

The Interdependence of Sequential Senate Elections: Evidence from 1946-2002

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Abstract

Among U.S. federal elections, Senate elections are unique in that each state is a two-member district where representatives are elected sequentially to overlapping terms. Models of the sequential nature of Senate elections have been proposed suggesting that the outcome of the election for one of the state's two U.S. Senate seats affects the contest for the other. More specifically, these models predict that the winning party for the first Senate seat will receive less votes, holding other things constant, in the next election for the other seat. Using data on U.S. Senate elections from 1946-2002 and a regression discontinuity design (RDD), I find strong evidence that the outcomes of the elections for the two Senate seats are independent for close elections.

1 Introduction

In multi-member districts with staggered elections, does the identity of the winning party in one election affect the outcome in the next? In other words, are the elections for the separate seats independent or interdependent? In the context of U.S. Senate elections, at least two different models - which I respectively refer to as the delegation balancing model and the constituency support model - have been proposed which predict that elections for the two

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Senate seats in any given state are interdependent. Further both of these models make the same prediction regarding the nature of that interdependence, namely that the party that wins one of the state's U.S. Senate seats will receive less votes, holding all else constant, when competing for the other Senate seat two or four years later (see e.g. Alesina, Fiorina, and Rosenthal (1991), Heckelman (2000), and Jung et al. (1994)).

A few studies have tested this prediction by seeing whether the partisanship of the sitting senator (i.e. the one not up for election) affects the outcome for the other Senate seat, but with mixed results. Alesina, Fiorina, and Rosenthal (1991) find that under some conditions, specifically when an incumbent candidate runs during a presidential election year, that candidate is hurt when the other sitting Senator is of the same party. More recently Schmidt, Kenny, and Morton (1996) have found evidence supporting the idea under broader circumstances (560). Still their study is also limited to incumbent Senators.

On the other side of the debate, Segura and Nicholson (1995) find no evidence that the partisanship of the sitting senator affects the outcome of the current election. Segura and Nicholson do a probit analysis with the dependent variable a dummy variable for whether the incumbent party wins or loses and the independent variable another dummy for whether both Senators in the state delegation are from the same party or different parties. They suggest that if the election outcomes are dependent on each other then the incumbent is more likely to lose, *ceteris paribus*, if both sitting Senators are of the same party. They find that the effect of the dummy for the partisanship of the state's Senate delegation is insignificant. Of course their findings are open to potential criticisms including the fact that their measures of the independent and dependent variables are only dummies that are rough at best (i.e. as opposed to looking at vote share). Further, it is very likely that the independent variable of interest, partisanship of the sitting Senators is correlated to unaccounted for factors affecting incumbents. Perhaps it is because of such criticisms that their findings have been ignored as models continue to be proposed that suggest that within-state U.S. Senate election outcomes are dependent on each other (e.g. Heckelman (2000, 2004)).

Given the mixed nature of the existing evidence combined with the continued interest in modeling sequential Senate elections the relationship between the election outcomes for the within-state U.S. Senate seats deserves further scrutiny. The primary purpose of this paper is to use an innovative approach to test for the independence/interdependence of sequential Senate elections. The advantage of this study over previous studies is that I 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 1946-2002 I show that contrary to what the delegation balancing model and constituency support model predict, there is no evidence that the outcome in one election affects the outcome in the other. Thus I find confirming evidence for the results of Segura and Nicholson (1995), that sequential Senate elections are independent of each other.

I begin this paper by reviewing both the delegation balancing model and constituency support model. Having introduced the models, I discuss the RDD method and its ideal applicability to this case. I then introduce the data I use and present the results. I finish with a discussion of our findings and their implications for modeling voting behavior in Senate elections and other multi-member districts with overlapping terms.

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 multi-member district with 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 interdependent. Their models suggest that the winning party of the first Senate seat will be disadvantaged in the race for the other. At least two such general models have been proposed, both of which I review here.

The delegation balancing model, which I discuss in section 2.1, focuses on the behavior of voters at the ballot box. The basic argument is that moderate voters, when faced with a conservative and a liberal political party, balance out or impose compromise on 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 a more moderate policy outcome that the moderate voters prefer to both the conservative and the liberal policy outcome. The basic prediction then, is that the party that wins a senate seat in any given election will be disadvantaged at the ballot box when the election for the other seat takes place two or four years later.

The constituency support model, which I discuss in section 2.2, uses slightly different logic but yields the same basic prediction. In the constituency support model, political parties experience diminishing returns for each party candidate elected to office in the form of wealth transfers. Once a group, or in this case a political party, wins one election, their incentives to win the other Senate seat decreases because their marginal return to a

further win is lower. At the same time, the losing party's marginal return from victory and their incentive level to win the other Senate seat remain unchanged. Thus the relative marginal return to victory and the relative incentive level for winning the other Senate seat shifts towards the losing party.

2.1 The Balancing Model

The basic premise of the delegation balancing model is that 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). While there are some differences between the models that these authors present, the differences are of minor concern for the question dealt with in this paper. The authors use the same Downsian (Downs 1957) framework, invoke many of the same assumptions, and most importantly, their models make the same predictions regarding the active balancing behavior of voters. For the purpose of simplifying the presentation, I only focus on Heckelman's (2000) model.

Heckelman (2000) builds his model by making the following nine assumptions:

1. The issue space is a single-dimension.
2. Voters have symmetrical single-peaked preferences.
3. There are no abstainers.
4. Voters vote sincerely.
5. There are two candidates in each election.
6. Elections are decided by plurality rule.
7. Voters' bliss(or ideal) points are uniformly distributed.
8. Policy positions are fixed once they are announced.
9. Senators share representation equally.

Assumptions (1)-(6) come from Down's framework and are typical in formal models of elections. Heckelman invokes assumptions (7) and (8) to simplify the analysis. As Heckelman notes, assumption (7) concerning the distribution is not critical to the result. In his original work, Downs considered other distributions and the median voter result held each time. Heckelman chooses the uniform distribution because it simplifies the analysis. Concerning assumption (8), Heckelman acknowledges that it is a strong assumption but justifies it by pointing out that "it is tantamount to assuming that changing positions is infinitely costly. Candidates cannot react to rival positions

and must choose the best position a priori...The assumption of costly movements can be rationalized on the grounds that constant movement abuses the voters trust. In a dynamic setting, politicians have reputations they need to preserve (Bernhardt and Ingberman, 1985; Harrington, 1993).”

The final assumption, assumption (9), is important to get the math to work out nicely. That said, the assumption is reasonable and intuitive. It essentially amounts to assuming that the two Senators are equals in the extent to which they represent their state. Given that each Senator has one and only one vote and that they are not institutionally constrained to vote together (or apart), assumption (9) is natural.

To present Heckelman’s model, I need to establish some notation. Heckelman assumes that there are N voters, each of whom has a bliss/ideal point represented by b_{it} where i references the individual and t the election. Any move to the left or right of b_{it} decreases the voter’s utility (by assumption 2). Next, let SD_t represent the position of the state’s Senate delegation in the issue space as a result of election t . Note that the position of the Senate delegation is simply the equally weighted average (by assumption 9) of the two Senator’s positions. If we let X_t represent the position of the Senator who won in election t , then we have

$$SD_t = \frac{1}{2}(X_t + X_{t-1}) \tag{1}$$

Note that for election t , X_t represents the position of the winning Senator and X_{t-1} represents the position of the Senator who won the last election (i.e. the sitting Senator who was not up for election at time t). For voters in this model, the overall position of their Senate Delegation (SD_t) is the primary value of interest. The model assumes that voters want the delegation’s overall position to be as close as possible to their own position in the issue space (assumption 2). In other words, the voter in this model, maximizes her utility when

$$b_{it} = SD_t = \frac{1}{2}(X_t + X_{t-1}) \tag{2}$$

One of the unique things about Senate elections is that only one of the state’s two U.S. Senate seats is up for election at a time. The ideological position of the state’s other U.S. Senator is unchanged as a result of the election¹ and, consequently, voters can condition their decision on the position

¹Whether the sitting Senator not up for election moves ideologically as a result of the election is an interesting empirical question worth study in its own right. However, making the assumption that the sitting Senator doesn’t move as a result of the election for the other senate seat, is not crucial for the results of the model to hold. To see this, let’s

of the sitting Senator (i.e. X_{t-1}). If we let $\rho(X_{it})$ represent voter i 's preferred position for the winning Senator in election t , we can rearrange equation (2) to show that

$$\rho(X_{it}) = 2b_{it} - X_{t-1} \quad (3)$$

Equation (3) shows that voter i 's preference is to have a winning candidate whose position in the policy space is exactly the same distance away from her preferred position as the sitting candidate but in the opposite direction. In other words, each voter's preference is to get a Senate delegation representing her own ideal point by electing a Senator who will exactly offset the sitting Senator. This result means that if the sitting Senator is more liberal than the voter, the voter's ideal candidate is not the one who takes the same position she does, but one who takes a position more conservative than her own. The problem with the candidate who takes exactly the same position is that the resulting position of the Senate delegation will be a compromise between the two senators and will still be too liberal for the voter. Because preferences are symmetrical and single-peaked, if a voter cannot find a candidate that perfectly matches her own preference $\rho(X_{it})$, she will choose the candidate that is closest in absolute distance to $\rho(X_{it})$.

Within the Downsian framework, the median voter is pivotal. If we let subscript m represent the median voter, then the candidate closest in absolute distance to $\rho(X_{mt})$ will win election t . 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 on average. 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 figure 1 of Ansolabehere, Snyder, and Stewart (2001, 142) shows that the position 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

assume that voters do expect the sitting senator to pay attention to the election outcome for the other seat. Within the Downsian framework, we would expect the sitting senator to move ideologically in the direction of the winner. If voters are interested in moderating the position of their state's senate delegation, then they still maximize their utility by voting for the candidate who takes the position on the opposite side of their ideal point as the sitting senator, because this will also bring the sitting senator closer to the voter's own position.

disadvantaged, and other things being equal, will receive less votes than the opposition party in the following election for the other Senate seat.

2.2 The Constituency Support Model

Like the balancing delegation model, Jung, Kenny, and Lott's (1994) constituency support model predicts that the winning party for one senate seat will be disadvantaged in the race for the other. However, the logic behind the models differ. 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. The basic line of reasoning is that candidate supporters receive wealth/political transfers when one of their candidates wins. However, once they have elected one of their candidates, the marginal returns from winning another election decrease, giving supporters less reason to mobilize. Once a party wins one of the state's two Senate seats, the party's motivation to win the other seat decreases. On the other hand, the marginal returns to winning, and the associated incentives level, are unaffected for the losing party. 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 contest for the other seat. In their own words, Jung et. al describe this effect 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. For net losers, the effect operates in the opposite direction (68)

It should be noted that the concept of supporters applies broadly within this model and could include ethnic or other interest groups, or simply individuals. However, in the context of U.S. federal elections, most supporters are easily divided into two camps represented by the major political parties. We do not lose much then, by discussing the model in terms of political parties and gain the advantage of simplifying the discussion. It is clear that Jung et al also thought of political parties as a good way of capturing the camp of "supporters." In discussing applications of their theory, Jung et. al write that "Democrats would find it hard to elect a senator whose terms

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).

3 Research Design and Data

The basic prediction of both models discussed in the previous section is that in a Senate election, the candidate of the same party as the senator sitting in the other seat, will be penalized at the ballot box. To test this proposition, I use a regression discontinuity design (RDD) and data on U.S. Senate elections during the post-war period (1946-2002).

The important characteristic of a RDD is the assignment of some “treatment” based on a continuous selection variable with a random element. The classic RDD example is awarding scholarships according to standardized test scores. Some threshold is set before exams are taken and any student who surpasses 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 the threshold provide the natural counterfactual to the students just above the threshold. The random nature of the selection variable is important because it essentially assigns “treatment” status around the threshold. It is the ex-ante unpredictability which gives RDDs leverage. In the context of standardize testing, some students will guess correctly on problems they can’t solve and some will guess incorrectly. Thus students of equal ability could find themselves on opposite sides of the threshold due to the random nature of guessing. A natural estimate of the impact of that scholarship on income would be to compare the income of those just below the threshold and those just above the threshold.

The advantage of using a 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. With RDD the selection criteria is observed and has a random element to it. In the classic example, the standardized test score determines the selection into the scholarship. The inherently unpredictable nature of elections, particularly close ones, provides the researcher with an intuitive quasi-experiment. The ex-ante unknown selection variable with a random element is the vote share for the two parties and the treatment is which party wins the election. Several recent papers have used RDD in the context of elections (see Lee (2004) and Lee et al. (2004)).

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 subject of Sunday's sermon, or even the late-afternoon television programming - the outcome could have changed so that the opposing party would have won instead. In close elections then, one can think of these shocks as randomly affecting which party wins.

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 and its intuition, let the function for the observed Democratic vote share for observation i (V_i) be written as follows:

$$V_i = v_i + \varepsilon_i \tag{4}$$

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 I am not asserting that the outcome in every election has to be changed by the random shocks captured in the ε_i term. In some elections, the random shocks will have no effect. Rather the key assumption is that as elections get closer and closer, the observables (i.e. v_i 's) are not systematically affecting which observations get the treatment. One benefit of the discontinuity design is that the researcher can test this assumption, which I do in Section 5.

Note that observation i receives the treatment if V_i crosses some threshold γ . Because I am considering plurality elections, $\gamma = .5$ in this case. If we let D be a variable indicating if the observation received the treatment, a Democrat as the sitting senator in this case, then $D = 1$ when $V_i \geq \gamma = .5$ and 0 otherwise.²

Technically any election can be decided randomly by the ε_i 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. closer elections are more likely to have been decided randomly). In our estimation then, we want to weight observations with closer elections more heavily. In the actual estimation, we accomplish this weighting by following the strategy employed in Lee (2004) and Lee et al.

²Here I assume \geq completeness. There is no such case in the data set.

(2004). Specifically we estimate a fourth order polynomial on both sides of the threshold value and then take the difference between $D=0$ and $D=1$ when X is held at the threshold.³ I present the results of the estimation in section 4.

The data used in the estimation comes from the regularly scheduled Senate elections of 1946-2002.⁴ The dependent variable is the Democratic percentage of the two party vote share in the current election (equation 5) and the independent variable is the same value for the previous election for the other Senate seat (equation 6). Subscript t indexes the current election and $t-1$ indexes the previous election for the other Senate seat.

$$Y = Dem.Vote_t / (Dem.Vote_t + Rep.Vote_t) \quad (5)$$

$$X = Dem.Vote_{t-1} / (Dem.Vote_{t-1} + Rep.Vote_{t-1}) \quad (6)$$

As is typical in U.S. federal elections, third parties rarely if ever seriously competed for Senate seats so excluding them from equations 5 and 6 has no practical effect. While almost all Senate races had a candidate from each party, there are a few races, mostly in the South from earlier decades, when only one of the major parties fielded a candidate. The values for the variables for those years were coded as missing. There are at least two alternative ways those variables could have been coded. First, one could assign the party that did not field a candidate 0 votes and then calculate the values as indicated above. This would make it so that the winning candidate received 100 percent of the two party vote share. Second, one could compare the winning candidate to the second place candidate from a third party. I reran the estimation using both of these alternatives. The alternative coding did not change the conclusions reached by the original analysis.

³This is equivalent to estimating the following equation:

$$Y_i = X_i + X_i^2 + X_i^3 + X_i^4 + D_i + D_i X_i + D_i X_i^2 + D_i X_i^3 + D_i X_i^4$$

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 represents a dummy variable that equals 1 when the sitting Senator is a Democrat (i.e. $X_i \geq .5$) and 0 otherwise. And then calculating the following value:

$$(Y_i | X_i = .5, D_i = 1) - (Y_i | X_i = .5, D_i = 0)$$

⁴When a senator for one reason or another leaves his or her office before the end of the six-year term, a special election is called to fill the vacancy for the remainder of the term. This happens so rarely that I felt comfortable excluding these observations. Tests done including these observations, had no effect on the results.

4 Empirical Results

Both of the models discussed in section 2 predict that elections for the two senate seats are interdependent. The party that wins the election for one senate seat will, *ceteris paribus*, receive less votes in the following election for the other seat. Figure 1 graphically displays the prediction of these models. 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 dashed 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 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. Figure 1 displays how the data should look if this type of interdependence exists for the two Senate seats. If however, the models are wrong, and the elections are in fact independent, there should be no discontinuity at the threshold (i.e. $x = .5$). Figure 2 then, displays what the graph should look like if the elections are independent.

(Figures 1 & 2 about here)

Figure 3 is a graph of the actual relationship, using data on Senate elections from 1946 to 2002. 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.⁵ The observations to the left of the vertical dashed line, are those where the sitting senator is a Republican; to the right, the observations where he or she is a Democrat. As noted in section 3, a fourth order polynomial⁶ was used on each side of the threshold to get predicted values of the dependent variable. The solid line in figure 3 plots out the predicted values and the dashed lines the corresponding confidence intervals.

(Figure 3 about here)

(Table 1 about here)

⁵The actual number of observations used in the estimation was 852. I only present the local average to help prevent visual confusion.

⁶Using a fourth order polynomial follows the precedent of Lee (2004) and Lee et al. (2004). The advantage of using a fourth order polynomial is that it allows a great deal of flexibility in fitting the data without giving the researcher the ability to make arbitrary choices which can change the results as in the case of using kernel estimators.

A quick look at figure 3 shows that it closely resembles figure 2; there is no discontinuity or drop. These are the results we would expect if the elections for the two Senate seats are independent. The actual estimate of the gap at the threshold confirms the intuition of the graphical results. Receiving the treatment - having a Democratic sitting senator - has no causal effect. 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).⁷ The estimate of the gap is 0.0057, approximately only one half of one percent, with a corresponding standard error of .0237;⁸ the size of the gap is not statistically significant at any conventional level. It is also telling that the extent to which there is a gap, the sign for the estimate of that gap is positive. The positive coefficient reflects the fact that there is a jump rather than the drop predicted by both of the models discussed in section 2. All of the evidence suggests that the delegation balancing and constituency support models are wrong, at least as they are applied to sequential Senate elections.⁹

One potential criticism of using a RDD is that close elections may not be representative of all elections and that the RDD will provide an estimate that is only valid for close elections. In the context of Senate elections, close elections are more likely to occur in districts where the two parties are evenly matched. While this is an important general point that should be kept in mind when using a RDD, it does not invalidate the findings of this paper. Weighting close elections more heavily does not bias the results towards not finding an effect. If it does anything, 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 the models tested here, are most likely to work. In using the discontinuity design, we have favored finding an effect and still found none. This provides strong evidence that, holding other factors constant, the outcomes in the election are independent of each other.

⁷More formally it is estimated by using equation: $(Y_i|X_i = .5, D_i = 1) - (Y_i|X_i = .5, D_i = 0)$

⁸The standard error of the gap was estimated by the following equation: $\sigma = \sqrt{(\sigma_{x=.5, D=0}^2 + \sigma_{x=.5, D=1}^2)}$

⁹As with other statistical estimators, there is always some uncertainty with the precision of the point estimate. Our findings suggest that the effect of being from the same party as the sitting senator is 0.5 percent with an associated 95 percent confidence interval of ± 4.5 percent.

5 Testing the Quasi-random Assignment Assumption

The empirical results of this paper, and regression discontinuity more generally, depend on making the assumption that assignment of the treatment is random close to the threshold value for the independent variable. For this study, that means that we are assuming that as you compare closer and closer elections in the race for the sitting senator, the differences in the pre-determined characteristics between the districts where the Republican won and those where the Democrat won should get smaller and smaller. Essentially I am 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. 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.¹⁰

(Table 2 about here)

One advantage of the discontinuity design is that one can test the assumption of quasi-random assignment against the observable pre-determined characteristics. If random assignment assumption is correct, then as the elections get closer, the districts where Democrats barely won and those where Republicans barely won should look very similar ex-ante. I test this assumption by looking at data on region and the lagged democratic vote share for the seat of the sitting senator (i.e. I test it on the lag of the independent variable). The results are displayed in table 2 and show that as the elections get closer, the differences between the two groups of districts become smaller. For elections within two percent or even five percent of the threshold value, the differences between the two groups are statistically insignificant.¹¹ This is also shown graphically in figure 4. As elections get closer, the two groups of districts become more and more similar.

¹⁰The reader interested in a more formal treatment of this assumption is referred to Lee et al (2004).

¹¹The estimated gap for the South that is based on the polynomial is statistically significant. However, this may be, at least in part, a result of the fact that polynomials are ill-behaved at the threshold value. This is the reason for also estimating the gap by simply taking the average of the two groups as the elections get closer. As noted in the text, as I did so the estimated gap becomes statistically insignificant (see table 2).

6 Discussion

The primary purpose of this paper has been to test whether the elections for a state's two Senate seats are independent or interdependent. While both the delegation balancing model and the constituency support model predict that the sequential elections are interdependent, I have presented strong evidence that they are in fact independent of each other. Having a sitting Senator of one party in the other Senate seat does not hurt nor help that party in the election for the other seat.

One of the motivations for these models of sequential Senate elections was to explain the growth in the number of divided U.S. Senate delegations. One of the implications of our finding is that these models cannot explain the increased frequency in divided delegations. Brunell and Grofman (1998) offer an alternative explanation, suggesting that the existence of divided Senate delegations is partly a result of shifting party loyalties. As they show in their paper, the year with the largest percentage of divided Senate delegations was not during the post-WWII period, but was actually in 1830 (394). 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. When one party is dominant the number of divided state delegations is low. When the relative strength of the parties changes, there is initially a period where there is a large number of divided Senate delegations grows larger before decreasing again as the new party becomes dominant.

As figure 1 in Brunell and Grofman (1998) shows, this cycle has occurred since the Senate was established. The biggest change since 1914, when Senators began to be popularly elected, is that the cycles seem to be more drawn out now. This change can partly be explained by the increased incumbency effect. Now even after a party loses support in a given state, the individual Senator can continue to serve for several terms because of the incumbency advantage. Sometimes it is not until the sitting Senator retires that the other party which has the stronger base in the state is finally able to win the seat. This may partly explain why it is only recently that the Republicans are winning many of the congressional seats in the South despite strong showings in presidential elections within that area several election cycles.

While our results show that the basic prediction of the delegation balancing and constituency support models to be wrong, it doesn't necessarily mean that the underlying logic of the models is wrong. Regarding the balancing model, there is compelling evidence that a small but non-trivial 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 executive and legislative branches, and electing opposing parties as a way of moderating the final outcome.

In the context of the sequential Senate elections, one of problems with the Heckelman (2000, 2004) and Alesina et al. (1991) models, is that the model assumes that all voters care about is the representation of their own state delegation and not the ultimate policy outcome. In many ways this problem stems from the nature of the assumptions that the models make about the sophistication of the voters. On one-hand they assume that the voters are sophisticated enough to actively attempt to moderate outcomes and yet they are not sophisticated enough to worry about the effect on the ultimate policy outcome. In reality the sophisticated voter assumed by Heckelman and Alesina et al. will care more about the median position of the Senate than just their own state's Senate delegation. The basic logic underlying these models is correct, but because it doesn't take into account the context of the elections (i.e. the nature of the relationship between the branches of government or among the Senators) it makes incorrect predictions concerning voting behavior. Future formal work should build upon the work of Alesina et al. and Heckelman but incorporate the political context more into the model.

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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					
	0.0868	0.0371	0.0271	0.0010	0.0057
Std Error	(0.0072)	(0.0075)	(0.0092)	(0.0140)	(0.0237)
T-stat	12.12	4.92	2.95	0.07	0.24
N	1357	756	461	205	

Table 2: Random Assignment Checks

Variable	Difference Dem-Rep	± 10 Percent Dem-Rep	± 5 Percent Dem-Rep	± 2 Percent Dem-Rep	Polynomial Dem-Rep
South					
	0.2423	0.0307	-0.0208	-0.0787	-0.15838
Std Error	(0.0191)	(0.0225)	(0.0289)	(0.0442)	(0.05222)
T-stat	12.70	1.36	-0.72	-1.78	-3.03
N	2167	1157	702	322	
North					
	-0.2470	-0.0899	-0.0222	0.0459	0.10437
Std Error	(0.0211)	(0.0293)	(0.0378)	(0.0558)	0.06383
T-stat	-11.71	-3.07	-0.59	0.82	1.64
N	2167	1157	702	322	
West					
	-0.0105	0.0710	0.0616	0.0444	0.08177
Std Error	(0.0188)	(0.0266)	(0.0338)	(0.0491)	(0.0583)
T-stat	-0.56	2.67	1.82	0.90	1.40
N	2167	1157	702	322	
Lagged Same Senate Seat Vote Share					
	0.0870	0.0328	0.02811	0.0170	0.0101
Std Error	(0.0076)	(0.0079)	(0.0103)	(0.0161)	(0.0198)
T-stat	11.41	4.10	2.73	1.06	0.51
N	1161	695	415	189	

Figure 1: Expected Results if Elections are Interdependent

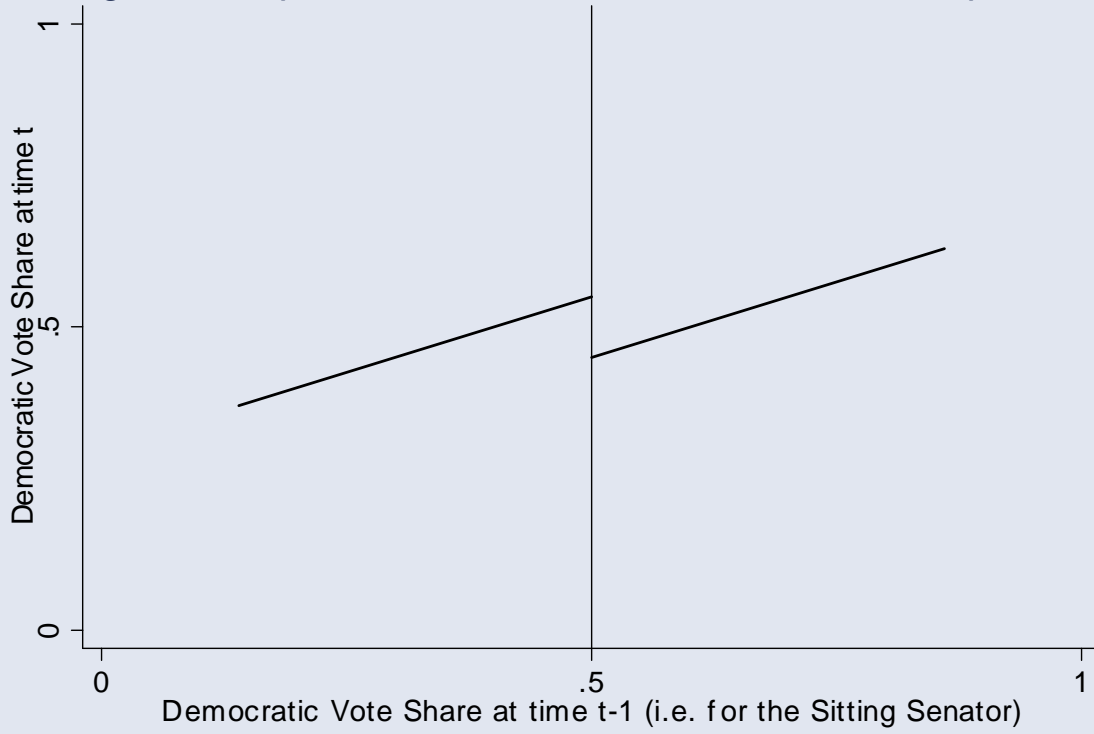
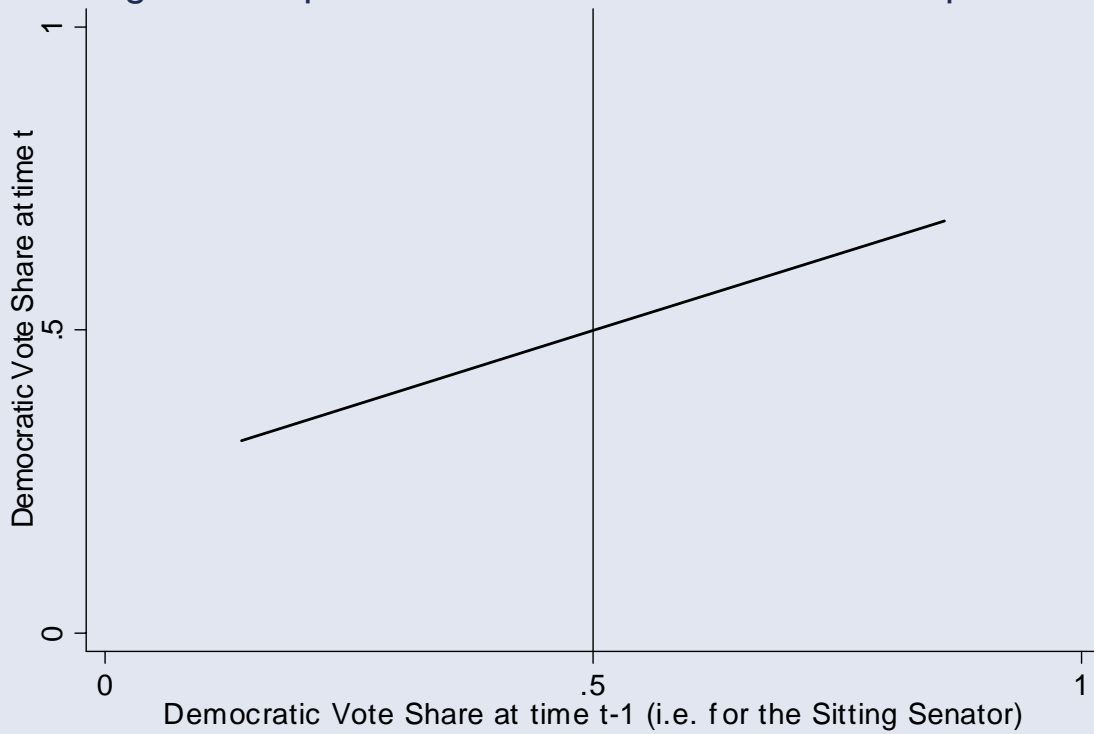


Figure 2: Expected Results if Elections are Independent



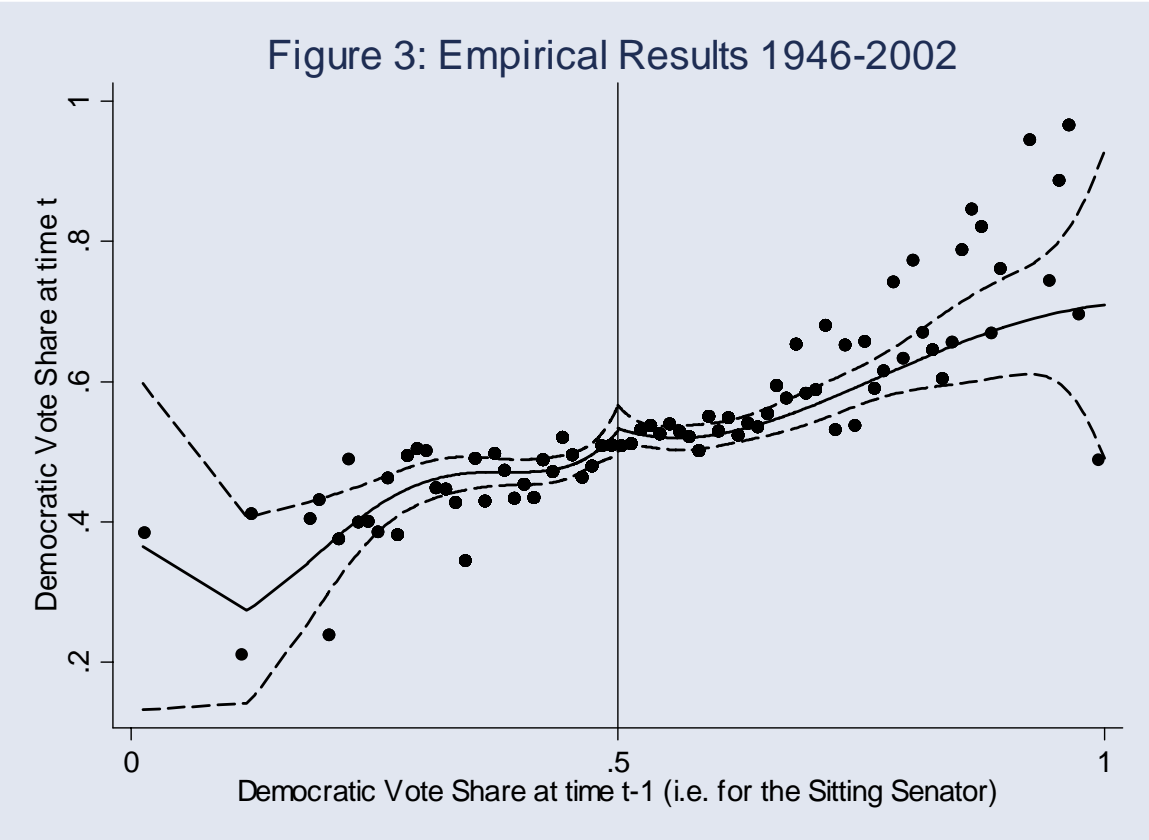


Figure 4: Random Assignment Checks 25 to 75 Percent Vote Share

