Hypothesis 2:* Controlling for  $((P_{\hat{p}} - P_{\hat{o}})^2)$ , as the prior probability of having drawn a general election challenger ( $P_{\hat{o}}$ ) increases, bills sponsored with relatively more members of the opposition party ( $\pi_o$ ) increase as a proportion of the legislator's cosponsorship portfolio.

*Hypothesis 3:* As the difference between the prior probability of having drawn a primary challenger and the prior probability of having drawn a general election challenger  $((P_{\hat{p}} - P_{\hat{o}})^2)$  decreases, the proportion of bills sponsored alone ( $\pi_a$ ) increases.

Assuming we find support for our hypotheses regarding past challenges and current cosponsorship portfolios,<sup>8</sup> our model also implies the following empirically testable hypotheses should hold regarding future challenges:

*Hypothesis 4:* If bills sponsored with relatively more members of the legislator's own party ( $\pi_p$ ) do not increase after facing a relatively tough primary election challenger, the probability of drawing a primary election challenger ( $P_{\hat{p}}$ ) increases still further.

*Hypothesis 5:* If bills sponsored with relatively more members of the opposition party ( $\pi_o$ ) do not increase as a proportion of the a legislator's cosponsorship portfolio after facing a relatively tough general election challenger, the probability of drawing a general election challenger ( $P_{\hat{o}}$ ) increases still further.

*Hypothesis 6:* If bills sponsored alone ( $\pi_a$ ) do not increase after having faced roughly equal primary and and general election challengers, the probability of drawing a challenger in the election

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<sup>8</sup>If we do not find that a particular type of challenge is generally associated with the predicted cosponsorship portfolio, then it is impossible to label any cosponsorship portfolio as an error.

stage not neglected increases.<sup>9</sup>

The full sequence of causation implied by our model is therefore be as follows:<sup>10</sup>

- At election  $t$ : An election takes place, defining a legislator's relative challenges at the primary and general election stages;
- In the legislative term between elections at  $t$  and elections at  $t + 1$ , the legislator chooses her cosponsorship portfolio in accordance to the challenges observed during the election at  $t$ ;
- At election  $t + 1$ : An election takes place, the results of which at least partially reflect the cosponsorship decisions made in the previous step

We now empirically test this sequence of causation, first examining the effects of past challenges on subsequent reputations built through cosponsorship portfolios and then, if appropriate, the effects of (*errors in*) reputation building through cosponsorship on future electoral challenges.

## Cosponsorship Portfolios as *Responses to Electoral Challenges*

The model makes comparative statics predictions, which we can then take to data in the sense of Morton (1999) to determine whether or not electoral outcomes can predict cosponsorship patterns. Our theory focuses on how members of congress use legislative work, namely cosponsorship choices, to build a reputation with which to respond to their strongest challengers, defending themselves as they seek reelection in the future. From our formal model, we derived precise statements about the reputation-based relationship between electoral challenges, past and future, and cosponsorship. We will now empirically test those hypothesized relationships with electoral and sponsorship data spanning from the 93<sup>rd</sup> through the 108<sup>th</sup> congress – 30 years of American legislative history.<sup>11</sup> We will measure electoral margins of victory continuously and then simulate

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<sup>9</sup>In other words, having faced roughly equal challenges, if a legislator chooses to cosponsor relatively frequently with copartisans, the odds of a general election challenge will increase. Conversely, having faced roughly equal challenges, if a legislator chooses to cosponsor relatively frequently with the opposition, the odds of a general election challenge will increase.

<sup>10</sup>Notice that, although it is the case that this sequence would indicate a dependency of current cosponsorship patterns on previous ones, the theory only predicts this happening through the effects of the immediately preceding electoral outcome. Furthermore, it is not the case that current cosponsorship patterns affect the electoral outcomes immediately preceding them (i.e. voters are not theorized to make decisions based on prospective assessments of cosponsorship strategies). Hence, endogeneity is not an issue.

<sup>11</sup>Primary election data was kindly made available by J. M. Snyder and his research team. (Ansolabehere et al., 2007)

their impact on cosponsorship with chosen values that capture the easiest of victories and the toughest of challenges. Although there are growing literatures on the politics of bill cosponsorship, no one has carefully conceived of an incumbent’s portfolio of bill sponsorship choices as a single reputation. As we developed earlier, a single location on a simplex of cosponsorship choices can capture that reputation.

Our formal model showed how the location of a member’s cosponsorship portfolio should depend on the particular electoral challenges – in the primary and in the general election – he or she faced. To test these assertions, we will assume the compositional portfolios of Figure 3 to be generated by sampling from an overdispersed multinomial distribution (Mebane Jr and Sekhon, 2004), in which counts (viz. the number of cosponsors of each type chosen by a legislator for a given bill) are aggregated and observed as shares of a total (viz. the total amount of cosponsors per bill), much in the same way votes for parties within a district are aggregated and modeled as vote shares generated by a multinomial process. Such a multinomial distribution has three categories (viz. “Alone”; “Copartisan”; “Opposition member”), and (as usual) we model the vector of probabilities that legislator  $i$  chooses each category  $j$  as a logistic function of linear predictors  $\mathbf{x}'_i\beta_j$ ,<sup>12</sup> so that

$$p_{ij} = \frac{\exp(\mathbf{x}'_i\beta_j)}{\sum_{k=1}^3 \exp(\mathbf{x}'_i\beta_k)} \quad (1)$$

in which the predictor vector  $\mathbf{x}_i$  includes the legislator’s most recent set of electoral challenges, as characterized by the margins of victory in both the primary and general election, the square of the difference between these two margins (to reflect the functional form used in our formal model), and a number of control variables.

The controls we include are the number of copartisans in the legislator’s state delegation; the legislator’s ideological extremism (as measured by distance, in standard deviations, of the member’s Common Space (Poole and Rosenthal, 2000) score from the chamber’s median); the ideology of the legislator’s district (as measured by a moving average of the share of district votes received by presidential candidate of the legislator’s party); an indicator of whether the district’s boundaries have been redrawn in the immediate past and whether the legislator holds a leadership

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<sup>12</sup>For purposes of identifiability of the parameters, one must choose a category  $r$  and assume that  $\beta_r$  is  $\mathbf{0}$  – a reference category. In our case, we have chosen “Alone” as the reference.

position, such as a committee chairmanship.

The number of copartisan legislators from one's state creates a ready-made pool of potential cosponsors with whom a legislator shares tangible interests – both partisan and geographic. Ideological extremism on votes would seem to make sharing a reputation with the opposition via cosponsorship less likely – and it might even be positively associated with working alone. In addition, we include the ideology of the district as it seems logical that a Democratic House member from a liberal district (one that consistently votes for Democratic presidential candidates), for example, would not want to devote a great deal of time initiating bills solely or primarily with members of the Republican party. For the same reason legislators have been shown to be less bipartisan at the roll-call stage when their districts become more prone to support their parties (for a review, see Layman, Carsey and Horowitz, 2006), if legislators come from a district which shows consistent support for the opposition party, they are expected to be inclined to work with the opposition; similarly, if legislators come from a district with high support for their own party, we expect them to be more prone to work with copartisans. We also include an indicator of whether redistricting has occurred to serve, in a sense, as an indicator of the legislator's uncertainty about future challenges. The most recent primary and general election are the member's best information on likely future challenges, but redistricting calls into question the relevance of that information. Finally, we include a control for whether the legislator holds a position of leadership within their party, because recent research shows that these legislators tend to be more moderate in their revealed preferences (Woon, 2008), which could also translate into a greater likelihood of working with an even mixture of copartisans and members of the opposition.

All variables (except the squared difference of margins of victory) have been mean centered and standardized to one standard deviation. In addition to facilitating the computation and interpretation of results, standardization allows us to meaningfully compare primary and general elections. Because it is possible that a given margin of victory is close for a primary, but safe for a general election, rescaling these two variables ensures we are comparing substantively similar quantities when we control for the squared difference between margins of victory at both electoral stages.

Out of the possible ways in which compositional data can be modelled (e.g. using a linear model of additive logistically transformed data), we have chosen Mebane Jr and Sekhon's

overdispersed multinomial distribution, and their corresponding robust estimators, for four main reasons. First, it allows us to correct for unobserved bill- and legislator- specific characteristics that result in greater (or lower) variance in the choice of cosponsor types – something a regular multinomial model does not permit.<sup>13</sup> Second, it takes into account the fact that compositional data is autocorrelated by its very nature (Chayes, 1960), allowing us to make the appropriate econometric corrections to the estimated standard errors of the  $\beta$  coefficients – something other models, such as the additive-logistic  $t$  model (Katz and King, 1999) or the seemingly unrelated normal model (Tomz, Tucker and Wittenberg, 2002), force us to ignore. And third, it avoids overfitting the data when outlier observations are present without the need for manual and arbitrary data dismissal – something truly unusual and useful about Mebane Jr and Sekhon’s proposed weighted estimation routine, and which is particularly appropriate in our case, given our previous discussion of outlier portfolios that lean toward the ‘Alone’ end of the simplex. Using the `R` routine designed by Mebane Jr and Sekhon (2006), we obtained the hyperbolic tangent estimators of Equation 1’s  $\beta$  vectors, which allow us to complete our empirical model and test our hypotheses at the 80% confidence level. The resulting model appears to be right for a vast majority of our observations – almost 90% of our data points were given positive weights by the estimation routine, which indicates a good model fit based on information carried by the model’s residuals. We now turn to the results of this estimation.<sup>14</sup>

Figure 5 presents the results of our estimation. We have relegated the usual (and less immediately useful) regression table to the Appendix, which also contains a covariance matrix of the  $\hat{\beta}$ ’s – all the information required to replicate and expand our current analysis.<sup>15</sup> Figure 5 displays estimated effects on odds ratios, along with 90% confidence bands around them. Hence, bands not crossing the dashed reference lines indicate effects reliable at the 90% confidence level.

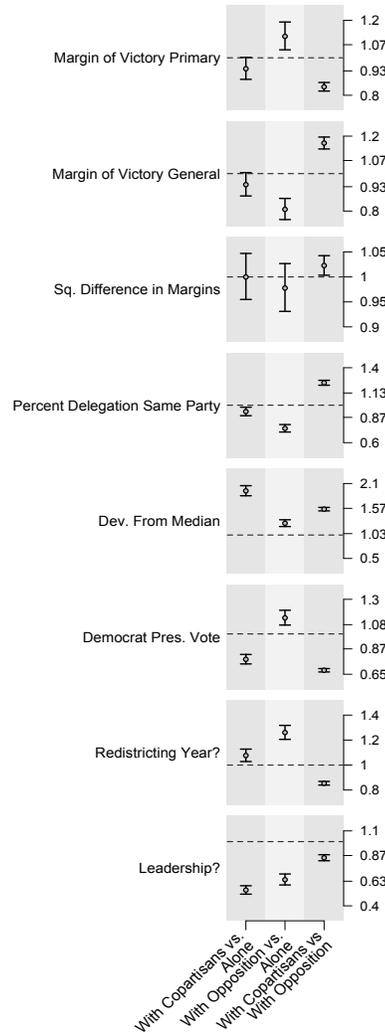
Hypothesis 1 stated that, holding the difference in margins constant, increasing the probability of drawing a primary challenge (i.e. decreasing the margin of victory in the primary election)

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<sup>13</sup>In fact, the implemented ‘sandwich’, or Huber 2009, correction also minimizes the effects of the autocorrelation that arises from the fact that we are dealing with *cosponsorships*.

<sup>14</sup>In order for the parameters to be appropriately estimable, it is required that the compositional response variable be entirely positive – that is, without zeroes. We therefore adopted the “modified Aitchison” zero replacement strategy suggested by Fry, Fry and McLaren (2000), which is ratio preserving (i.e. it preserves the ratio between the originally non-zero parts of the composition). We replaced zeroes with a quantity of one percent using a rounding error equal to 1. See Fry, Fry and McLaren (2000) and Aitchison and Kay (2003) for further discussion on this matter.

<sup>15</sup>Replication data and `R` code are available upon request.



**Figure 5.** Estimated effects of (standardized) covariates on the odds of choosing a type of cosponsorship strategy over another, along with 90% C.I.

should make a legislator more likely to work with copartisans – rather than working either with members of the opposition or alone. We find evidence that, in fact, increasing the expectation of a challenging primary (while holding the margin at the general constant) by one standard deviation makes legislators 16% more likely to work with copartisans than with members of the opposition. In other words, as hypothesized, those facing a tough primary adjusted their strategies by foregoing reputation-building across the aisle to better focus on reputation-building within their party. However, we find the effect of a tough primary on the likelihood of working with copartisans vs. working alone to be indistinguishable at the 90% confidence level when we control for all relevant

variables. The effect is statistically discernible at a less stringent  $\alpha = 0.8$ , but even then it is only estimated to increase the likelihood of working with copartisans vs. working alone by 6%.

In order to better understand this relatively weak result, we returned to the data to identify the members of Congress who faced a tough primary, had no significant challenge in the general election, and nonetheless preferred working alone to working with copartisans. One pattern immediately emerged – these members were at the ideological fringes of their own party. One group of members who shunned their copartisans despite seemingly needing the party’s reputation tended to be freshman members who were ideologically extreme. When, in an apparently safe seat in partisan terms, a hard fought primary led to the nomination of an ideological extremist over a party stalwart, once in Congress, the extreme member apparently did not feel at home amongst his or her copartisans. On the other hand, they certainly had no inclination or reason, given the safe margin of victory in the general election, to engage in building a reputation shared with the *very* ideologically distant opposition – increasing the prospect of going it alone. So, as freshmen, members like Elizabeth Holtzman and Eliot Engel tended to go it alone. Another group of members who could not bring themselves to work with their copartisans despite fearing a challenge in the primary were members who were “extreme” in the other direction – members who were so moderate that they later became independents or switched parties. John Anderson, Richard Shelby, and Phil Gramm are examples of this tendency. Early in their careers they avoided their copartisans, choosing to sponsor alone relatively more often than we would have predicted given the tough primary challenge they had faced.

Hypothesis 2 stated that holding the prospect of a challenge at the primary stage constant, increasing the probability of having a challenging general makes legislators more likely to work with the opposition, and thereby less likely to work with either copartisans or alone. We find strong support for this hypothesis. Controlling for our battery of covariates, we find evidence that reducing the margin of victory in the general while holding the probability of drawing a primary challenge constant does result in an increase in the odds of working with the opposition when compared to the odds of either working alone or working with members of one’s own party. Specifically, increasing the probability of drawing a tough challenge in the general election increases the odds of working with the opposition *vis-à-vis* working alone by 23%, and *vis-à-vis* working with copartisans by 14%. Both of these effects are reliable at the 90% confidence level.

The 9% difference implies that, in a situation in which the general election becomes tougher, legislators who reallocate efforts to increase the amount of work they do with opponents are more likely to shift efforts away from solitary work rather than efforts dedicated to working with copartisans. This is most likely explained by the types of risks associated with decreasing efforts on either front – a matter we discuss in greater detail in the next section. Although decreasing the amount of work done alone is not expected to have a direct negative effect on either race individually (it is only expected to hurt prospects whenever *both races* are similarly challenging), working less than the correct amount with copartisans can lead to a direct and negative effect on the prospects of primary success. Hence, if additional efforts ought to be redirected to working with the opposition, it makes the most sense to take them from work conducted alone than from work conducted with copartisans.

Indeed, and contrary to our theoretical expectation, we do not find enough evidence to support the claim made in Hypothesis 3: Increasing the squared difference between the margins of victory does not discernibly increase the odds of working alone vs either working with copartisans or working with the opposition, although both coefficients are in the direction hypothesized. But there is not enough evidence to show that the contrary is true, either, so it may be the case that we simply do not have enough data to provide good evidence in favor of our first hypothesis.

With respect to our controls, we find that the size of the pool of potential cosponsors with obviously shared interests – the percent of the state delegation belonging to one’s party – affects cosponsorship strategies in an interesting way. As this pool increases in size, legislators are more likely to work with copartisans than with members of the opposition and, when given the opportunity to choose, would rather work alone than with members of the opposition. They are, however, also more likely to work alone than with other members of their own party as this pool of potential cosponsors gets bigger. The latter relation could indicate desire to keep options open for a potential run for a statewide office. If legislators think they might have such progressive ambition (Schlesinger, 1966), they may not wish to build reputations alongside those who will be their future competition. The relatively small size of this effect, however, would indicate that this tension is not very strong, and that legislators would rather err by ending up being too similar to their copartisans than err and end up being too different. This indicates a modicum of risk aversion, whereby legislators are unwilling to forgo electoral security in the present for a possible run

in the future.

We also find (not to our surprise) that ideology plays a very important role in defining a cosponsorship strategy after we control for other relevant factors. In general, the more ideologically extreme legislators are, the more likely they are to work with copartisans than with members of the opposition, and the more likely they are to work with the opposition than alone. The odds ratios on which these conclusion are drawn are all discernible from 1 at the 90% confidence level, as can be seen in Figure 5.<sup>16</sup>

A legislator's district long-term ideological leanings – as measured by the moving average of the incumbent's party vote on the presidential elections in the district – is also found to have a significant and relatively important effect on her cosponsorship strategies. However, and contrary to what we anticipated, a higher tendency in the district to support a legislator's party in the presidential election is predicted to push legislators away from working with copartisans and toward working with the opposition: the odds of working with copartisans vs. working with the opposition are predicted to be reduced by almost 31% for every unit increase in the moving average of the party's vote share in the presidential election, all else being equal. This result seems more plausible in light of two independent findings reported by Theriault: first, less than one third of the polarization observed in the House of Representatives during our period of study can be attributed to increases in partisanship of the constituencies, once other factors are controlled for 2008; and second, polarization at the bill sponsorship stage is much lower than polarization at the roll-call voting stage of the legislative process 2009. In fact, we find that controlling for the type of the immediate electoral challenge (among other covariates), more *partisan* districts lead to more *bipartisan* efforts when it comes to cosponsoring. Because our original expectation was borne out of an extrapolation from the findings related to roll-call analyses, our results suggest that, although district ideology matters at the cosponsorship stage, the logic behind this connection is different from the logic that operates when studying roll-call behavior.

Finally, we find that legislators with leadership posts tend to prefer working either alone or cross party lines at the cosponsorship stage, being more likely to work alone than with the opposition, and more likely to work with the opposition than with copartisans. The latter comports with the idea that members with leadership positions tend to distinguish themselves both from

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<sup>16</sup>All subsequently discussed odds ratios will be discernible from 1, as can be verified in Table 2 of the Appendix.

members of their own party and from members of the opposition, a behavior that should result in more moderate sponsorship alternatives (Woon 2008)

Regarding the fit of our model, let us add that the estimated dispersion parameter was found to be significantly different from one (viz.  $\hat{\sigma}^2 = 0.04$ , to use Mebane Jr and Sekhon's notation), which supports our modeling decision over other plausible models, such as the traditional multinomial model for compositional data. The underdispersion indicated by so small a  $\sigma^2$  parameter is consistent with a clustering process resulting from our expectations about the cosponsorship decisions within legislatures: members of congress tend to make similar decisions for all the bills they sponsor (given, among other things, that their electoral incentives are the same throughout a term), but these decisions differ from legislator to legislator.

## **Changes in Electoral Challenges *as Result of Cosponsorship Strategies***

As usual, it is best to test as many empirical implications of our theories as possible. As we made explicit in hypotheses 3, 4, and 5, our theory implies that, all else being equal, choosing the “wrong” cosponsorship strategy should result in a worsened electoral situation during the next round of elections. If this is not the case, rational legislators ought not to follow the strategies we outlined in the model. Hence, for instance, our model predicts that a legislator with a tough primary should dedicate most of her cosponsorship portfolio to her copartisans. If she fails to do so, however, and chose to work more alone more often, or with members of the opposition more often, then the first principles assumptions of our theory imply that she should have an even harder primary challenge in the next election.

The portfolios predicted by our previous model can be thought of as the expected cosponsorship strategies given a particular electoral situation and given that our theory is correct. Since we have found enough evidence to suggest our theory is, at least in part, correct, we can treat some of these predicted portfolios as prescriptions – strategies that legislators should have followed in the face of their most pressing electoral challenges. Deviations from these prescribed cosponsorship strategies should therefore have clear electoral consequences, according to the first principles of our theoretical model. To our knowledge, this is the first attempt to find a systematic link between cosponsorship patterns and electoral fates in the study of the US Congress.

The empirical strategy will consist of modeling *changes in* the electoral challenges at both stages as functions of typical predictors of electoral performance (e.g. party ID, whether the election was midterm, etc.) *and* cosponsorship strategies during the term immediately preceding the election. In particular, we are interested in *how different* the actual, observed cosponsorship strategy adopted by the legislator was from the strategy expected under our theoretical model, on each of the relevant dimension of the cosponsorship portfolio. We call these differences “Errors” in reputation building.<sup>17</sup> Given that we found no support for Hypothesis 3, we cannot characterize any particular cosponsorship portfolio as being in error after having faced roughly equal challenges. In other words, we cannot test Hypothesis 6. Therefore, we focus this test of the prescriptive dimension of our model to the situations in which legislators face a distinct challenge at one of the electoral stages relative to the other. Hence, we will evaluate the effects of erring on the “with copartisans” dimension as well as on the “with opposition” dimension, on both the changes in the primary challenge and the general challenge. As a reminder, we wish to answer the questions raised by hypotheses 4 and 5:

1. For a legislator who had a tough primary and an average general, does making the mistake of working relatively less with copartisans (regardless of whether they work with the opposition or alone instead) than suggested by our model result in a tougher primary next time?
2. For a legislator who had an average primary and a tough general, does making the mistake of working relatively less with the opposition (regardless of whether they work with copartisans or alone instead) than suggested by our model result in a tougher general next time?

In order to answer these questions, we have first calculated the difference in the two-party margins of victory at time  $t$  and at time  $t + 1$  at the primary and general stages, subtracting the former from the latter so that smaller differences represent worse electoral situations. We then modeled these two quantities simultaneously using a bivariate normal distribution, the dimensions of which correspond to changes in primary and general elections. Although we use the

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<sup>17</sup>These are errors both in the statistical sense – or rather residuals – and errors in the prescriptive sense, since they are considered deviations from what our theory suggested as the best strategy given previous electoral conditions.

same control covariates for both dimensions, we model the means of the change in each electoral challenge with an interaction between the log of the error of interest (i.e. the error in amount of work with copartisans when considering primary challenges, and the error in work with the opposition when considering general challenges) and the margins of victory at time  $t$ . In other words,

$$\begin{bmatrix} \Delta P \\ \Delta G \end{bmatrix} \sim \mathcal{MVN} \left( \begin{bmatrix} \mu_p \\ \mu_g \end{bmatrix}, \Omega \right)$$

$$\begin{aligned} \mu_p &= \beta_0 + \beta_1 \mathbf{ErrorCopartisans} + \beta_2 \mathbf{MarginPrimary}_{t-1} \\ &\quad + \beta_3 \mathbf{ErrorCopartisans} \times \mathbf{MarginPrimary} + \mathbf{X}'\beta \\ \mu_g &= \gamma_0 + \gamma_1 \mathbf{ErrorOpposition} + \gamma_2 \mathbf{MarginGeneral}_{t-1} \\ &\quad + \gamma_3 \mathbf{ErrorOpposition} \times \mathbf{MarginGeneral} + \mathbf{X}'\gamma \end{aligned}$$

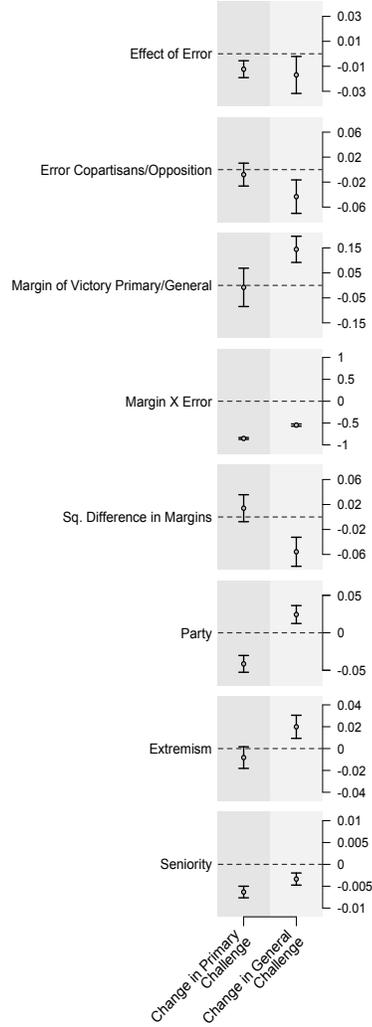
where  $\Delta P$  and  $\Delta G$  are the differences in margins of victory from one election to the next in the primary and general elections (margin at time  $t + 1$  minus margin at time  $t$ ), respectively;  $\mathbf{X}$  is a matrix of covariates, including the squared difference between margins in primary and general elections at the previous election (to follow the theoretical model's specification), the party of the legislator, their ideological extremism and their seniority; the error terms are constructed by taking the logarithm of the ratio between the value predicted by our previous model and the value observed; and the interactions will allow us to make predictions for specific electoral situations;  $\beta$  and  $\gamma$  are vectors of coefficients; and  $\Omega$  is a variance covariance matrix.

Using 4584 observations of legislators who ran at for at least two consecutive terms, we estimated this model using MCMC methods and found good evidence in favor of the prospective implications of our theory. Figure 6 shows the mean posterior effect of each of the conditional errors discussed in questions 1 and 2 above, along with 90% credible intervals.<sup>18</sup>

We find that, after controlling for other determinants of electoral outcomes, there is at least

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<sup>18</sup>The complete table of results can be found in the Appendix. In general, the conditional effects are estimated by sampling from the posterior distribution of the conditional effect of each error. As an example, consider the conditional effect of erring in the amount of work with copartisans on the change in primary challenge for a legislator with a tough



**Figure 6.** Estimated Mean Posterior Effects of (standardized) covariates on the change in electoral challenge at the primary and general elections, along with 80% Credible Intervals.

a 90% chance that failing to dedicate the right share of one’s cosponsorship portfolio to the appropriate pattern will result in a harder electoral challenge at the corresponding electoral stage, as indicated by the negative and reliable effects depicted at the top of Figure 6. Unlike frequentist confidence intervals, Bayesian credible intervals have the advantage of being interpretable as primary and an average general election:

$$\frac{\partial \widehat{\Delta P}}{\partial ErrorCopartisans} = \hat{\beta}_1 + \hat{\beta}_3 MinMarginPrimary$$

where *MinMarginPrimary* is the minimum observed margin of victory in the primary election (results also hold when using the first quartile). These results are based on a combination of 3 Markov chains and 25e4 samples from the posterior distributions. All estimates displayed good evidence of chain mixture and convergence to the stationary distribution according to the Brooks-Gelman-Rubin statistic and to the Geweke statistic, respectively.

real probabilities. In our case, our empirical model suggests that failing to build the cosponsorship portfolio our formal model suggests is the best deterrence strategy has detrimental electoral effects at least 90% of the time.

More specifically, consider Hypothesis 4. It followed from our model that, given that we found support for Hypothesis 1, we would expect to see legislators who faced a tough primary to experience even greater challenges at the primary stage if they failed to respond to the original challenge by working sufficiently with copartisans. We find that for every one percent of the workload not dedicated to cosponsoring with copartisans with respect to the amount stipulated by our previous empirical model, the margin of victory in the primary election of a legislator with a tough primary challenge is reduced even further by 1.2 percentage points. To put this effect size in perspective, ten percent of our sample won their primary race by a margin of less than 28% – so this effect is discernible but substantively relatively small.

Hypothesis 5 led us to expect an increase in the general election challenge whenever a legislator who, having experienced a tough general election, failed to work enough with the opposition. Holding other relevant factors constant, we find evidence that this is in fact the case, and that for every one percent reduction in the share of the cosponsorship portfolio dedicated to working with the opposition (once again, with respect to the expected workload derived from the empirical model in the previous section) we see a decline in the margin of victory of about 1.7 percentage points. Compared to the effect on primaries, however, the substantive meaning of this effect is substantial: the bottom ten percent of our sample won their general election by a margin of less than 7.3%. In other words, relatively small errors in being willing to cross the aisle when cosponsoring opens one up to a challenger from the opposition party with which the incumbent failed to cooperate.

The relative sizes of these effects are also informative and substantively interesting. Although making mistakes in either situation hurts a legislator's prospects in the next election, making the mistake of not working enough with the opposition when a tough general has been observed is, on average, more deleterious than making the mistake of not working enough with copartisans when a challenge is most likely to come at the primary stage. Certainly, we cannot expect that constituents are familiar with the minutia of cosponsorship profiles. Yet challengers, presumably, can be. Furthermore, it stands to reason that copartisan challengers would be easier to deter than

opposition challengers. Potential copartisan challengers likely are deterred by the relative unpopularity of running against a copartisan incumbent, a source of pressure that does not encumber opposition challengers. Interestingly, then, this loyalty from potential copartisan challengers allows disloyalty from incumbents to go relatively unpunished. Legislators can cheat their own party to better shore up their general election support, with less response from their potential copartisan challengers.

With the exception of seniority,<sup>19</sup> our controls displayed the expected behaviors. The squared difference in margins – a measure of how similar primary and general races were – has a clearly negative impact on the general election, implying that, when it is unclear where the challenge will come from, most of the times the challenge at the general election will increase. This result supports the argument above about primary challengers being relatively easier to deter. Ideological extremism appears to moderately hurt one’s prospects during primaries, but help decidedly during generals. Republicans seem to have a harder time during primaries, but a somewhat easier time during generals, which can be explained by the electoral system’s bias in favor of the GOP, which operates by creating safer, partisan districts, which in turn mean closer primaries (for a recent evaluation of bias introduced by electoral geography in favor of the GOP, see Rodden, 2010).

Finally, regarding our empirical modeling strategy generally, our choice of a bivariate normal model would not have been justified if the two dimensions of our model distribution (viz. the change in challenge at the primary and general elections) had shown no evidence of linear dependence. The estimated correlation between the two dimensions, however, is positive and discernible from zero (more specifically, the mean posterior correlation is 0.087), lending support to our modeling strategy. This positive correlation indicates that legislators’ electoral challenges change together: when primaries get tougher, so do generals, and viceversa. This behavior would have made separate estimations inappropriate, and is to be expected.

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<sup>19</sup>The counterintuitive finding regarding seniority may well point to the relative stability of electoral outcomes for senior legislators. Our measure is the difference between two election outcomes, and senior legislators may not see starkly different outcomes from election to election. At the most extreme, those senior legislators who never see a challenge would earn a 0 on our measure, because they never see a change in electoral outcomes.

## **Conclusion: Cosponsorship as a Defense against Challengers**

Our empirical operationalization of cosponsorship portfolios as compositions proved to be an efficient way of talking about reputation building, capturing our theoretical intuitions well. This operationalization strategy could prove fruitful for studies of other implications of cosponsorship patterns, inform other areas of legislative studies. For instance, the same approach could be used to capture partisan polarization at a stage of the legislative process far prior to roll call voting. Similarly, the elusive question of party effects could be explored at this stage of the legislative process, with the advantage that some of the usual agenda setting powers that confound studies based solely on roll call votes should operate in very different ways at the bill introduction phase.

Our results represent systematic evidence that directly connects elections to cosponsorship patterns and back again. Undoubtedly, bill cosponsorship is a reflection of district or personal ideology (Wilson and Young, 1997; Balla and Nemacheck, 2001). It also serves to signal other legislators where a member stands in terms of policy preferences (Krehbiel, 1995; Wawro, 2001). Beyond those uses, we have shown that bill cosponsorship can be used, quite effectively, as a reputational shield designed to defend an incumbent from his or her strongest potential challengers. Although challenger deterrence has been pinpointed as a reason for collecting a campaign war chest (Box-Steffensmeier, 1996) or securing federal funds for the district (Bickers and Stein, 1996), we find evidence that challenger deterrence can also account for decisions about with whom a member should collaborate while doing legislative work. Most generally, we find evidence that legislators strive to eliminate the possibility of being “called out” by their strongest opponent for having spent too much time working with the members most different from that opponent. Avoiding being “called out” requires that legislators build reputations that make it difficult for their toughest challengers to draw a distinction between them.

In future research we would like to explore whether the more difficult challenges induced by errors in reputation-building through cosponsorship are the result of encouraging better challengers to enter or if the errors simply give challengers of equal quality more ammunition with which to attack the incumbent. In other words, elites in the form of higher quality prospective challengers may be aware of the reputational error and enter to pose a challenge when they would have otherwise let a lesser quality challenger run against – and presumably lose to – an incumbent

with the appropriate deterrence shield. In this case, the incumbent is not only vulnerable because she built the wrong reputation but also because that reputation brought out a more qualified challenger. On the other hand, it may be that the quality of the challenger does not change, but that whoever emerges now simply has an opening through which to cast doubt on the incumbent's suitability for the constituency in question.

Retrospectively, legislators are more prone to pay attention to the electoral cues sent at the general election stage when deciding how to design their cosponsorship portfolios. Prospectively, that focus on the opposition party seems warranted as cosponsorship patterns have a greater deterrent effect for general elections. This asymmetry in the electoral connection of cosponsorship patterns was neither predicted nor preempted by our decision theoretic model. However, although general elections matter most in explaining cosponsorship patterns, primaries have an effect, too. Despite the asymmetry, it is likely that the failure to account properly for the institutional setting – considering *both* primary and general – explains the inability of the previous literature to uncover any relationship between elections and bill cosponsorship patterns.

Although novel in the formal and empirical literatures, these findings – that electoral outcomes matter when it comes to sponsoring bills, and that sponsoring bills matter when it comes to elections – is far from counterintuitive. In fact, since bill cosponsorship plays a large role in the legislative process, it could be considered surprising that more works have not connected cosponsorship with electoral outcomes. Our paper contributes to filling this gap in the literature. Our results underline the importance of electoral institutions – in this case, institutions that assure both intraparty and interparty competition – in translating voter preferences to political outcomes.<sup>20</sup>

Perhaps most importantly, our results provide an explanation for how outcomes correlate with constituent preferences, despite the inability of most constituents to understand or even know fully the behavior of those who represent them (MacKuen, Erikson and Stimson, 1989). Elites, here in the form of potential electoral challengers, provide information to constituents, either in the form of their own quality or by explicit attention to the incumbent's reputation, about the quality of representation constituents receive. In turn, this check prompts incumbents to think about their two sets of constituents when deciding what type of reputation they ought to pursue.

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<sup>20</sup>This type of finding is more frequently supported in the comparative literature on legislative/parliamentary politics. Most relevant to this paper, the role of electoral institutions in determining cosponsorship patterns has already been identified in the Chilean legislature (Crisp, Kanthak and Leijonhufvud, 2004).

Challenger deterrence keeps legislators “honest” and ensures that legislators who do not properly anticipate it are immediately punished. Cosponsorship patterns, then, although previously thought to be unrelated to the constituency connection, actually provide strong evidence, indeed, that the connection is robust.

## References

- Achen, Christopher H. 1977. "Measuring Representation: Perils of the Correlation Coefficient." *American Journal of Political Science* 4(21):805–15.
- Achen, Christopher H. 1978. "Measuring Representation." *American Journal of Political Science* 2(23):475–510.
- Aitchison, John. 1982. "The statistical analysis of compositional data." *Journal of the Royal Statistical Society. Series B (Methodological)* 44(2):139–177.
- Aitchison, John J. and James W Kay. 2003. "Possible solution of some essential zero problems in compositional data analysis."
- Alvarez, R. Michael and Betsy Sinclair. 2010. "Electoral Institutions and Legislative Behavior." Typescript. University of Chicago.
- Ansolabehere, Stephen, James M. Snyder, Jr. and Charles. Stewart, III. 2001. "Candidate Positioning in U.S. House Elections." *American Journal of Political Science* 1(45):136–59.
- Ansolabehere, Stephen., John M. Hansen, Shigeo. Hirano and James M. Snyder Jr. 2007. "The incumbency advantage in US primary elections." *Electoral Studies* 26(3):660–668.
- Arnold, R. Douglas. 1990. *The Logic of Congressional Action*. New Haven: Yale University Press.
- Balla, Steven J. and Christine L. Nemacheck. 2001. "Position Taking, Legislative Signaling, and Nonexpert Extremism: Cosponsorship of Managed Care Legislation in the 105th House of Representatives." *Congress and the Presidency* 2(27):163–88.
- Bickers, K.N. and R.M. Stein. 1996. "The Electoral Dynamics of the Federal Pork Barrel." *American Journal of Political Science* 40(4):1300–25.
- Box-Steffensmeier, Janet M. 1996. "A Dynamic Analysis of the role of War Chests in Campaign Strategy." *American Journal of Political Science* 2(40):352–71.
- Campbell, Angus, Philip E. Converse, Warren E. Miller and Donald E. Stokes. 1960. *The American Voter*. Chicago: University of Chicago Press.

- Campbell, James E. 1982. "Cosponsoring Legislation in the U.S. Congress." *Legislative Studies Quarterly* 7(3):415–22.
- Canes-Wrone, Brandice, David W. Brady and John F. Cogan. 2002. "Out of Step, Out of Office: Electoral Accountability and House Members Voting." *American Political Science Review* 1(96):127–40.
- Chayes, F. 1960. "On correlation between variables of constant sum." *Journal of Geophysical Research* 65(12):4185–4193.
- Crisp, Brian F., Kristin Kanthak and Jenny Leijonhufvud. 2004. "The Reputation Legislators Build: With Whom Should Legislators Collaborate?" *American Political Science Review* 4(98):703–16.
- Erikson, Robert S. 1971. "The Electoral Impact of Congressional Roll Call Voting." *American Political Science Review* 4(65):1018–1032.
- Erikson, Robert S. 1978. "Constituency Opinion and Congressional Behavior: A Reexamination of the Miller-Stokes Representation Data." *American Journal of Political Science* 3(22):511–35.
- Fenno, Jr., Richard F. 1978. *Home Style: House Members and their Districts*. Boston: Little, Brown.
- Fowler, James H. 2006. "Connecting the Congress: A study of cosponsorship networks." *Political Analysis* 14(4):456.
- Fry, Jane M., Tim R. L. Fry and Keith R. McLaren. 2000. "Compositional data analysis and zeros in micro data." *Applied Economics* 32(8):953–959.
- Geer, John G. 1986. "Rules Governing Presidential Primaries." *Journal of Politics* 4(48):1006–25.
- Gerber, Elisabeth R. and Rebecca B. Morton. 1998. "Primary Election Systems and Representation." *Journal of Law, Economics, and Organization* 2(14):304–24.
- Goldenberg, Edie N., Michael W. Traugott and Frank R. Baumgartner. 1986. "Preemptive and Reactive Spending in U.S. House Races." *Political Behavior* 8(1):3–20.
- Goodliffe, Jay. 2001. "The Effect of War Chests on Challenger Entry in U.S. House Elections." *American Journal of Political Science* 4(45):830–44.
- Huber, Peter J. and Elvezio Ronchetti. 2009. *Robust statistics*. John Wiley & Sons Inc.

- Jacobson, Gary C. 1989. "Strategic Politicians and the Dynamics of U.S. House Elections, 1946–86." *American Political Science Review* 3(83):773–93.
- Jacobson, Gary C. and Samuel Kernell. 1983. *Strategy and Choice in Congressional Elections*. 2 ed. New Haven: Yale University Press.
- Kanthak, Kristin and Rebecca B. Morton. 2001. The Effects of Primary Systems on Congressional Elections. In *Congressional Primaries and the Politics of Representation*, ed. Peter Galderisi and Mike Lyons. Lanham, MD: Rowman and Littlefield.
- Katz, Jonathan N. and Gary King. 1999. "A Statistical Model for Multiparty Electoral Data." *American Political Science Review* 93(1):15–32.
- Kaufman, Karen M., James G. Gimpel and Adam H. Hoffman. 2003. "A Promise Fulfilled? Open Primaries and Representation." *Journal of Politics* 2(65):457–76.
- Kessler, Daniel and Keith Krehbiel. 1996. "Dynamics of Cosponsorship." *American Political Science Review* 90(3):555–66.
- Koger, Gregory. 2003. "Position Taking and Cosponsorship in the U.S. House." *Legislative Studies Quarterly* 2(28):225–46.
- Krason, Johnathan S. and Donald Philip Green. 1988. "Preempting Quality Challengers in House Elections." *Journal of Politics* 4(50):920–36.
- Krehbiel, Keith. 1995. "Cosponsors and Wafflers from A to Z." *American Journal of Political Science* 39(4):906–23.
- Layman, Geoffrey C., Thomas M. Carsey and Juliana M. Horowitz. 2006. "Party polarization in American politics: Characteristics, causes, and consequences." *Political Science* 9(1):83.
- MacKuen, Michael B., Robert S. Erikson and James A. Stimson. 1989. "Macropartisanship." *The American Political Science Review* 83(4):1125–1142.
- Mayhew, David. 2004. *Congress: The Electoral Connection*. 2 ed. New Haven: Yale University Press.

- Mebane Jr, W. R. and J. S. Sekhon. 2006. *multinomRob: Robust Estimation of Overdispersed Multinomial Regression Models*. R package version 1.8-2.  
**URL:** <http://sekhon.polisci.berkeley.edu/>
- Mebane Jr, Walter R. and Jasjeet S. Sekhon. 2004. "Robust estimation and outlier detection for overdispersed multinomial models of count data." *American Journal of Political Science* 48(2):392–411.
- Miller, Warren E. and Donald E. Stokes. 1963. "Constituency Influence in Congress." *American Political Science Review* 1(57):45–56.
- Morton, Rebecca B. 1999. *Methods and models: A guide to the empirical analysis of formal models in political science*. Cambridge University Press.
- Norrander, Barbara. 1989. "Ideological Representativeness of Presidential Primary Voters." *American Journal of Political Science* 3(33):570–87.
- Poole, Keith. and Howard Rosenthal. 2000. *Congress: A political-economic history of roll call voting*. Oxford University Press.
- Ragsdale, Lyn and Timothy E. Cook. 1987. "Representatives Actions and Challengers Reactions: Limits to Candidate Connections in the House." *American Journal of Political Science* 1(31):45–81.
- Rodden, J. 2010. "The Geographic Distribution of Political Preferences." *Annual Review of Political Science* 13:321–340.
- Schlesinger, Joseph A. 1966. *Ambition and politics: Political careers in the United States*. Rand McNally.
- Theriault, Sean M. 2008. *Party Polarization in Congress*. Cambridge University Press.
- Theriault, Sean M. 2009. The Procedurally Polarized Congress. In *Annual Meeting of the Midwest Political Science Association, in Chicago, IL*.
- Tomz, Michael, Joshua A. Tucker and Jason Wittenberg. 2002. "An easy and accurate regression model for multiparty electoral data." *Political Analysis* 10(1):66.
- Wawro, Gregory J. 2001. *Legislative Entrepreneurship in the U.S. House of Representatives*. Ann Arbor: University of Michigan Press.

Weissberg, Robert. 1978. "Collective vs. Dyadic Representation in Congress." *American Political Science Review* 2(72):535-47.

Wilson, Rick K. and Cheryl D. Young. 1997. "Cosponsorship in the U.S. Congress." *Legislative Studies Quarterly* 22(1):25-43.

Woon, Jonathan. 2008. "Bill sponsorship in Congress: the moderating effect of agenda positions on legislative proposals." *The Journal of Politics* 70(01):201-216.

## Appendix A: Proofs

*Proposition 1:* When

$$\alpha < \frac{(P_o - P_p)^2}{P_o + P_p}$$

is true, the legislator will sponsor no bills alone.

*Proof:* The problem is one of constrained optimization. Using the method of Lagrange multipliers, we find that the constraint,  $\lambda$ , is equal to  $\alpha$ . Taking this into account, we can solve for the values of  $\pi_p$  and  $\pi_o$ . Those values are as follows:

$$\pi_o = \frac{P_o - \alpha}{2P_p}$$

and

$$\pi_p = \frac{P_p - \alpha}{2P_o}$$

We can see from this that when  $P_o, P_p \leq \alpha$ , the legislator ought not to work with the opposition or with copartisans, respectively, at all. This is because work alone is valuable enough relatively that the legislator ought to concentrate on working alone instead.

Furthermore, taking those two values together, coupled with the fact that the proportions of work must sum to 1, we can solve for  $\pi_a$ , where the following is true:

$$\pi_a = \frac{aP_o + aP_p - P_o^2 - P_p^2}{2P_p P_o}$$

Rearranging terms, we find that the value of  $\pi_a$  exists (i.e.  $\pi_a \geq 0$ ) when the following is not true:

$$\alpha < \frac{(P_o - P_p)^2}{P_o + P_p},$$

thus proving the proposition. Q.E.D.

*Proposition 2:* As the threat posed by drawing a primary challenger increases, the legislator will sponsor more bills with copartisans.

*Proof:* Via Proposition 1, when the following is true:

$$\alpha < \frac{(P_o - P_p)^2}{P_o + P_p}$$

then legislators will divide their time among working with the opposition ( $\pi_o$ ), working with a copartisan ( $\pi_p$ ), or working alone ( $\pi_a$ ), and the value for  $\pi_p$  is:

$$\pi_p = \frac{P_{\hat{p}} - \alpha}{2P_{\hat{o}}}$$

Because  $P_{\hat{p}}$  is a positive value in the numerator of the fraction, increases in  $P_{\hat{p}}$  translate to increases in  $\pi_p$ , thus proving the proposition under these circumstances.

When the following is true:

$$\alpha \geq \frac{(P_{\hat{o}} - P_{\hat{p}})^2}{P_{\hat{o}} + P_{\hat{p}}},$$

via Proposition 1, then legislators will divide their time between  $\pi_o$  and  $\pi_p$  only.

When this is the case, we can minimize the following argument:

$$P_{\hat{o}}(1 - \pi_o + \pi_p^2) + P_{\hat{p}}(1 - \pi_o + \pi_p^2)$$

which is simply the same equation as before, with  $\pi_a$  set to zero, subject to the constraint  $\pi_o + \pi_p = 1$ . Solving the constrained optimization problem yields the following equation:

$$\pi_p = \frac{3P_{\hat{p}} - P_{\hat{o}}}{2(P_{\hat{o}} + P_{\hat{p}})}$$

Since  $P_{\hat{p}}$  is a positive value in the numerator of the fraction, increases in its value thus increase the value of  $\pi_p$ , thus proving the proposition in this circumstance as well.

Q.E.D.

*Proposition 3:* As the threat posed by drawing a general election challenger increases, the legislator will sponsor more bills with the opposition.

*Proof:* The proof of Proposition 3 mirrors that of Proposition 2.

First, given what we know from the proof of Proposition 1, we know that the value of the proportion of work a legislator will spend on the opposition is equal to:

$$\pi_o = \frac{P_{\hat{o}} - \alpha}{2P_{\hat{p}}}$$

Because  $P_{\hat{o}}$  is a positive value in the numerator of the fraction, increases in  $P_{\hat{o}}$  translate to increases in  $\pi_o$ , thus proving the proposition in this circumstance.

When the following is true:

$$\alpha \geq \frac{(P_{\hat{o}} - P_{\hat{p}})^2}{P_{\hat{o}} + P_{\hat{p}}},$$

via Proposition 1, then legislators will divide their time between  $\pi_o$  and  $\pi_p$  only.

When this is the case, we can minimize the following argument:

$$P_{\hat{o}}(1 - \pi_o + \pi_p^2) + P_{\hat{p}}(1 - \pi_o + \pi_p^2)$$

which is simply the same equation as before, with  $\pi_a$  set to zero, subject to the constraint  $\pi_o + \pi_p = 1$ . Solving the constrained optimization problem yields the following equation:

$$\pi_o = \frac{3P_\delta - P_p}{2(P_\delta + P_p)}$$

Since  $P_\delta$  is a positive value in the numerator of the fraction, increases in its value thus increase the value of  $\pi_o$ , thus proving the proposition in this circumstance.

Q.E.D.

## Appendix B: Regression Tables

	$j = 1$		$j = 2$		(Implicit Comparison)	
	W/ Cop. Est	VS Alone SE.Sand	W/ Opp. Est	VS Alone SE.Sand	W/ Cop. Est	VS W/ Opp. SE.Sand
$\hat{\beta}_{1j}$ : (Intercept)	4.110	0.131	2.349	0.143	1.761	0.055
$\hat{\beta}_{2j}$ : MarginVictoryPrimary	-0.060	0.037	0.108	0.041	-0.168	0.016
$\hat{\beta}_{3j}$ : MarginVictoryGeneral	-0.061	0.041	-0.212	0.042	0.151	0.016
$\hat{\beta}_{8j}$ : (MarVicPrim - MarVicGen) <sup>2</sup>	-0.001	0.028	-0.022	0.029	0.022	0.011
$\hat{\beta}_{4j}$ : PercDelegationSameParty	-0.071	0.030	-0.284	0.032	0.214	0.012
$\hat{\beta}_{5j}$ : DeviationFromMedian	0.664	0.033	0.224	0.035	0.439	0.014
$\hat{\beta}_{6j}$ : M.A.PartyVotePresidential	-0.249	0.032	0.131	0.034	-0.379	0.013
$\hat{\beta}_{7j}$ : RedistrictYear?	0.074	0.028	0.231	0.027	-0.157	0.011
$\hat{\beta}_{8j}$ : Leadership?	-0.603	0.043	-0.439	0.048	-0.164	0.020

$N = 5670$ ; LQD  $\hat{\sigma}^2 = 0.047$

**Table 1.** Estimation Results of Robust Multinomial Model of Cosponsorship Portfolios. Values correspond to hyperbolic tangent estimators (except for dispersion parameter) and sandwich standard errors.

	$\Delta$ Primary Challenge		$\Delta$ General Challenge	
	Mean ( $\hat{\beta}$ )	SD	Mean ( $\hat{\gamma}$ )	SD
(Intercept)	0.832	0.012	0.2319	0.012
Conditional Effect of Error ( $\frac{\Delta Challenge}{\partial Error}$ )	-0.012	0.005	-0.017	0.009
Error Copartisans (Opposition)	-0.008	0.011	-0.043	0.016
MarVicPrim (MarVicGen)	-0.007	0.046	0.14	0.031
Margin $\times$ Error	-0.85	0.012	-0.54	0.015
(MarVicPrim - MarVicGen) <sup>2</sup>	0.014	0.013	-0.055	0.014
Republican?	-0.041	0.006	0.024	0.007
Extremism	-0.008	0.006	0.019	0.006
Seniority	-0.006	0.001	-0.003	0.001

$N = 4584; \hat{\rho} = 0.0871$

**Table 2.** Estimation Results of Multivariate Normal Model Using Markov Chain Monte Carlo. Values correspond to mean and sd of posterior densities, computed using 25e4 samples drawn by the Gibbs sampler. The largest absolute value among the Geweke statistics was 1.72, and every measure of the BGR statistic was below 1.1.  $\hat{\rho}$  is the estimated correlation between the two dimensions of the bivariate normal