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Splitting the Difference? Causal Inference and Theories of Split-party Delegations

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We provide an introduction to the regression discontinuity design (RDD) and use the technique to evaluate models of sequential Senate elections predicting that the winning party for one Senate seat will receive fewer votes in the next election for the other seat. Using data on U.S. Senate elections from 1946 to 2004, we find strong evidence that the outcomes of the elections for the two Senate seats are independent.

1 Introduction

Among U.S. federal elections, Senate elections are unique in that each state is a two-member district. Because the same set of voters choose the candidates to fill both Senate seats, we would expect the winning senators to have similar policy positions and to most often be from the same party. However, as Fig. 1 shows, there has consistently been a number of split-party delegations during the postwar period. Why?

At least two different models—which we respectively refer to as the ideological balancing model and the constituency support model—have been proposed to explain the origin of split-party delegations. While the mechanisms of the models are distinct, both models suggest that elections for the two Senate seats are interdependent. In other words, both models predict that the winning party in the election for the first Senate seat will be at a disadvantage when competing for the second Senate seat two or four years later.

A few studies have tested these models' basic prediction of election interdependence, but the results have been mixed. Alesina, Fiorina, and Rosenthal (1991) found that when an incumbent candidate runs during a presidential election year, the candidate is hurt when the other sitting senator is of the same party. More recently Schmidt, Kenny, and Morton

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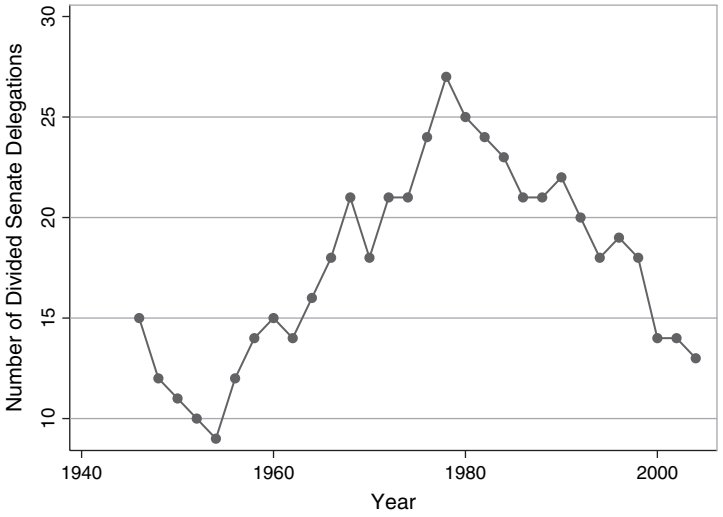

Fig. 1 Number of divided delegations in postwar era. Replication (with extended data) from Brunell and Grofman (1998).

(1996, 560) found that for incumbent senators, same-party candidates are disadvantaged even in nonpresidential elections.

On the other side of the debate, Segura and Nicholson (1995) find no evidence that the partisanship or ideological position of the sitting senator affects current election outcomes. Segura and Nicholson fit the probability that the incumbent party wins on a dummy for whether both senators in the state delegation are from the same party and find that the effect of the dummy for same partisanship is insignificant.

The answer to this debate is important because models assuming the interdependence of sequential Senate elections continue to be proposed (see Heckelman 2000, 2004; Schiller 2000). Given the mixed nature of the existing evidence, this article tests the independence of sequential Senate elections. The advantage of this study over previous research is that we use a regression discontinuity design (RDD), which allows us to exploit close elections as an intuitive quasi-experimental identification strategy. Using data from the years 1946–2004, we show that there is no evidence that the outcome in one election affects the outcome of the other. In light of these findings, efforts being put into models built on the assumption that sequential Senate elections are interdependent should be redirected to more fruitful avenues.

2 Models of Sequential Senate Elections

One way in which U.S. Senate elections differ from other U.S. federal elections is that each state is a multimember district in which representatives are elected sequentially to overlapping terms. While each state has two seats, the elections for those seats are staggered, with the elections being separated by either two or four years. In modeling U.S. Senate elections, several authors have noted their sequential nature and have suggested that the elections for two separate seats within a state are not independent but that the outcome of the election for one of the Senate seats will affect the outcome of the election for the other. At least two such general models have been proposed.

The ideological balancing model, which we discuss in section 2.1, focuses on the behavior of voters at the ballot box. The basic argument is that moderate voters, when

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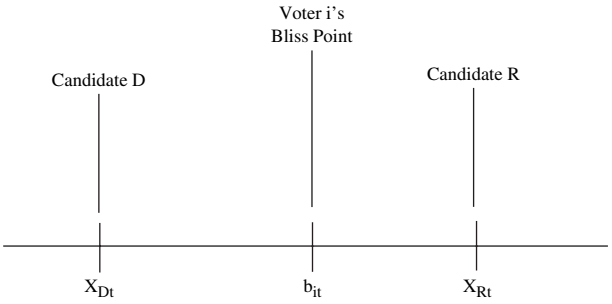

Fig. 2 Basic spatial voting model.

faced with a conservative and a liberal political party, impose compromise upon the sitting senator by voting for his or her ideological counterpart in the current election. A sitting liberal/conservative senator would be forced to work with a conservative/liberal senator to pass legislation forcing the state's Senate delegation to have a more moderate overall position that moderate voters prefer.

The constituency support model, which we discuss in section 2.2, uses slightly different logic but gives the same basic prediction. In general terms, the constituency support model suggests that there are diminishing returns in the form of political/wealth transfers to getting more and more of one's own candidates elected. Once a political party wins one election, the incentives of party supporters to win the next election decrease relative to the supporters of the losing party. This then gives the losing party the edge in competing for the other Senate seat in the next election.

2.1 *The Balancing Model*

The basic premise of ideological balancing is that moderate voters want to be represented by a moderate position and so will elect candidates from opposite parties to balance each other out. The formal logic behind this model is set forth by Alesina, Fiorina, and Rosenthal (1991) and Heckelman (2000, 2004). Readers interested in an extensive formal treatment of the model are referred to the original articles. Here we graphically review the basic logic of the spatial models in Figs. 2 and 3. Figure 2 shows the bliss point of voter i (b_{it}) and the position taken by candidates D and R (X_{Dt} and X_{Rt}, respectively) in the current election. In this basic spatial model, individual i votes for the candidate nearest her—candidate R in this case. Into this basic framework, the delegation balancing model adds

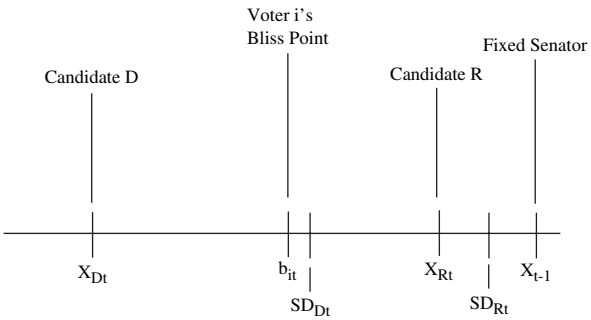

Fig. 3 Spatial voting model when conditioning on senator in other seat.

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the position of the sitting senator, which we denote as the "fixed senator" in Fig. 3 so as to emphasize that his or her position will not change as a result of the current election. Because the sitting senator's position will not change as a result of the election, voters can condition their choice on the sitting senator's position. If, as the delegation balancing model assumes, voters are interested in the overall position of their state's Senate delegation (SD_{Dt} and SD_{Rt}, depending on whether candidate D or R wins, respectively), then voter i will not compare the distance between her ideal point (b_{it}) and the candidate's positions (X_{Dt} and X_{Rt}) but rather the distance between her ideal point and the position of the resulting Senate delegation (SD_{Dt} and SD_{Rt}). We then get the result in these figures that voter i votes for candidate D (because b_{it} is closer to SD_{Dt} than to SD_{Rt}) even though candidate R is closer in absolute distance to her ideal point.

Within the Downsian framework the median voter is pivotal, so the candidate who provides the best balance to the other sitting senator, from the perspective of the median voter, will win. Which candidate will this be? If we assume that the median voter is located in the issue space between the two parties and that Senate candidates of the same party within the same state locate on the same side of the median voter, then in general the candidate of the opposite party of the sitting senator will win election t or at least have an advantage. The assumption concerning the placement of the median voter and the parties in the issue space is intuitive and finds support in applied work. For example, Fig. 1 of Ansolabehere, Snyder, and Stewart (2001, 142) shows that the positions of Republican candidates are almost always located to the right of the district median and Democratic candidates to the left. The basic prediction of this model, then, is that in sequential Senate elections, the party that wins one election will be disadvantaged and receive fewer votes than the opposition party in the following election for the other Senate seat.

2.2 *The Constituency Support Model*

Like the ideological balancing model, the constituency support model predicts that the winning party for one Senate seat will be disadvantaged in the contest for the other seat. However, in contrast to the balancing model, which is a story about ideal points, the constituency support model focuses on transfers from the candidate to his or her constituents. Jung, Kenny, and Lott (1994) lay out the basic logic of the constituency support model, with Schiller (2000) providing a more nuanced version of it.

The basic line of reasoning in Jung, Kenny, and Lott (1994) is that candidate supporters receive wealth/political transfers when one of their candidates wins. However, once they have elected a candidate, the marginal returns from winning another election decrease, giving supporters less reason to mobilize. In the case of U.S. Senate elections this implies that once a party wins one of the state's two Senate seats, the motivation of its supporters to win the other seat decreases. For the supporters of the losing party, their marginal returns to winning an election and the associated incentive levels to do so are unaffected. Combined, these two effects give the party that loses the election for one of the state's U.S. Senate seats an edge, ceteris paribus, in the next contest for the other seat. Jung, Kenny, and Lott describe the mechanism as follows:

> Past political success can also be self-defeating. Following Stigler's (1971) and Peltzman's (1976) assumptions that political support increases, but at a decreasing rate, with the level of transfers, the more success a politician has in increasing the wealth of his supporters, the lower the marginal value that his supporters receive from obtaining additional future transfers. The lower the marginal return that these supporters get from future transfers, the less effort they will put into winning the next election. (68)

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The concept of supporters applies broadly within this model and could include ethnic, economic, or other interest groups, or simply individuals. However, it is clear that Jung, Kenny, and Lott thought of political parties as a good way of capturing the camp of "supporters." In discussing applications of their theory, they write, "Democrats would find it hard to elect a senator whose term starts in 1990 if they had already won a Senate seat from that state in 1988 as their constituents would already have been partially placated by their 1988 victory" (70).

Schiller (2000) uses the same basic logic, suggesting that once a group has successfully elected one of their own candidates to a Senate seat, those supporters are less motivated to win the second Senate seat. The difference is that Schiller argues that the simple dichotomy of party label is not nuanced enough to capture the sources of candidate support. She suggests that there are four important dimensions: partisan/ideological, economic, geographic, and stylistic (21). Successful candidates win by mobilizing support among those not currently represented by the other sitting senator. By this logic, the wining party for the first Senate seat will, ceteris paribus, be at a disadvantage when competing for the other seat two or four years later because the candidate of the losing party can take the winning position on the economic, geographic, and stylistic dimensions and still have the advantage on the partisan/ideological dimension.

3 Research Design and Data

Both models discussed in the previous sections—the ideological balancing and constituency support models—predict that the candidate of the same party as the sitting senator (i.e., the senator not up for election) will be at a disadvantage in the current election. As noted above, earlier tests of this relationship have yielded mixed results. We help resolve the ambiguity by using a regression discontinuity design (RDD) and data on U.S. Senate elections during the postwar period (1946–2004) to test the prediction.

The RDD has been developed and used in other fields, particularly economics (e.g., Thistlethwaite and Campbell 1960; Judd and Kenny 1981; Trochim 1984; Angrist and Lavy 1999; Hahn, Todd, and van der Klaauw 1999, 2001; Shadish, Cook, and Campbell 2002; van der Klaauw 2002; Leuven and Oosterbeek 2004), but to our knowledge has not been used in the political science literature (although see Lee 2005 and Lee, Moretti, and Butler 2004 for political science applications done by economists). It is unfortunate that the RD design has not been used more in political science because it gives leverage on identifying causal relationships for many of the questions we are interested in. To help remedy that situation we provide a brief introduction to regression discontinuity designs. We emphasize that we are not introducing anything new but are rather providing an overview to a methodology that many readers will not have been previously exposed to. We intentionally keep the discussion fairly informal but provide references in footnotes for those interested in a more formal treatment.

The advantage of using an RDD is that it gives us quasi-experimental results. Under the assumption of random assignment of the treatment in a quasi-experiment, the researcher can compare the control and treatment groups directly without concern about the confounding effects of self-selection bias. The important characteristic of an RDD is the assignment of some treatment based on a continuous selection variable. The classic RDD example is awarding scholarships according to standardized test scores (Thistlethwaite and Campbell 1960). Some threshold for exam scores is set before the exams are taken, and any student who passes the threshold is awarded a scholarship. If the researcher were interested in the effect of that scholarship on income later in life, the students just below

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the threshold would provide the counterfactual to the students just above the threshold because on average the only difference between those two groups would be that one group got the scholarship and the other did not—just as it would be if we had randomly assigned the treatment.

The random nature of the selection variable is important because it precludes the possibility of self-selection into a treatment status around the threshold. It is the ex ante unpredictability that gives RDDs leverage. In the context of standardized testing, some students will guess correctly on problems they cannot solve and some will not. Thus students of equal ability could find themselves on opposite sides of the threshold due to the random nature of guessing. The inherently unpredictable nature of elections, particularly close ones, also provides the researcher with an intuitive quasi-experiment, which is why several recent papers have used RDD in the context of elections (see, e.g., Dinardo and Lee 2004; Lee, Moretti, and Butler 2004). The ex ante selection variable with a random element is the vote share for the two parties and the treatment is which party wins the election.

The intuition and advantages of RDD in the electoral context are made clear by thinking about a close election. For illustrative purposes, consider an election decided by a single vote. It is not hard to imagine that if a few things had been different—the weather on election day, the traffic that afternoon, or the content of the most recent news cycle—who turned out to vote, or for whom people chose to vote, could have changed so the opposing party would have won instead. Now think of 200 such elections: half where the Republican candidate won and half where the Democratic candidate won. On average the only difference between the 100 elections where the Republican won and 100 elections where the Democrat won would be the partisanship of the winner. So if we wanted to compute the effect that having a Democrat win has on an outcome of interest, we could simply compare means for the two groups because other potential confounding factors would on average be the same for the two groups.

In this article our RDD is to compare the Democratic vote share for the currently contested Senate seat in states where the other Senate seat's election was determined by a small margin of victory. Under the assumption of near random assignment we will compare the Democratic vote share of elections where the Democrats barely won and elections where Democrats barely lost the previously contested election for the other Senate seat in that state. To formalize this identification strategy, let the function for the observed Democratic vote share for observation i (V_i) be written as follows:

$$V_i = v_i + \varepsilon_i, \tag{1}$$

where v_i represents the observed characteristics of election i such as the relative quality of the candidates, the money spent on the campaign, the partisanship of the state's voters, etc., and ε_i represents the random shocks. It is worth noting that we are not asserting that the outcome in every election has to be changed by the random shocks captured in the error term. In some elections, the random shocks will have no effect on which candidate wins. Rather, the key assumption is that as the margin of victory in elections gets smaller and smaller, the observables (i.e., v_i's) are not systematically affecting which observations get the treatment. In other words, when one looks only at the observations where the election was close, there should be a balance of the predetermined covariates when comparing the control and treatment groups. It is important to note that simply using an RDD does not guarantee balance of the covariates. However, if an RDD is chosen well, we would expect there to be such balance. In our case, we are comparing free and fair elections and so we would expect that for close elections, the assignment of treatment is essentially random.

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One benefit of the discontinuity design is that the researcher can test this assumption on observables, which we do in section 5.

Note that observation i receives the treatment if V_i crosses some threshold γ. Because we are considering the two-party vote share in plurality elections, $\gamma = .5$. If we let D be a variable indicating if the observation received the treatment, a Democrat as the sitting senator, then $D = 1$ when $V_i \geq \gamma = .5$ and 0 otherwise.[1]

Technically any election can be decided randomly by the ε term; all that is needed is a shock large enough. However, the likelihood that an election will be decided randomly is directly related to how close V_i is to threshold value of γ (i.e., the outcomes of close elections are more likely to have been changed by random shocks). In our estimation, then, we want to weight observations with closer elections more heavily.[2] In the actual estimation, we accomplish this weighting by using a fourth-order polynomial on both sides of the threshold value and then taking the difference in the expected values at the threshold between the treatment and control groups.[3] Lee (forthcoming) and Lee, Moretti, and Butler (2004) also use a fourth-order polynomial as part of their estimation strategy.

This is not the only possible approach. Hahn, Todd, and van der Klaauw (2001) discuss a kernel estimator, and van der Klaauw (2002) considers the fourth-order polynomial in addition to others. We decided to use a fourth-order polynomial because it allows a great deal of flexibility in fitting the data without giving the researcher the ability to manipulate the results by making arbitrary choices about the kernel estimator. In the tables, which we present in section 4, we also do nonparametric comparisons—just comparing means—as we restrict the sample to those observations closer and closer to the threshold value. These results confirm those found using the polynomial.

The data used in the estimation include all the Senate elections in and between 1946 and 2004. The dependent variable is the Democratic percentage of the two-party vote share in the current election.[4] The measure for the independent variable comes from the election results for the other senator's last election (either two or four years earlier). The independent variable is best thought of as a dummy variable for whether the observation receives the treatment (i.e., a Democratic sitting senator) weighted by how close the race for the sitting senator was. In other words, while vote share is used for weighting purposes in the estimation, the actual "variable" whose impact we are trying to estimate is a dummy

[1]Here we assume $\geq$ for completeness. There is no case in which equality holds in the data set (i.e., we do not observe a perfect tie in any of these elections).

[2]Readers interested in a formal treatment are referred to part b of Lee's (forthcoming) theorem 2, which shows formally why we want to weigh observations closer to the threshold value more heavily.

[3]This is equivalent to estimating the following equation:

$$Y_i = \hat{\beta}_1 X_i + \hat{\beta}_2 X_i^2 + \hat{\beta}_3 X_i^3 + \hat{\beta}_4 X_i^4 + \hat{\beta}_5 D_i + \hat{\beta}_6 D_i X_i + \hat{\beta}_7 D_i X_i^2 + \hat{\beta}_8 D_i X_i^3 + \hat{\beta}_9 D_i X_i^4$$

where Y represents the Democratic vote share in the current Senate election, X represents the Democratic vote share in the election for the sitting senator, and D is a dummy variable that equals 1 when the sitting senator is a Democrat (i.e., $X_i \geq .5$) and 0 otherwise. We then calculate the value:

$$(\hat{Y}_i \mid X_i = .5, D_i = 1) - (\hat{Y}_i \mid X_i = .5, D_i = 0).$$

[4]As is typical in U.S. federal elections, third parties rarely if ever seriously competed for Senate seats so excluding them has no practical effect. While almost all Senate races had a candidate from each of the two major parties, there are a few races, mostly in the South, in which only one of the major parties fielded a candidate. The values for the variables for those years were coded as missing. Alternatively, one could assign the party that did not field a candidate 0 votes and then calculate the values as indicated above. We reran the estimation using this alternative and it did not change the conclusions reached by the original analysis.

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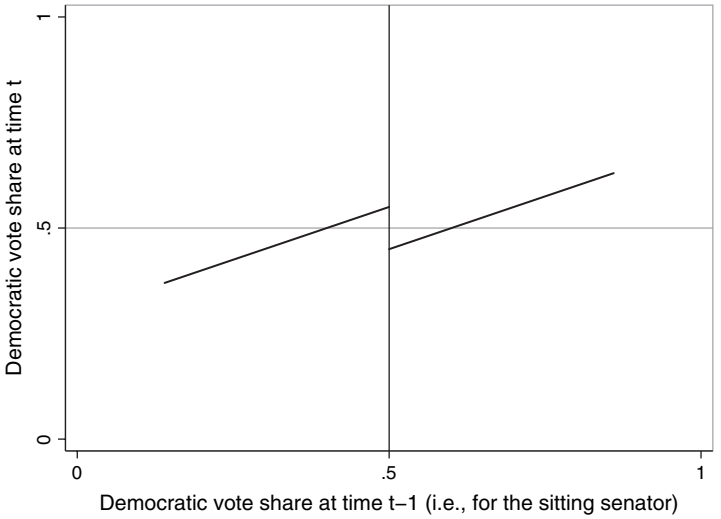

Fig. 4 Expected results if elections are interdependent.

variable for the partisanship of the sitting senator (i.e., a dummy variable for who received the treatment).

4 Empirical Results

The models in section 2 that predict the elections for the two Senate seats are interdependent such that the party that wins the election for one Senate seat will receive fewer votes in the election for the other seat. Figure 4 graphically displays the prediction of this model.[5] The x-axis is the Democratic vote share in the previous election for the sitting senator (i.e., the one not up for election) and the y-axis is the Democratic vote share for the current election. The vertical line represents the threshold value. To the right (left) of the line, the sitting candidate is a Democrat (Republican). If the models presented in section 2 are correct, there should be a drop at the threshold, as displayed in figure 4, when moving from left to right. If a Republican wins the election at t-1, the Democratic candidate should get a boost in election t, and vice versa. If, however, the models are wrong and the elections are in fact independent, there should be no discontinuity at the threshold (i.e., $x = .5$), as displayed in Fig. 5.

Figure 6 is a graph of the actual relationship, using data on Senate elections from 1946 to 2004. As before, the axes show the Democratic vote share with the x-axis the vote share in the election for the sitting senator and the y-axis the vote share for the current election. Each point represents the local average of the dependent variable where the bins are .01 wide. The observations to the left of the vertical line are those where the sitting senator is a Republican; to the right, the observations where the sitting senator is a Democrat. As noted in section 3, a fourth-order polynomial was used on each side of the threshold to get predicted values of the dependent variable. The solid line in Fig. 6 plots out the predicted values and the dashed lines the corresponding confidence intervals.

[5]We expect the slope of this line to be positive and between 0 and 1. We expect it to be greater than 0 because elections in which the Democrats win by a large majority tend to be in states in which the Democratic party is stronger and therefore likely to do well in the other statewide elections. However, we expect the slope to be less than 1 because of the regression to the mean effect.

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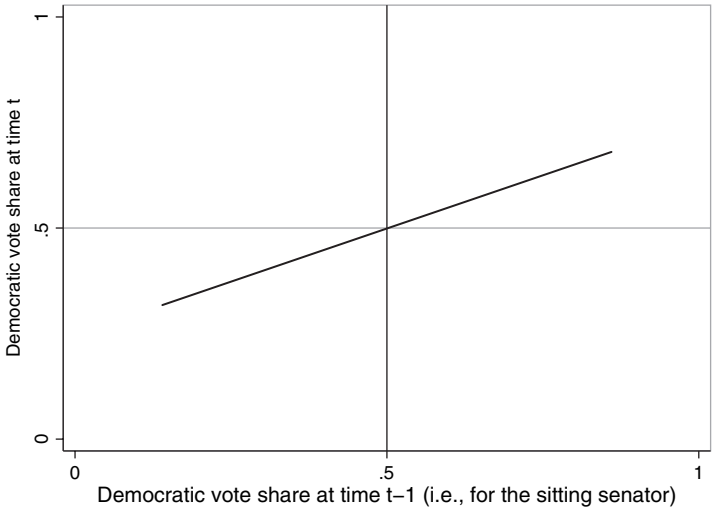

Fig. 5 Expected results if elections are independent.

A quick look at Fig. 6 shows that it closely resembles Fig. 5; there is no discontinuity or drop.[6] These are the results we would expect if the elections for the two Senate seats were independent. The actual estimate of the gap at the threshold confirms the intuition of the graphical results. The estimated effect of receiving the treatment[7]—i.e., having a Democratic sitting senator—is 0.012, just over 1%, with a corresponding standard error of 0.024.[8] Not only is the gap statistically insignificant at conventional levels but the sign for the estimate of that gap is positive, indicating that there is a jump at the threshold rather than the drop predicted by both models discussed in section 2.

We also test the robustness of the results by comparing the difference in means between the treated and control groups (i.e., districts where the sitting senator was, respectively, a Democrat or a Republican) as we restrict the sample to observations where the margin of victory of the initial election (i.e., for the sitting senator) was smaller and smaller. These results are displayed in the first four columns of Table 1, where each column shows the results of a separate comparison of means test and the column headers indicate the subsample of observations that were included. So the results in the first column come from using all the observations, the second column when the sample is restricted to those observations where the winning candidate had 60% or less of the two-party vote, the third column 55% or less, etc. Table 1 shows that as we limit the sample to those observations closer to the treatment threshold, the effect of the partisanship of the sitting senator on the

[6]While we have found no causal effect in our discontinuity design, the RDD has no inherent bias toward zero. For example, using the same data to estimate party incumbency advantage for the U.S. Senate, we find that there is a large positive discontinuity. In our estimation we used the same dependent variable but with vote share for that seat from six years earlier (instead of the results from the other seat) as the independent variable. The full results are presented in the appendix.

[7]The value of the gap is calculated by taking the difference in the predicted values at the threshold (x = .5) for the treatment group (i.e., a Democratic sitting senator) and the control group (a Republican). It is estimated more formally by using the following equation: $(Y_i \mid X_i = .5, D_i = 1) - (Y_i \mid X_i = .5, D_i = 0)$.

[8]The standard error of the gap was estimated by the following equation:

$$\sigma = \sqrt{(\sigma^2_{x=.5,D=0} + \sigma^2_{x=.5,D=1})}.$$

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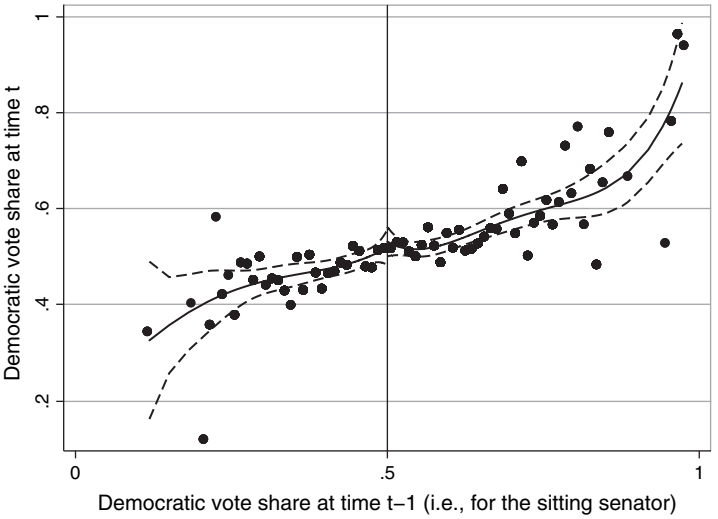

Fig. 6 Independence of Senate elections, 1946–2004.

current election approaches zero, strong evidence against the delegation balancing and constituency support models as applied to sequential Senate elections.[9]

There are at least two potential criticisms that could be made at this point. First, one might argue that our RDD will provide an estimate that is valid only for close elections that are not representative of elections generally. In the context of Senate elections, close elections are more likely to occur in districts where the two parties are evenly matched. While that general point should be kept in mind when using an RDD, it does not invalidate the findings of this article. Weighting close elections more heavily actually makes finding a causal effect more likely. It is in the districts where the parties are fairly evenly matched that causal mechanisms described in these models are most likely to work. In using the discontinuity design, we have favored finding an effect and still found none.

The second potential criticism is that in a true Downsian framework, the candidates converge to the position demanded by the median voter to win. One might argue, then, that the model is correct and that we do not observe a causal impact because candidates are also conditioning their platforms on the position of the sitting senator. If the sitting senator is a Republican to the right of the median voter, both the Democratic and Republican candidates in the current election will move to the left of the median voter and take a liberal position in order to compete in the election. If this happened then we might not observe a causal effect on vote share even though the position of the sitting senator was affecting the policy outcome.

In response to this potential criticism, three points can be made. First, the data we have on candidate positioning suggest that in contemporary U.S. elections, the Democratic candidate almost always takes a position to the left of the district median and the

[9]One reviewer pointed out that we might find an effect if we looked only at the observations in the second half of the sample because of the increased party polarization during that period. It might be that the similarities between the parties during the 1950s and 1960s kept there from being any need for balancing, so by pooling those observations with the later years any effect might be washed out. To check for this possibility we divided the sample in half (1946–1974 and 1976–2004) and ran the analysis described above on each half separately. The results from both periods were not substantively or statistically different from the pooled results. The results are available from the authors upon request.

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Table 1 Estimating the gap, or causal effect of the partisanship of the sitting senator on the current election, for closer and closer elections

Variable	*Difference Dem-Rep*	*±10 percent Dem-Rep*	*±5 percent Dem-Rep*	*±2 percent Dem-Rep*	*Polynomial Dem-Rep*
Vote share for sitting senator	**0.061**	**0.027**	0.017	0.008	0.012
Std error	(0.008)	(0.009)	(0.011)	(0.017)	(0.024)
T-stat	7.73	2.99	1.50	0.45	0.50
N	929	577	357	155	929

Note. Standard errors in parentheses. Variables that are significant at the 0.05 level are in bold.

Republican a position to the right (see, e.g., Ansolabehere, Snyder, and Stewart 2001). Second, most U.S. senators are subject to primaries or at least the threat of them. If a Republican senator were to take a Democratic position, the candidate would almost certainly be challenged in the primary and lose to any candidate taking a Republican position (i.e., right of the median). Third, our empirical results show that candidates are not moving to the platform position opposite the sitting senator. We tested for this possibility by using an RDD with the partisanship of the sitting senator (who won the election at time t−1) as the independent variable, but now with the ADA score of the winner of the current election (at time t) as the dependent variable.[10] If it is the case that both candidates try to move to the position on the opposite side of the median from the position of the sitting senator, then we should see a negative drop at the cut point, similar to what we expected under the hypothesis of election interdependence (see Fig. 4 again). Of course, if the senators are not converging to that spot, then we should see no discontinuity. Figure 7 graphically displays the estimation results on the data and shows no effect. Again the point estimates are not only statistically insignificant but they are positive—the opposite of what is predicted by the balancing model (see Table 2), although consistent with Fowler (2005).

5 Testing Quasi-random Assignment

The empirical results of this article, and regression discontinuity more generally, depend on making the assumption that assignment of the treatment is random close to the threshold value. For this study, that means we are assuming that as one compares closer and closer elections in the race for the sitting senator, the differences in the predetermined characteristics between the districts where the Republican won and those where the Democrat won should get smaller and smaller. Essentially we are assuming that before the initial elections were held, the districts where the Democrats won by a very small margin should, on average, look very similar to the districts where Republicans won by a very small margin.[11] If this is not true, then there is potentially self selection bias, which if correlated with the eventual outcome of interest can potentially bias the results.[12]

One advantage of the discontinuity design is that one can test the assumption of quasi-random assignment against the observable predetermined characteristics. If random assignment assumption is correct, as the elections get closer the districts where Democrats

[10]We use inflation-adjusted (aka turbo) ADA scores (Groseclose, Levitt, and Snyder 1999) in the estimation.
[11]See Hahn, Todd, and van der Klaauw (2001) and Lee, Moretti, and Butler (2004) for more formal discussions of this assumption.
[12]Of course, in some cases it is just such self sorting that is of interest (see, e.g., Hahn, Todd, and van der Klaauw 1999 and Leuven and Oosterbeek 2004).

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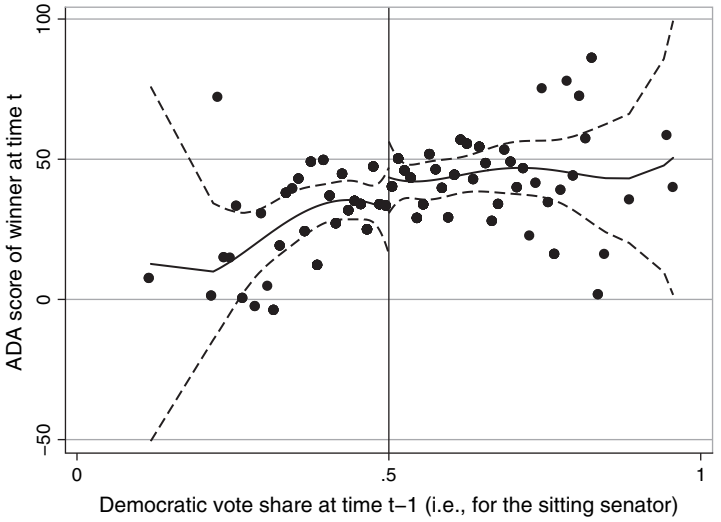

Fig. 7 Balancing behavior among election winners.

barely won and those where Republicans barely won should look very similar ex ante. We test this assumption looking at a number of predetermined characteristics including per capita personal income in the state, the state's population size, the partisanship of the sitting president, whether it was a presidential or midterm election year, the region (using the Inter-University Consortium for Political and Social Research's regional coding), the lagged vote share of the sitting senator (i.e., lag of the independent variable), how the state voted in the last presidential election, whether the seat was open, and finally the inflation-adjusted (aka turbo) ADA scores (Groseclose, Levitt, and Snyder 1999) for both of the state's two Senate seats. The results are displayed in Table 3 and show that as the elections get closer, the differences between the two groups of districts become statistically indistinguishable from zero.[13] This can be seen in the results of the polynomial estimate as well as for the elections within 2% of the threshold value. In both cases, the differences are statistically insignificant, supporting the hypothesis that the treatment was randomly assigned in "close" elections. These results, indicating that the random assignment criteria

Table 2 Estimating the causal effect of the partisanship of the sitting senator on the ADA score of the winner of the current election

Variable	*Difference Dem-Rep*	*±10 percent Dem-Rep*	*±5 percent Dem-Rep*	*±2 percent Dem-Rep*	*Polynomial Dem-Rep*
Vote share for sitting senator	**9.08**	**8.19**	**6.88**	5.83	5.92
Std error	(2.20)	(2.76)	(3.41)	(5.25)	(6.54)
T-stat	4.13	2.96	2.02	1.11	0.87
N	833	528	327	143	833

Note. Standard errors in parentheses. Variables that are significant at the 0.05 level are in bold.

[13]The graphs testing the random assignment assumptions for each of these variables are available from the authors upon request.

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Table 3 Random Assignment Checks

Variable	*Difference (1)*	*±10% (2)*	*±5% (3)*	*±2% (4)*	*Polynomial (5)*
Democratic president	−0.06	−0.03	0.03	0.04	0.12
	(0.03)	(0.04)	(0.05)	(0.08)	(0.10)
Presidential election year	0.01	0.00	−0.03	−0.07	−0.07
	(0.03)	(0.04)	(0.05)	(0.08)	(0.10)
Dem pres in pres election	0.03	0.01	0.00	−0.02	−0.01
	(0.03)	(0.04)	(0.05)	(0.07)	(0.08)
Dem pres in midterm election	**−0.09**	−0.04	0.02	0.05	0.12
	(0.03)	(0.04)	(0.04)	(0.06)	(0.08)
Rep pres in pres election	−0.02	−0.01	−0.05	0.06	−0.08
	(0.03)	(0.04)	(0.05)	(0.07)	(0.08)
Rep pres in midterm election	**0.08**	0.04	0.01	0.02	−0.05
	(0.03)	(0.04)	(0.05)	(0.07)	(0.08)
South	**0.13**	0.02	0.01	−0.04	−0.09
	(0.03)	(0.03)	(0.04)	(0.07)	(0.08)
North	**−0.07**	−0.06	−0.07	−0.04	−0.02
	(0.03)	(0.03)	(0.04)	(0.07)	(0.08)
Midwest	−0.05	0.00	0.02	0.04	0.04
	(0.03)	(0.04)	(0.05)	(0.07)	(0.09)
West	0.00	0.04	0.03	0.03	0.07
	(0.03)	(0.04)	(0.05)	(0.07)	(0.09)
Per capita personal income	−0.08	0.81	0.70	2.47	1.33
	(0.66)	(0.83)	(1.03)	(1.56)	(1.94)
Population size	0.47	0.29	0.08	−0.58	−0.19
	(0.32)	(0.43)	(0.56)	(0.84)	(0.94)
Presidential vote share	**0.04**	**0.02**	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Open seat	**−0.06**	−0.06	−0.02	−0.01	0.09
	(0.03)	(0.04)	(0.04)	(0.07)	(0.08)
Lag ADA score for other seat	**22.4**	**16.9**	**13.2**	7.2	2.6
	(2.1)	(2.8)	(3.5)	(5.4)	(6.1)
Lag ADA score for own seat	**14.5**	**10.7**	6.1	5.6	5.8
	(2.1)	(2.7)	(3.4)	(5.1)	(6.1)

Note. Per capita personal income reported in thousands of dollars. Population size measured in thousands. Standard errors in parentheses. Variables that are significant at the 0.05 level are in bold.

are met for close elections, give us confidence that there is not self-selection for close elections based on unobservable characteristics.

6 Discussion

We have provided strong evidence that models of interdependent sequential elections should be rejected in favor of the null hypothesis that Senate elections are independent. One of problems with the balancing model as applied to Senate elections is that it assumes that voters care only about the representation of their own state delegation and not about the ultimate policy outcome. This problem stems from the assumptions the model makes about the sophistication of the voters. On one hand, voters are assumed to be sophisticated enough to strategically counterbalance the sitting senator, and on the other, they are not sophisticated enough to worry about the effect on the ultimate policy outcome. In reality

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the sophisticated voter assumed by Heckelman (2000, 2004) and Alesina, Fiorina, and Rosenthal (1991) will care more about the median position of the Senate than their own state's Senate delegation. The basic logic underlying these models may be correct, but if the models do not account for the context of the elections (i.e., the nature of the relationship between the branches of government or among the senators) they will incorrectly predict voting behavior. (Segura and Nicholson [1995] make a similar point.)

There is compelling evidence that a small but nontrivial number of voters intentionally split their ticket when voting as a way of getting more moderate policy outcomes (see Mebane 2000; Mebane and Sekhon 2002). Those results, applying to voting on legislative-executive outcomes, are not necessarily inconsistent with the findings here. In splitting their ticket between the executive and legislative branches, voters are considering the policy process as a compromise between the those branches and are electing opposing parties as a way of moderating the final outcome.[14] Our results do not necessarily mean that the ideological balancing is not worth pursuing but rather that future research will be improved by incorporating the political context more into the model.

In support of the constituency support model, Schiller (2000) provides evidence that legislators from the same state diversify by taking on different issues even when the two senators are from the same party. She interprets this as evidence that senators respond to the electoral incentives to identify and appeal to underrepresented voting blocs. In light of our results, a more plausible explanation for her results is that senators diversify because there is an institutional norm in the Senate that two senators from the same state and same party cannot sit on the same committee (Schiller 2000, 43–44). As senators are forced to sit on different committees, they naturally spend time doing work on different issues. While there may be things the constituency support model can explain, there seems to be no support for the model as it applies to the behavior of voters at the ballot box.[15]

Given that the balancing and constituency support models do not explain the existence of split-party delegations, what does? Brunell and Grofman (1998) argue that partisan shifts have played a primary role in creating split-party delegations. They point out that the cycles of going from relatively low numbers of divided delegations to high numbers and back down again have coincided with shifts in the relative strength of the two parties (see Fig. 8). When one party dominates American politics, the number of divided Senate delegations is low. Because they did not consider the importance of incumbency advantage, Brunell and Grofman missed one of the more interesting aspects of the trends in the number of split delegations, namely that the cycle observed in the postwar era is much longer and drawn out compared with earlier cycles (see Fig. 8). As it turns out, the beginning of this cycle, around 1950, corresponds to the time when incumbency advantage began to become an important factor, growing over the time period covered (Gelman and King 1990). This comports with Burden and Kimball (2002), who find that incumbency advantage is an important cause of split-party delegations.

In providing a better test of the ideological balancing and constituency support models, we have described the regression discontinuity design (RDD) to an audience largely unfamiliar with this approach. Understanding the RDD is important because it is a relatively simple method to understand and has a number of potential applications in political

[14]We also used an RDD similar to the design we use in this paper to test ticket splitting between the state legislature and the governor, but the results were inconclusive. There was a gap in the direction expected by the balancing theory, but it did not reach standard levels of statistical significance.

[15]The constituency support model might make more sense regarding such things as campaign contributions. It seems odd, however, when applied to the voting booth. Voters have policies they prefer and vote for the candidate who can best achieve them, regardless of the position of the sitting senator.

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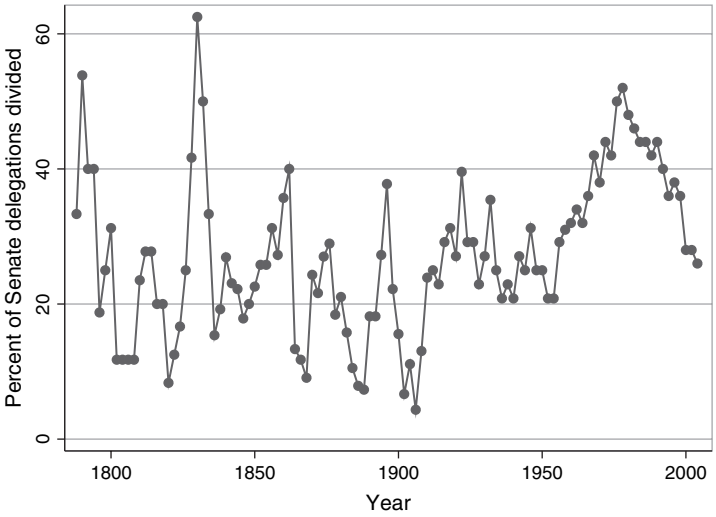

Fig. 8 Divided delegations, 1788–2004.

science. Frequently we are interested in the impact of an election or vote in Congress, but we always face the possibility that the vote merely reflects some underlying but unobserved sentiment, trend in opinion, or other unmeasured causal forces and that it is not the passage of the law or election that is really at play but rather this underlying "factor." The regression discontinuity design allows us to integrate out the other confounding factors and isolate the effect of the treatment of interest. The regression discontinuity design is a powerful tool for making causal inferences that should be used more frequently in political science.

Appendix

As noted in note 6, using the same data and an RDD, we looked at the incumbency advantage in the Senate during the period 1946–2004. We take the incumbency advantage to be how much better a party does in a district *because* the incumbent runs as opposed to having an average, nonincumbent candidate run. To measure the incumbency advantage we first used an RDD to estimate how well parties do where they have incumbents (i.e., we restricted the analysis to races where an incumbent was running). We followed the same procedures used in the article, but this time used the previous vote share for the *same* seat as the independent variable. The results are given in the top of Table A1 and show that there is about a 9–11 percentage point advantage.

Next we got a measure of the counterfactual—how much of an advantage does a party enjoy when it runs an average candidate (in a seat it previously controlled)—by doing the same analysis on the subsample of open seats. These results are given in middle of table A1 and show that there is strong evidence that the incumbent party does not enjoy any advantage in open seat races, ceteris paribus. To get the measure of the incumbency advantage, then, we take the differences between the results in the top and middle of Table A1.[16] The last row of Table A1 gives these results, showing that the incumbency advantage is about 8–10 percentage points.

[16]We assumed that the covariance between the estimates was zero when calculating the standard errors.

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Table A1 Average incumbency advantage in the U.S. Senate, 1946–2004

	Difference Dem-Rep	*±10% Dem-Rep*	*±5% Dem-Rep*	*±2% Dem-Rep*	*Polynomial Dem-Rep*
Races w/Incumbents					
Vote share	**0.146**	**0.091**	**0.087**	**0.080**	**0.087**
Std error	(0.008)	(0.009)	(0.011)	(0.018)	(0.023)
T-stat	18.06	9.47	7.63	4.42	3.96
N	806	441	268	114	806
Open Seats					
Vote share	**0.031**	0.024	−0.006	0.004	−0.020
Std error	(0.014)	(0.015)	(0.017)	(0.022)	(0.040)
T-stat	2.15	1.64	−0.33	0.19	−0.50
N	166	117	70	39	166
Incumbency Advantage					
Vote share	**0.115**	**0.067**	**0.093**	**0.076**	**0.107**
Std error	(0.024)	(0.017)	(0.020)	(0.028)	(0.046)
T-stat	4.79	3.94	4.65	2.71	2.33

Note. Standard errors in parentheses. Variables that are significant at the 0.05 level are in bold.

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