Appendix: Is Divided Government A Cause of Legislative Delay?

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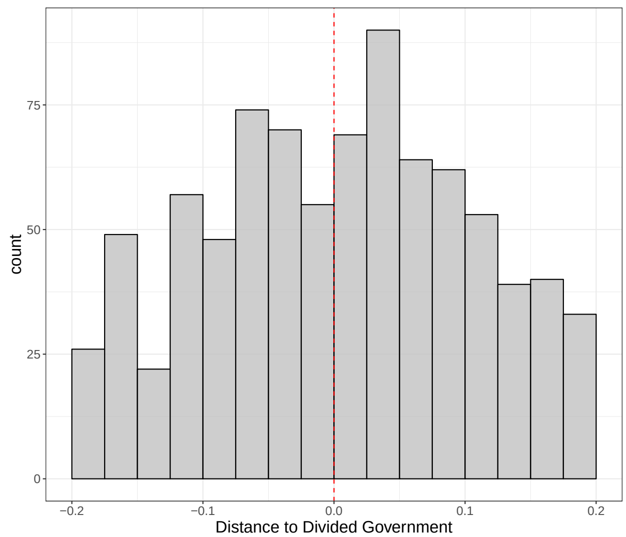
Validity of the RDD

The "no sorting" assumption—that potential outcomes are smooth across the discontinuity—is the key identifying assumption of the RDD. We test the validity of our RDD in several ways. First, we examine the distribution of the forcing variable as shown in Figure A1. Then, we use the McCrary (2008) sorting test to formally assess the density of the forcing variable at the threshold. In doing so, we fail to reject the null hypothesis of no sorting (log difference in heights is -0.099 with SE 0.247; p = 0.689). We also conduct a series of placebo tests, using pre-treatment covariates as dependent variables to check for discontinuities at the threshold of the forcing variable. As in our RDD analysis, we use local linear regression models and rely on the I & K optimal bandwidth. The results are displayed in Table A1 and provide further support for the validity of the RDD. Covariates include indicators of government shutdown provisions, biennial budgeting, and supermajority budget passage requirements, as well as measures of legislative session length and state-level economic conditions.

Figure A1: Distribution of the Forcing Variable



Note: The histogram displays the distribution of the forcing variable using bins of 5%. Zero on the x-axis is the cutpoint. Observations to the right of the cutpoint (i.e., positive values) have divided government; observations to the left of the cutpoint (i.e., negative values) have unified government.

Our Estimates of the Probability of Divided Government

Recall that we use our simulations to construct two measures. The first is our rating variable—distance to divided (unified) government—which is the smallest state-level vote shock that produces a different outcome in terms of divided or unified government in a majority of simulations. The second measure that we construct is the probability of divided government. The probability measure is simply the proportion of simulations that produce divided government in a given state year. Figure A2 plots these two measures against one another. As the figure suggests, these two measures are highly correlated ($\rho = 0.964$).

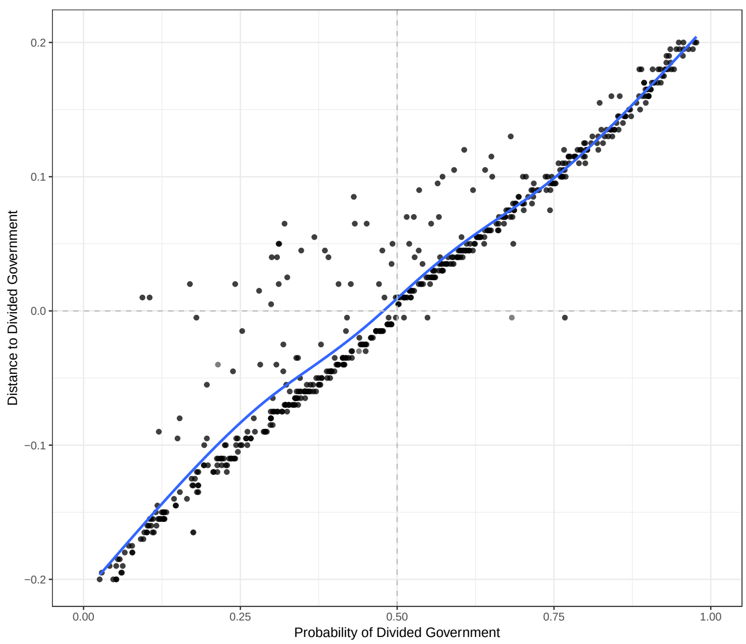
Although we use the distance to divided government as the forcing variable in our RDD analysis, we use the simulated probability of divided government to formulate the weights for our inverse probability weighting (IPW) strategy. We find that our simulated measure of the probability of divided government performs quite well, correctly predicting divided government in over 96% of cases. Figure A3 plots the percent of correctly predicted observations across the range of the probability measure. In general, we do better at correctly categorizing states as our predicted

Table A1: The Effect of Divided Government on Covariates

Covariate	Bandwidth	Estimate	Std. Error	p-value
Government Shutdown	0.127	-0.074	0.078	0.347
Biennial Budgeting	0.116	0.031	0.079	0.691
Session Length	0.096	15.295	10.444	0.143
Supermajority Requirement	0.063	-0.079	0.053	0.135
Per-capita Income Change	0.094	1.120	0.777	0.149
Election Year	0.189	-0.002	0.064	0.975

Note: Local linear regression models using I & K optimal bandwidth. Robust standard errors reported.

Figure A2: Probability of Divided Government & Distance to Divided Government

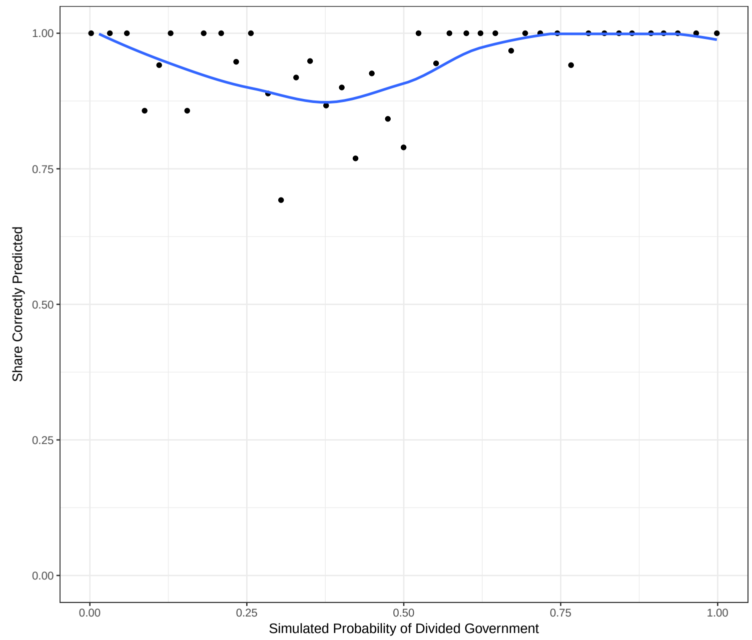


probability of divided government moves away from 50%. Interestingly, when we err, we tend to do so by over-predicting unified government. We are unsure why this is the case. We do note, however, that incorrect predictions tend to occur close to the 50% threshold, i.e., where divided and unified government are about as likely to occur.

Alternative Distributions for Electoral Simulations

Throughout our simulation procedure, we rely on random draws from the uniform distribution to establish state- and district-level vote shocks. Recall that our goal is to find the smallest

Figure A3: Simulated Probabilities & Divided Government

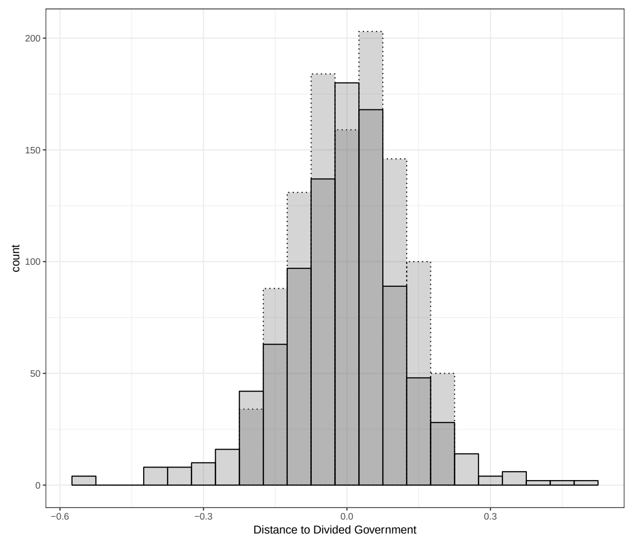


Note: This figure displays how accurately our simulated probabilities predict divided government across the values of the rating variable. The points plot the average of correctly predicted cases in bins of 2.5% of the rating variable.

vote shock that likely would have generated a different configuration of party control of state government. Using the uniform distribution ensures that we have simulations that incorporate widely varying vote shocks across the range of possible shocks. To construct the forcing variable for our RDD, we choose the smallest vote shock that produces a different outcome in terms of divided government. As a result, we would expect use of a normal distribution with mean 0 would produce nearly identical values of the forcing variable.

Yet another possible approach would be to use actual historical vote shocks to generate the electoral shocks used in our simulation. For example, we could use the historical elections data to assemble a distribution of district-level shocks for each state and use random draws from each state's distribution to determine its state- and district-level vote shocks. Again, however, because our simulations are designed to find the smallest electoral shock that would have produced the opposite outcome in terms of divided government, we expect that this approach would also generate nearly equivalent values of the forcing variable. Indeed, when we replicate our simulation procedure (albeit for a smaller number of iterations) drawing electoral shocks from each state's distribution of historical electoral shocks, the resulting forcing variable is highly correlated with our main forcing variable ($\rho = 0.991$, $p < 0.001$). Figure A4 compares the distribution of our main forcing variable and the alternative measure determined using actual historic vote shocks.

Figure A4: Comparison of Distributions of Forcing Variables



Note: The histogram displays the distribution of forcing variables using bins of 5%. Bins for the distribution of the primary forcing variable are outlined by a dashed line, while bins for the forcing variable generated using historic shocks are overlayed and outlined with a solid line. Zero on the x-axis is the cutpoint. Observations to the right of the cutpoint (i.e., positive values) have divided government; observations to the left of the cutpoint (i.e., negative values) have unified government.

An Alternative to Simulations: A Centering Approach

As we discuss in Section 3.2, divided or unified government results from multiple elections, which creates complications in formulating a suitable assignment variable. In our main RDD analysis, our simulated measure of the distance to divided government serves as the forcing variable. However, we could take a different approach, using actual vote-share margins. Several earlier studies (e.g. Reardon and Robinson 2012; Wong, Steiner, and Cook 2013) have considered techniques for RDDs in which treatment assignment is determined by multiple variables. Several applications investigate the effects of remedial education programs when students are assigned to treatment on the basis of multiple test scores, but we can also use this method to develop a forcing variable for divided government. Our approach is akin to what Wong et al. (2013, 109) refer to as "centering," a procedure in which multiple forcing variables are collapsed by choosing the value closest to the threshold that determines treatment assignment.[1]

To implement the centering or binding-score approach we need to determine the minimum vote-share margin that would have resulted in the opposite outcome in terms of divided government. That is, if a state experienced divided (unified) government in a given year, we need to collapse multiple assignment variables across legislative chambers and the executive branch to identify the smallest shift in vote-share that would have produced unified (divided) government.

The assignment variable for the governor's party is simply the vote-share margin between the two or top two candidates. The analogous variables for the upper and lower house, however, are less straightforward. Because seat share determines party control of each chamber, we need to incorporate the majority party's legislative seat margin to find the pivotal district election that would shift party control of a chamber. We focus on district-level elections that the minority party lost, sorting vote-share margins from smallest to largest (by chamber). For each chamber, we choose the margin that would change the outcome in the election for the pivotal seat.

For the sake of clarity we provide an example using Pennsylvania's 1982 state general election. The governorship, all 203 seats in the PA House of Representatives, and half of the 50 seats in the Senate were up for election. The state's 1982 elections jointly produced divided government, with Republican Governor Richard Thornburgh winning reelection to face a split legislature. Democrats won 103 seats to control the lower chamber, and Republicans held control of the upper chamber with 27 seats.

To determine our single forcing variable, we begin by examining the vote-share margins of party control for each institution. Table A2 shows the results of the gubernatorial election. Republican Richard Thornburgh won reelection with 2.72% more votes than his opponent (centered margin of 1.36%). Democrats had 2-seat margin in the lower chamber, so to find the vote share margin that would have given Republicans a majority, we need to find the second closest race

[1] Reardon and Robinson (2012) describe this approach as a "binding-score RD."

lost by a Republican. Table A3 includes the two closest Democratic victories among the House elections. The Republican candidate in district 32 lost by a margin of 0.47%, so with a 0.235% (centered margin) shift in the two-party vote, Republicans would have won both of their narrowest losses to take control of the House. Analogously, if Democrats had won 3 additional Senate seats, they would have controlled the upper chamber. Table A4 lists the three closest Democratic Senate losses of the 1982 election. If 1.04% of the vote share shifted from Republicans to Democrats across all districts, Democrats would have won these three seats to take control of the Senate.

Table A2: 1982 PA Gubernatorial Election Results

Candidate		Vote Share	Margin	Centered Margin
Thornburgh	(R)	50.84%	+2.72%	+1.36%
Ertel	(D)	48.12%	−2.72%	−1.36%

Table A3: 1982 PA House Elections—closest Republican losses

	Margin Rank	District	Republican Margin	Republican Centered Margin
	1	89	−0.16%	−0.08%
•	2	32	−0.47%	−0.23%

Table A4: 1982 PA Senate Elections—closest Democratic losses

	Margin Rank	District	Democratic Margin	Democratic Centered Margin
	1	16	−0.28%	−0.14%
	2	30	−1.26%	−0.63%
•	3	44	−2.08%	−1.04%

If Republicans had won control of the House or if Democrats had won both the gubernatorial election and a Senate majority, the result would have been unified government. Therefore, the collapsed forcing variable will be the smaller of either (1) the margin that would have switched party control of the House or (2) the larger of the governor's vote share margin and the margin that would have shifted party control of the Senate. The 1982 PA elections would have produced unified Republican party control if 0.235% of the vote had shifted to Republicans, and a 1.36% shift from Republicans to Democrats would have left Democrats in control of a unified state government. Therefore, the centered forcing variable for divided government is 0.235%.

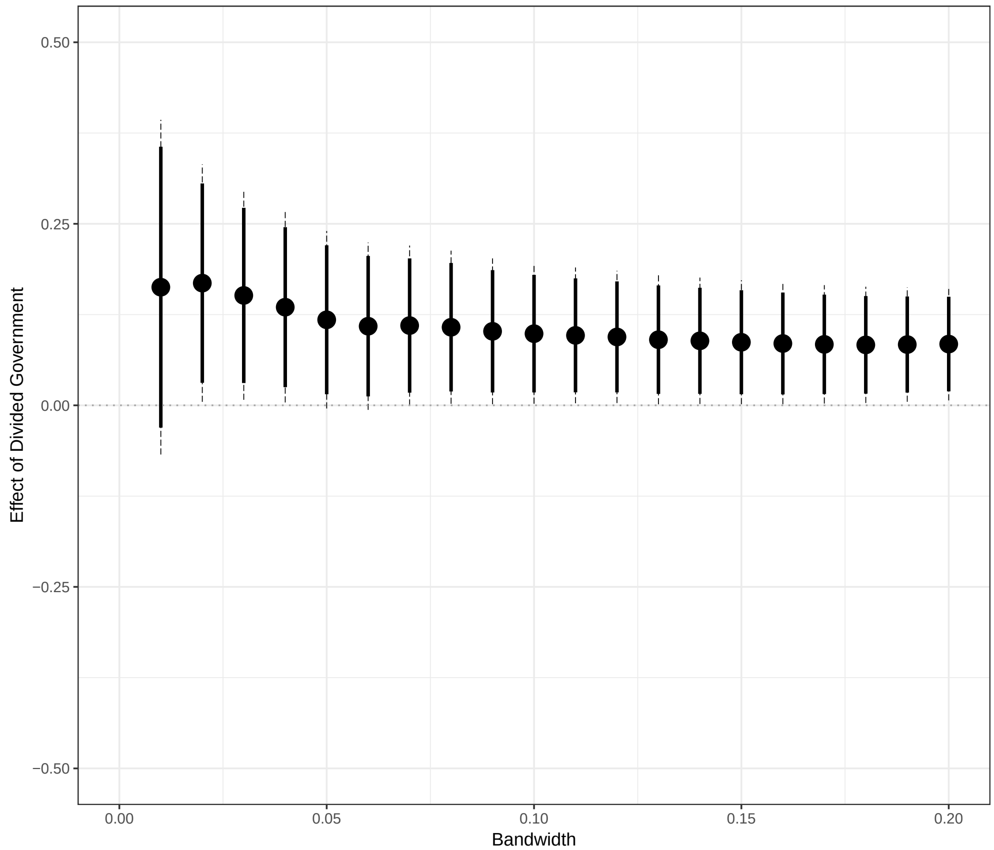
Throughout the paper, our RDD specifications incorporate our simulated measure of the distance to divided government as the forcing variable. We take this approach for two main reasons. First, our simulation method also allows us to produce a measure of the probability of divided government which we use in our IPW analysis. Second, the centering option described above requires the assumption that shifts in legislative vote-shares would be uniform across districts while the simulations allow for variation across districts. Our approach is similar to methods developed by Folke (2014) and Fiva, Folke, and Sørensen (2013) to study the effects of party in proportional representation systems.[2] We did, however, replicate our main analysis with a vote-share forcing variable constructed using the centering or binding-score method. The two assignment variables are highly correlated ($\rho = 0.982$), and we obtain similar results with either measure. Using local linear regression models that incorporate our non-simulated vote-share forcing variable, we estimate that divided government increases the probability of a late budget by 11 percentage points using the I & K optimal bandwidth (0.066). Figure A5 plots the point estimates and confidence intervals for the effect of divided government across multiple bandwidths, and we note that the pattern here is quite consistent with the results we present in Figure 5 of the paper.

An Alternative Dependent Variable: Days Late

Here extend the primary analysis in our manuscript by considering the effect that divided government has on the length of delay. That is, conditional on a budget being late, is it later during periods of divided government than it is during periods of unified government. Perhaps unsurprisingly, the answer is yes. Our models uncover a divided government effect of between 23 and 34 additional days. Stated somewhat differently, fiscal stalemate lasts, on average, three to

[2]For a more thorough discussion of various legislative rating variables, including seat shares, vote shares and simulated distance measures, see Fiva, Folke, and Sørensen (2013)

Figure A5: The Effect of Divided Government—alternative vote-share forcing variable



The figure plots the effect of divided government across multiple bandwidths. The horizontal axis measures the bandwidth size, and the vertical axis measures the effect size. The dots indicate point estimates from local linear regression models, and the error bars reflect two-tailed tests. The solid black lines show 90% confidence intervals while the dashed lines indicate 95% confidence intervals.

four weeks longer during divided government.

Table A5: The Effect of Divided Government on Days Late

	Dependent variable:		
	Days Late		
	(1)	(2)	(3)
Divided government	30.898	34.485	23.435
	(21.058)	(16.718)	(12.207)
Distance to divided gov't	−347.277	−354.846	−118.495
	(688.951)	(352.912)	(140.833)
Distance to divided gov't * Divided government	452.200	254.964	121.669
	(865.027)	(437.676)	(182.122)
Constant	9.855	10.588	18.556
	(16.828)	(13.452)	(9.639)
Bandwidth	0.05	0.10	0.20
Observations within bandwidth	65	99	150
R^2	0.095	0.067	0.042
Adjusted R^2	0.051	0.037	0.022
Residual Std. Error	25.719 (df = 61)	29.232 (df = 95)	33.297 (df = 146)
F Statistic	2.138 (df = 3; 61)	2.264 (df = 3; 95)	2.121 (df = 3; 146)

Note: Estimated using local linear regression with robust standard errors. Dependent variable is number of days late conditional on a late budget.

Heterogeneous Effects: IPW & FE Analyses

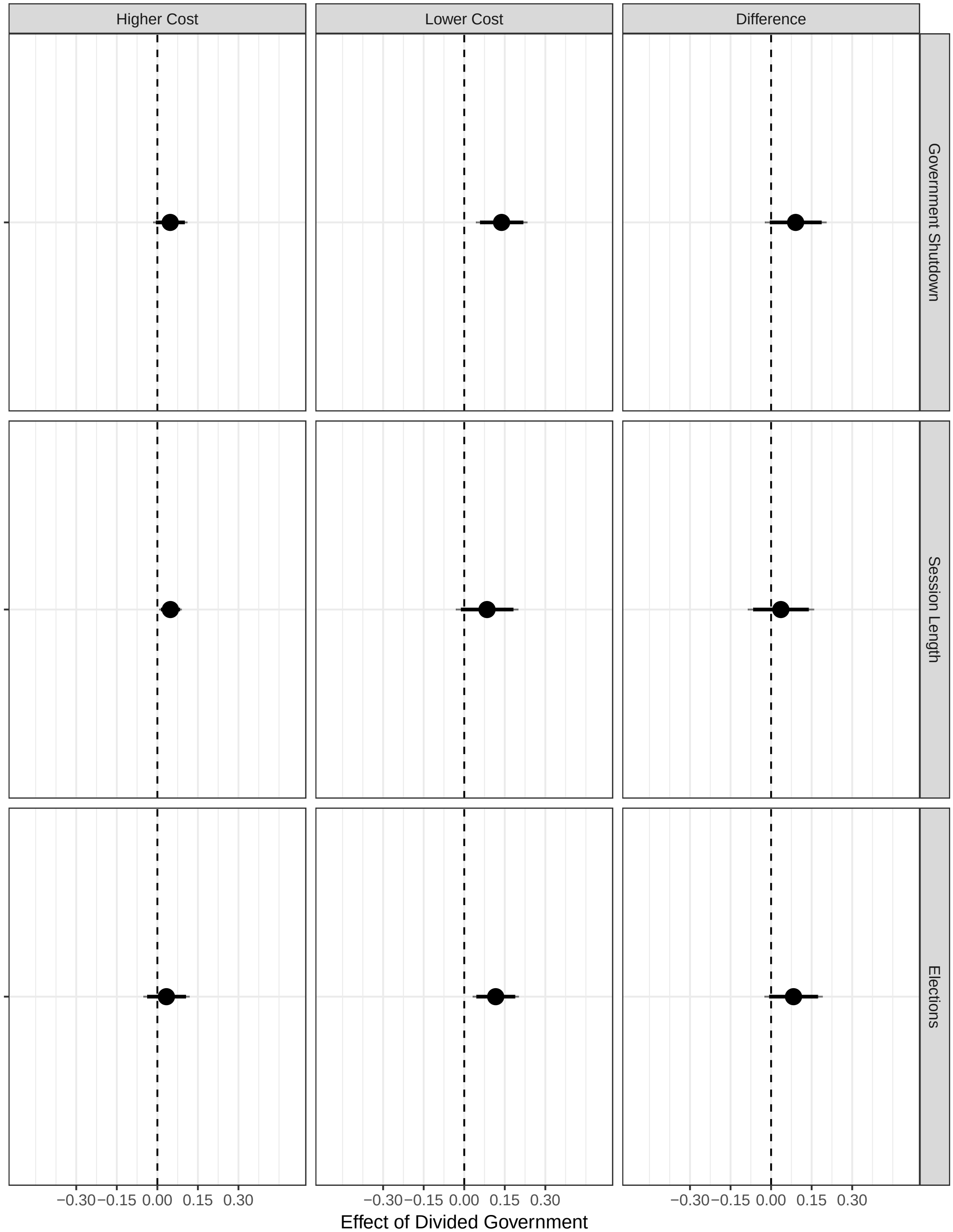
In Section 3 of the paper, we use our RDD to investigate whether the effect of divided government on legislative delay varies with the political context. We find that divided government seems to have the greatest impact when the costs of impasse to politicians are low. Our analysis also yields some evidence that divided government may have a larger effect under high levels of polarization. Here, we replicate our analysis of heterogeneous treatment effects using both IPW and FE models.

In Figure A6, we present IPW estimates of the effect of divided government when the political and private costs of delay are high and low (these estimates are from an IPW model without state and year fixed effects, see Column 1 of Table 2). Unsurprisingly, these results are analogous to those presented above. When the costs of delay are high, the effect of divided government ranges from a relatively modest 3.6 to 5 percentage points. However, this effect is at least twice as large when costs are low. As was the case in our RDD analysis, these differences are not always statistically meaningful. In states with a shutdown requirement, divided government results in a 4.7 percentage point increase in the probability of a late budget; in states without such a requirement, it results in 13.8 percentage point increase.

When we shift our focus to political polarization, we also find similar results using the IPW approach. In Figure A7, we again observe that effect of divided government appears to be greater when the level of polarization is high. When we use the Shor and McCarty ideology scores to measure polarization, our IPW model actually yields a negative, though small (about 5 percentage points) and not statistically significant, effect of divided government under conditions of low polarization. This jumps to nearly 20 percentage points during relatively high levels of polarization (though this difference is large, it fails to reach conventional levels of statistical significance). Likewise, during the first half of our time period (the lower polarization era), divided government increases the probability of fiscal delay by about 7 percentage points, jumping to 11 percentage points in the second half. Again, this difference is not statistically meaningful.

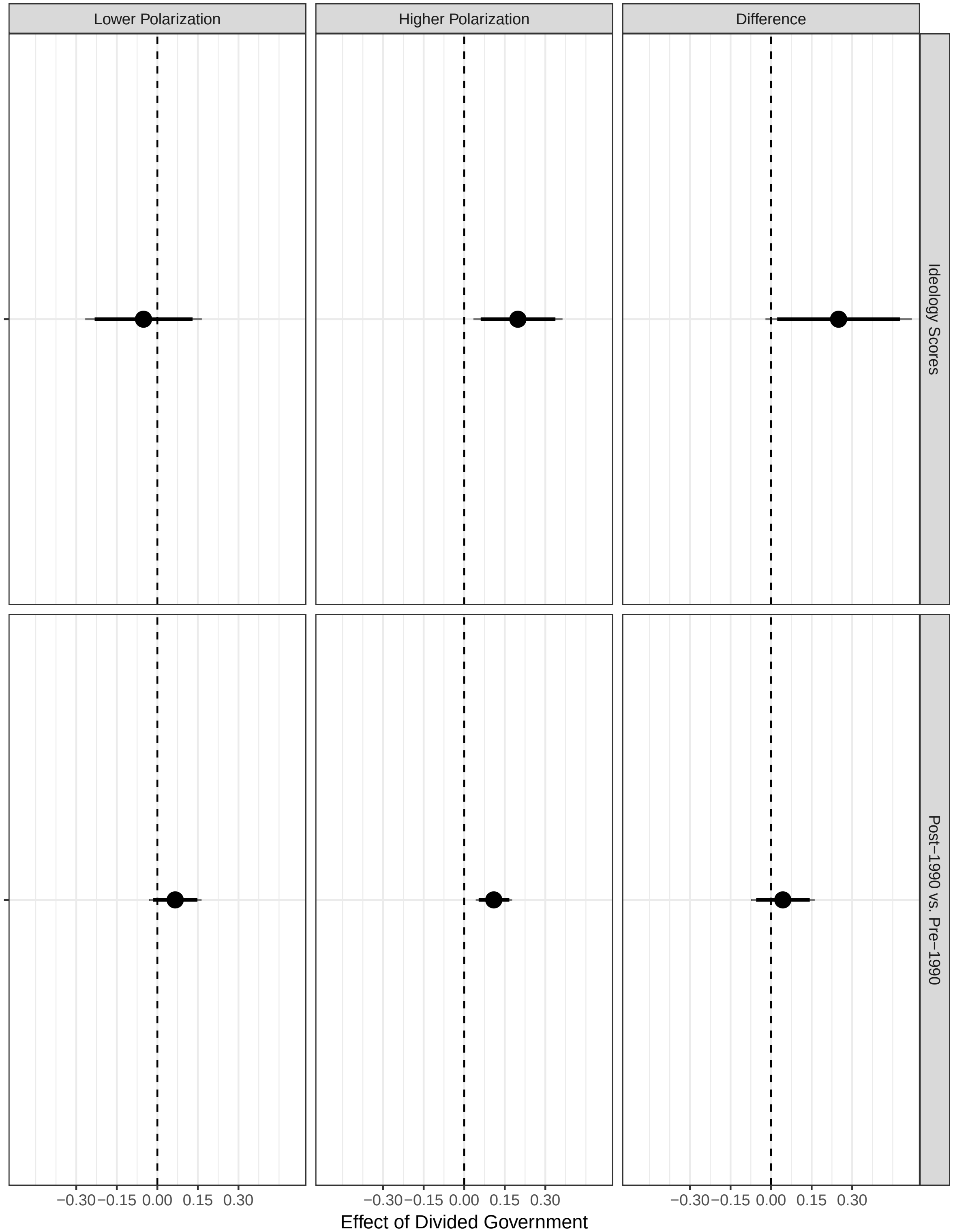
Perhaps not surprisingly, the results of our FE models follow a familiar pattern. When

Figure A6: Heterogeneous Effects of Divided Government (IPW Results)



This figure summarizes the heterogeneous effects of divided government. The x-axis measures the effect size while the y-axis indicates the bandwidth. The black dots indicate point estimates from IPW models. Error bars illustrate 90% and 95% confidence intervals using 2-tailed tests.

Figure A7: Heterogeneous Effects of Divided Government (IPW Results)



This figure summarizes the heterogeneous effects of divided government. The x-axis measures the effect size while the y-axis indicates the bandwidth. The black dots indicate point estimates from IPW models. Error bars illustrate 90% and 95% confidence intervals using 2-tailed tests.

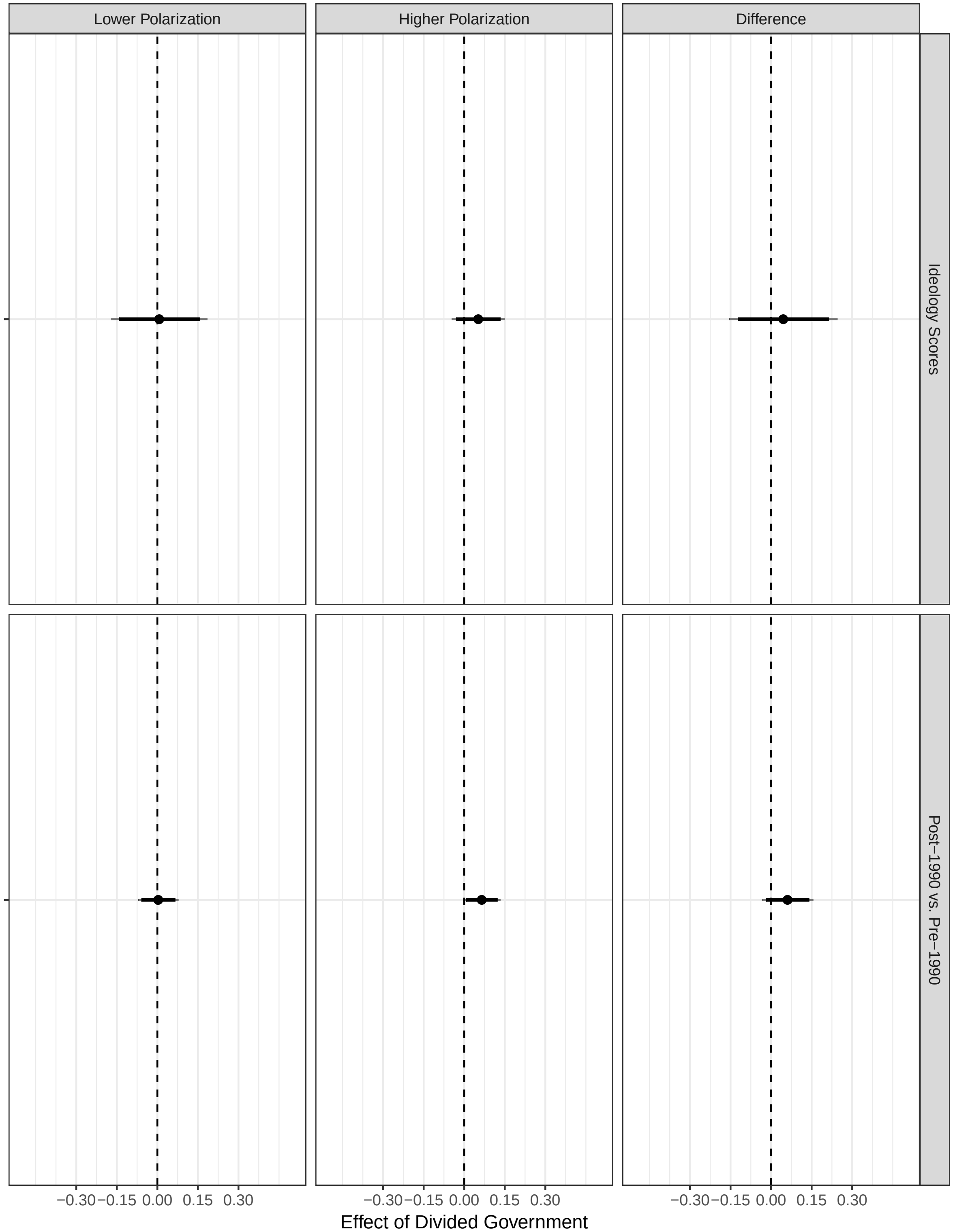
we include state fixed effects, the estimates presented in A8 indicate that the effect of divided government on legislative delay tends to be greater when the cost of delay to lawmakers is low. As in our main FE analysis, we also note that the magnitude of the estimates is smaller across the board. Indeed, the effect of divided government on legislative delay ranges from close to 0 to about 3 percentage points when the costs of delay are high. When costs are low, however, divided government increases the likelihood of a late budget by about 4 to 7 percentage points. Though many of these differences are not statistically significant, the effect of divided government increases from nearly 0 in states with government shutdown rules to 7.3 percentage points in states without shutdown provisions, and this difference is statistically significant ($p = 0.058$).

Moving on to consider polarization, the FE results displayed in Figure A9 are consistent with our the results of our RDD and IPW analyses—that is, the effect of divided government appears to be greater when polarization is relatively high. When we account for polarization using the 1990 cutoff, the effect of divided government is less than 0.5 percentage point during the earlier, lower-polarization time period compared to nearly 6.5 percentage points in the post-1990 era of higher polarization. If we employ ideology scores to gauge polarization, we also find a larger effect of divided government when polarization is higher. However, these differences are not statistically significant.

Figure A8: Heterogeneous Effects of Divided Government (FE Results)

This figure summarizes the heterogeneous effects of divided government. The x-axis measures the effect size while the y-axis indicates the bandwidth. The black dots indicate point estimates from models including state fixed effects. Error bars illustrate 90% and 95% confidence intervals using 2-tailed tests.

Figure A9: Heterogeneous Effects of Divided Government (FE Results)



This figure summarizes the heterogeneous effects of divided government. The x-axis measures the effect size while the y-axis indicates the bandwidth. The black dots indicate point estimates from models including state fixed effects. Error bars illustrate 90% and 95% confidence intervals using 2-tailed tests.