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Average and heterogeneous effects of political party on education finance and outcomes:

Regression discontinuity evidence from U.S. states across election cycles

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Abstract

In the U.S., state politicians directly influence legislation and budget decisions that can substantially affect public education spending and students. Does the political party of elected officials matter for these outcomes? We use a regression discontinuity design to analyze close house and gubernatorial elections from 1982 to 2016 and find that the impact of Democratic control of state government depends on whether elections occur during a presidential election year. On average, Democratic states spend less per capita on K-12 education. This trend, however, reverses when Democrats secure marginal control during off-cycle elections. Outside of presidential election years, we find increased state expenditures on both K-12 education and higher education. These increases coincided with smaller K-12 class sizes, relatively higher high school diploma rates, and expanded college enrollment. Our results highlight the importance of considering how federal political contexts influence the effects of state-level politics on education finance and outcomes.

Keywords: Educational economics, educational finance, expenditures, state politics; *JEL No. I2, JEL No. I21, JEL No. I22, JEL No. I23, JEL No. I28*

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1. Introduction

Over the last decade, several studies using credibly causal designs have investigated the importance of public-school spending in the U.S. Evaluations of contributors to the influx and efflux of K-12 revenues (e.g., recessions, school finance reforms, tax referenda) have largely concluded that spending positively impacts both the short- and long-term outcomes of youth (Baron, 2022; Jackson & Mackevicius, 2021; Jackson et al., 2021; Abbott et al., 2020; Candelaria & Shores, 2019; Hyman, 2017; Jackson et al., 2016; LaFortune et al., 2018). Similar studies in higher education link public investments to enrollment rates, degree completion, and other key post-secondary measures (Bound & Turner, 2007; Chakrabarti et al., 2020; Deming & Walters, 2018). All together, contemporary findings suggest that money matters for student outcomes, despite historical disagreements on this issue (e.g., Hanushek, 2003; Krueger, 2003).

A smaller but related body of work has explored how state-level politics affects the funds available to public K-12 school districts and post-secondary institutions (Beland & Oloomi, 2017; Hill & Jones, 2017; Ortega, 2020; Tandberg & Griffith, 2013). Elected policymakers can shape and vote for policies that reallocate dollars (e.g., Candelaria et al., 2022). State representatives also directly decide how trillions of dollars are spent each year (U.S. Census Bureau, 2021). These decisions must be made while considering several priorities and public programs that compete for these substantial yet finite resources—resources that may face additional budgetary constraint due to recessionary pressures.

Lay expectations associate political party with spending preferences: Democrats are perceived to value increased expenditures (Alt & Lowry, 1994; Besley & Case, 2003; Reed, 2006; Sieg & Yoon, 2017). But despite the growth in partisanship since the 1980's (Caughey et al., 2017) and partisan voting behavior (Bartels, 2000; Campbell et al., 1980), there is limited and/or conflicting empirical evidence on whether political party affects expenditures. The sparse but credibly causal evidence on educational spending may be an exception, with Hill and Jones (2017) and Ortega (2020) using more rigorous methods to show significant differences in educational appropriations between Democratic and Republican state governments. Both studies apply a regression discontinuity design to close gubernatorial elections and conclude that Democratic governors allocate more money to institutions serving more racially minoritized students.

With this study, we build on this prior work exploring the connection between political partisanship and government investment in public education by tackling the following research questions:

1) Does political party control affect the amount that state governments spend on K-12 and higher education?
2) Does political party control affect key educational outcomes downstream from spending?
3) How do these impacts vary by election cycle? Specifically, do impacts differ when state elections determining political party control occur concurrently with a presidential election?

To answer these questions, we first collate longitudinal, state-level data on government spending, election results, educational outcomes, and sociodemographic characteristics from 1982 to 2019. We then compare states under Democratic governmental control to those not

under Democratic governmental control.[1] To identify credibly causal impacts of political party, we use a multidimensional regression discontinuity (RD) design that contrasts education finance and outcomes between states that are barely Democratic to those that are barely Republican, based on votes cast for different parties' candidates in elections for both the governor and the lower chambers of bicameral legislatures (the "house").

Our analyses contribute three main findings. First, on average, states appropriate fewer dollars to public K-12 education during the years after Democrats barely take control of the government; no consistent pattern emerges for higher education. Second, we observe heterogeneity in these average effects across election cycles. We find that the negative effects for K-12 spending are primarily driven by elections that occur during presidential election years. In contrast, after non-presidential election years ("off-cycle" elections), Democratic state control leads to increased expenditure for K-12 and higher education. Finally, we demonstrate that partisanship impacts on downstream educational outcomes exhibit comparable sensitivity to when elections occur. For K-12 following off-cycle elections, Democratic states appear to decrease class size, and high school diploma rates are less negatively impacted relative to rates observed under Republicans after on-cycle years. Similarly, under Democrats, full-time equivalent enrollment in post-secondary institutions expands, but increases are only statistically significant following off-cycle elections.

Our findings first contribute rigorous empirical evidence to existing studies that link political party control to governmental spending on public education. We build on the two most related prior RD studies (Hill & Jones, 2017; Ortega, 2020) by extending the panel of financial data to nearly four decades, starting from the early 1980s and through the late 2010s. By

[1] For the remainder of the manuscript, we simply refer to these two types of observations as "Democratic" and "Republican" states.

expanding our analyses to include house election results, we also augment these existing investigations of political party control and state expenditures, which focus only on what happens after close gubernatorial races. We specifically introduce a new RD design that combines close house election results with close gubernatorial election results to assess how educational outcomes shift when Democrats control not one, but multiple branches, of state government.

Second, we test whether overall impacts vary by a key theoretical contributor to heterogeneity: whether state government elections coincide with presidential elections. Presidential elections may influence a party's decisions when they possess state control for several reasons. While the specific mechanism for why partisan spending and policy outcomes may differ based on election timing is beyond the scope of this paper, prior work documents potential explanations such as voter turnout and composition in the U.S. and abroad (Grofman et al., 1999; Hansford & Gomez, 2010; Holbrook & McClurg, 2005), issues emphasized during presidential campaigns (Petrocik et al., 2003; Shields & Hillygus, 2014), and coordination within party across branches of government (Golder, 2006; Hicken & Stoll, 2011). In education specifically, studies show that the broader federal political and policy-making context can influence state education resources (Baicker, 2001; Gordon, 2004). But because prior work documenting the influence of partisanship on education finance and outcomes largely focuses on gubernatorial elections, existing research has not been able to leverage this variation in impacts. Many U.S. states elect governors only during off-election years and governors often stay in office for longer terms than elected house representatives. By expanding our RD approach to

include house elections, we expand the cycles of data that can be analyzed (including of elections that occur on cycle), subsequently increasing power to investigate heterogeneity.[2]

Finally, by analyzing political party impacts on both state appropriations for public education and outcomes theoretically related to these finance measures, this study complements extant research on the importance of school spending. An established body of literature evaluates changes to investments and student outcomes under school finance reforms (Card & Payne, 2002; Hoxby, 2001; Jackson et al., 2016; Lafortune et al., 2018) but few studies have documented the role of political party in influencing educational outcomes (Berry & Wysong, 2010). Our results identify an important factor that can affect the resources available to public institutions in K-12 and higher education: the political party in control of state government (see also, Hill & Jones, 2017; Ortega, 2020). Like past work, we find that increased education spending under Democrats coincides with relatively more positive educational outcomes for youth in terms of class size, high school completion, and post-secondary enrollment.

In Section 2, we first briefly summarize the role of state legislators and governors in affecting budgets and the sources of public K-12 and higher education expenditures. We then describe the data, sample, and empirical approach we use to bring causal evidence on the impact of political party control on state education finance and outcomes in Section 3, before sharing our main results and their robustness in Section 4, and their implications in Section 5.

[2] By leveraging both house and gubernatorial elections in an RD and highlighting the need to consider heterogeneity across election cycles, we are also contributing methodologically to the close election literature more broadly which evaluates the importance of political party on a range of measures besides education finance and outcomes (Alt & Lowry, 1994; Besley & Case, 2003; Beland, 2015; Blinder & Watson, 2016; Chen, 2007; Cohen & Yang, 2019; Dynes & Holbein, 2020; Ferreira & Gyourko, 2009; Konisky, 2007; Leigh, 2008; Poterba, 1994; Reed, 2006; Yates & Fording, 2005). These evaluations, however, typically involve a focus on just one branch of government and overall average effects.

2. Background

2.1 State Governments and Budgets

In the U.S., different political parties vie for control over state governments in order to: set the legislative and policy agenda to achieve their policy goals (Bianco & Sened, 2005; Lee et al., 2004; Wright & Schaffner, 2002), control more discretionary funding decisions (Curto-Grau & Zudenkova, 2018), and receive more financial support from regional and federal counterparts when political parties align (Albouy, 2013; Curto-Grau et al., 2018).

Perhaps most importantly, political power can matter for the broader budget appropriation process—one of state governments' primary responsibilities (Abney & Lauth, 1987). Depending on the state, the governor may propose the initial budget, but the legislature is responsible for reviewing, amending, and approving the state budget. Studies suggest that legislatures possessed equal budgetary influence as governors in the 1990's and potentially even more influence in the 1970's and 1980's (Abney & Lauth, 1998; Dometrius & Wright, 2010). But despite the importance of state legislatures and their partisanship, RD studies evaluating partisanship effects on education spending have focused solely on governors (Beland & Oloomi, 2017; Hill & Jones, 2017; Ortega, 2020).

Because most general elections occur in November with elected officials beginning their first term the following January, the first budget cycle that new political leaders can influence typically begins two years after they take office (National Conference of State Legislatures, 2008).[3] Notably, though house representatives' terms usually last just two years, studies show that marginally Democratic state legislatures have a lower probability of holding onto their party control long-term (Feigenbaum et al., 2017). This highlights the particular importance of the

[3] Most states' fiscal years run from July 1 through June 30.

short-term budgetary decisions made by legislatures under weak political party control following elections.

2.2 State Education Finance

Investments in public K-12 and higher education together make up the largest state budget item. In fact, K-12 education spending was the single largest budget item from 1977 to 2015, until it was outpaced by Medicaid. States also act as the largest source of revenue for educational agencies during most of our panel (NCES, 2018 Table 235.10; NCES 2018, Table 333.10). By 1979, states were the largest revenue source for K-12 education, surpassing the contributions from local property taxes (Loeb, 2001; Hoxby, 1996; NCES 2018 Table 235.10); colleges and universities have relied on states as their largest source of revenue until tuition and fees revenues surpassed state revenues in 2013-14 (NCES 2018; Table 333.10). The exception is community colleges, which relies primarily on state revenue: States contribute 29 percent of these public institutions' revenues compared to the 17 percent received from tuition and fees.

3. Method

3.1 Data

In this study, we investigate how political party control of state government impacts spending on public education and downstream outcomes. To do so, we build a panel dataset that spans from 1982 through 2019 and covers four primary categories: election results, public education expenditures, student outcomes, and other state-level sociodemographic data.[4]

The first category comprises both state legislative and gubernatorial election data. Klarner (2018) provides information on legislative general election results for all 50 states. These

[4] The fiscal year ending in 1982 was the first when all states clearly identified in publicly available data the expenditures specifically tied to K-12 and higher education as opposed to simply classifying spending as "Not Elsewhere Classified".

data describe, at the election district level, election type, candidates, vote share, margin of victory, and outcome. For our analyses, we exclude state-election observations with data abnormalities (e.g., missing vote counts; Klarner, 2018), primary elections, non-partisan and/or unicameral legislatures (i.e., Nebraska), and (following Eggers and Fouirnaies [2014]) state chambers with multimember districts. Of the legislative branches, we focus on house elections because many states do not elect every senate seat each election cycle. We aggregate district-election results into a single state-level metric describing the Democratic legislative control and the strength of this control in any given year. We describe this measure, which contains information on both the number of seats needed to flip party control of state legislatures and the margins of victory for these seats, in more detail below. We then supplement house election data with gubernatorial election outcomes over the same period, compiled from the Candidate and Constituency Statistics of Elections in the United States, 1788-1990, database (ICPSR 7757) and David Leip's database on results from gubernatorial elections occurring from 1990 onwards. We focus on statewide margins of victory for Democratic candidates for governor.

The second category of data captures state-level expenditures on both public K-12 and higher education. All appropriations come from the U.S. Census Bureau's database on individual local government finances ("IndFin"), which has been used by several other studies of school finance (e.g., Jackson et al., 2016; Johnson & Jackson, 2019). These dollars describe the total current expenditures and capital outlays that state governments directly spend, as well as state-to-local government transfers tied specifically to K-12 and higher education. To facilitate comparisons, these spending measures (and all others used in this study) are rescaled to per capita estimates and adjusted using the Consumer Price Index unless otherwise noted.

For student outcomes that may be affected downstream by changes in the dollars available to public K-12 school districts and higher education institutions, we draw on data from the National Center for Education Statistics' (NCES) Common Core of Data and the State Higher Education Executive Officers Associations' State Higher Education Finance report. The NCES describes at the state-by-year level the average number of students per full-time equivalent teacher ("class size") and high school diploma rates.[5,6] For higher education outcomes, we focus on full-time equivalent enrollment, excluding medical enrollment counts.

Our final data sources capture states' sociodemographic conditions. Specifically, in analyses we follow Ortega (2020) closely and control for the party in control of unanalyzed branches of state governments (i.e., state senates), demographic characteristics (i.e., proportion of the population that is Black), and measures of states' economic health including unemployment rate and state personal income per capita. Like Ortega (2020), these data are collated from the University of Kentucky's Center for Poverty Research and the Surveillance, Epidemiology, and End Results data.

3.2 Sample

Our main analytic sample for investigating the impact of Democratic control over state governments on education finance and outcomes includes 575 state-election observations between 1982 and 2016 with expenditure data in the fiscal years elapsing immediately before (the "baseline" year or the "pre period") and after ("post period") an election. The post period includes fiscal years that end in the calendar year after or up to three years following an election

[5] Statewide diploma rates are calculated for any given year using the concurrent 8th grade enrollment count and the number of students reported as receiving diplomas four years later (see also Candelaria & Shores, 2019).
[6] Diploma rates are available from 1987 to 2006 while class size is available from 1987 onwards.

year, when state legislatures can theoretically influence policy and budgets before a subsequent cycle of voting for house or gubernatorial officials occurs.

In Appendix Table A1, we provide baseline descriptives for the 575 state-elections in our panel dataset but distinguish observations and their summary statistics by whether the corresponding election resulted in a Democratic trifecta (i.e., Democratic control over the state house, senate, and governorship) or not. The table unsurprisingly depicts significant variation between Democratic and Republican states, with higher unemployment, lower educational expenditures, and poorer high school outcomes in the former. These differences highlight the need to isolate random or quasi-random variation to address potential omitted variable bias and plausibly identify the causal effects of party control of state governments on education finance and outcomes.[7]

3.3. Empirical Methodology

3.3.1 Estimation Specification

Because of other observable and unobservable state characteristics that influence state educational expenditures and outcomes, naïve estimates of the impact of political party control of state government will likely be biased. We thus leverage quasi-random variation in party control resulting from close elections. Our preferred regression specification is:

$$(1)\quad Y_{it} = \alpha + \beta_1 DemocratMargin_{it} + \beta_2 Democrat_{it} + \beta_3 (DemocratMargin_{it} \times Democrat_{it}) + \delta_i + \gamma_j + \varepsilon_{it}$$

[7] In Appendix Figure A1 we show party differences in state-level spending across K-12 and higher education over time.

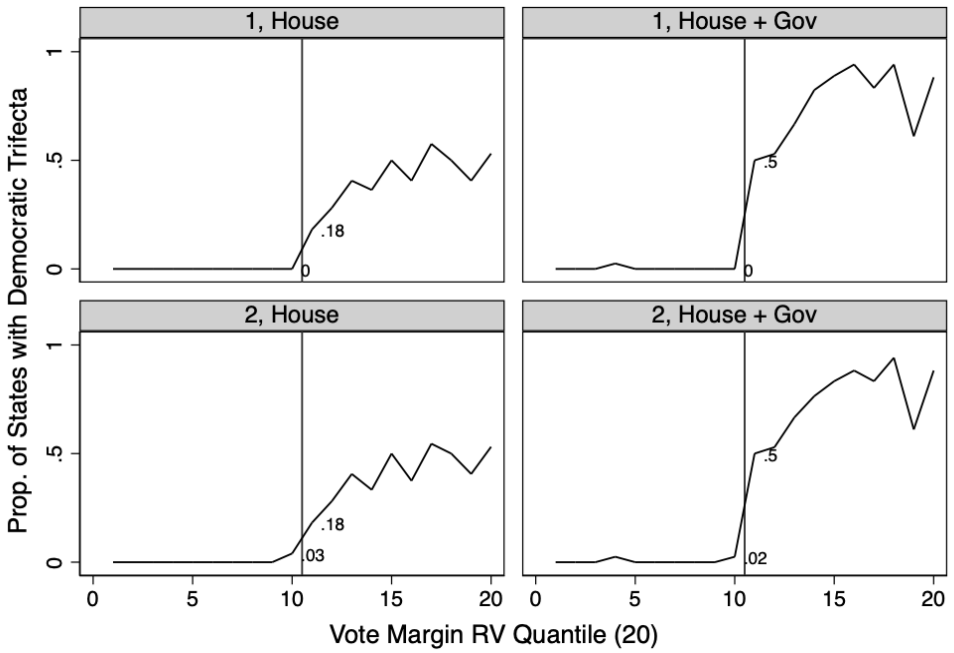
Y_{it} captures state government expenditures on public K-12 or higher education (or downstream outcomes) in state i either one, two, or three years following election year t. Key predictors in this model include $Democrat_{it}$, which indicates Democratic control of state government, and the running variable, $DemocratMargin_{it}$. As noted above, in our main specification we control for baseline state characteristics such as party in control of the state senate and sociodemographic characteristics.

Our $DemocratMargin_{it}$ measure accounts for party control of both the state house and the governorship. Focusing first on Democratic control of the legislative branch, we identify the number of district-level elections, n, required to flip the majority party status of each state house.[8] We then identify the margins of victory (in cases where Democrats have a majority) or loss (in cases where Democrats are in the minority) for the winning (losing) Democratic candidate in the n closest district-level elections. To arrive at state-level estimates, we then follow Folke (2014) and sum these n margins to calculate the minimum rectilinear distance to flip party control of the house (i.e., $\sum_1^n(DemocratHouseDistrictMargin)$). We rescale this vote margin or margin of victory measure (the L_1 Norm or the "Manhattan Distance") to be negative when Democrats are in the minority. As such, states with more positive (negative) estimates of this score have state houses that are more strongly Democratic (Republican) because vote margins of victory (loss) across the closest Democratic winners (losers) are large and/or Democrats need to flip more seats to secure the majority. Alternatively, states with house score estimates near zero are not only closer to flipping from Democratic to Republican house control (or vice versa), but they are also more plausibly comparable.

[8] For example, if there are three seats up for reelection, and the Democrats won zero districts, then n=2. If the Democrats won one district, then n=1, and so forth.

Given the important role of government unification in the legislative and budgetary process, we supplement the house-only approach with a new RD design that considers Democratic control of other branches of state government. We combine the Democratic house margin variable with gubernatorial election results. Specifically, our $DemocratMargin_{it}$ measure captures the minimum value between (1) the house running variable that factors in both the number of seats Democrats needed to secure a majority in the house and the margins of victory (or loss) for these seats and (2) the margin of victory (or loss) for the Democratic candidate from the concurrent or most recent gubernatorial election. Because the house and governor margin variables are on different scales, we rescale scores to have a standard deviation of one. Finally, to improve precision in estimates, we include in the model represented by Equation (1) the combined running variable and the original margin of victory measures for both the house and the governorship, as well as a dummy variable that flags the branch of government contributing to the minimum score. This multi-dimensional approach follows other RD designs where multiple rating scales contribute to determining "treatment" (Reardon & Robinson, 2012).

In our novel RD, the treatment, $Democrat_{it}$, is Democratic control of the house and the governorship; the limiting factor for determining treatment is thus the weakest Democratic victory (or loss) across the two branches. To see the value of using a running variable that relies on Democratic vote margins across multiple branches of state government instead of just a single branch, see Figure 1.



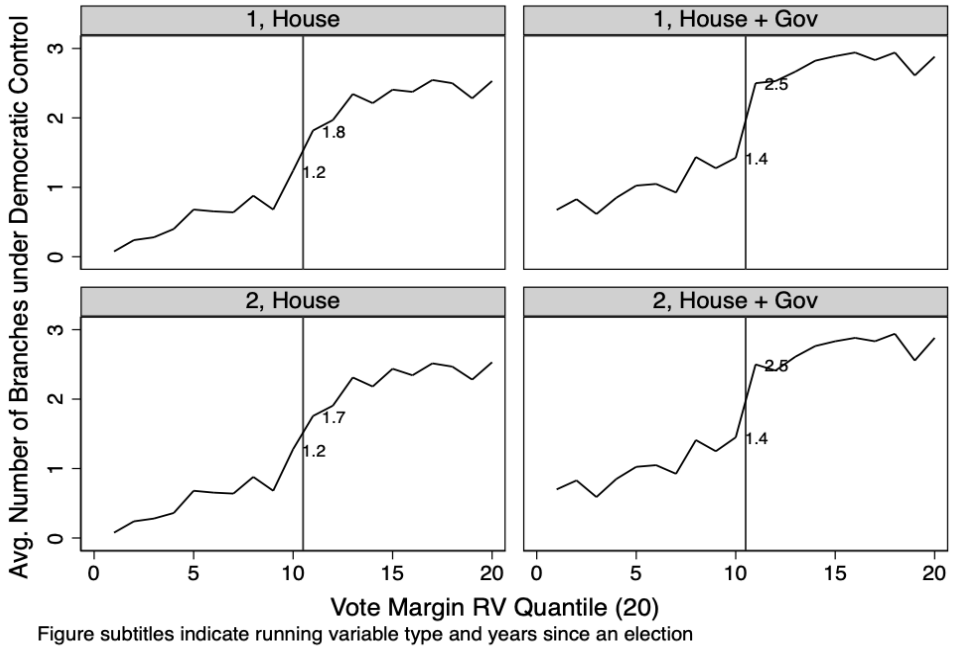


Figure 1. Democratic control of state government over time by regression discontinuity running variable

Note: Binned scatter plot (20 bins) with connected lines showing the average outcome across election-year observations. Average outcomes are labeled for the bin right below predicted Democratic control (bin 10) and for the bin right above predicted Democratic control (bin 11).

In the figure, we plot Democratic trifecta status based on vote margin variables that rely solely on house election results versus those that rely on both house and gubernatorial election results. The combined measure more noticeably predicts a higher probability of a Democratic trifecta post elections, as well as more branches of government falling under Democratic control.

In summary, in Equation (1) β_1 captures the underlying relationship between Democratic margin of victory in elections and outcomes; β_3 captures any difference in this relationship for Democratic state governments; and β_2 captures the effect of interest—the impact of "just barely" achieving Democratic control—by leveraging the quasi-random variation in control resulting from a series of close district-level and/or gubernatorial elections. The estimated model above also includes state fixed effects, δ_i, and election cycle fixed effects, γ_j, which allow us to account for differences in outcomes across contexts or election cycles.

When estimating the RD model represented in Equation (1), we focus on marginally Democratic or Republican state governments close to the threshold for party control. This limits the influence of potential outliers in party control on estimates and reduces the chance that results are sensitive to how we model the relationship between the running variable and outcomes. Specifically, we use a local linear regression with triangular kernel weights and an empirically determined optimal "bandwidth" for $DemocratMargin_{it}$ to make these exclusions and to arrive at robust, bias-corrected point estimates (Calonico et al., 2020).[9]

3.3.2 Internal Validity of RD Estimates

To support the internal validity of our RD estimates of state partisanship's impact on education finance and outcomes, we investigate whether state-elections with margin of victory

[9] The *rdrobust* command in Stata allows us to implement these decisions for our RD models.

scores just above zero (i.e., barely controlled by Democrats) are similar to those with margin of victory scores just below zero on observable characteristics. The key identifying assumption is that other plausible determinants of appropriations and outcomes evolve smoothly across the cut-off. This is necessary in order to attribute any observed discontinuities in outcomes to the "treatment" of Democratic party control, rather than other confounding variables. Though we cannot test for equivalence on unobservable characteristics, the absence of substantial discontinuities on other observable characteristics may assuage concerns that RD estimates may be biased by factors besides Democratic control.

To check for balance in state covariates, we estimate Equation (1), replacing our outcome measures with state-level data collected prior to when elections occur. Results from estimation of this model can be seen in Table 1.

Table 1. Impact of a Democratic governor and house majority on state characteristics at baseline

	Unemployment Rate	Prop. Population - Black	Personal Income	Democratic Senate	K-12 State Expenditures	Higher Education State Expenditures	K-12 Class Size	K-12 Diploma Rate	Higher Education FTE Enrollment
Democratic House + Gov	0.0523	-0.00164	401.7	0.212***	-35.70	-6.659	0.0819	-0.00460	-6,331
	(0.157)	(0.00118)	(453.2)	(0.0712)	(34.13)	(8.983)	(0.141)	(0.00400)	(6,860)
Years Since Election	0	0	0	0	0	0	0	0	0
Observations	575	575	575	575	575	575	501	315	575
N Left of 0	145	146	154	142	162	143	130	97	183
N Right of 0	108	109	111	108	120	108	88	55	125
Bandwidth	0.271	0.274	0.289	0.255	0.321	0.263	0.271	0.256	0.403

Note: All expenditure and income outcomes are in per capita 2019 dollars. Each column represents the estimation of a separate regression, with the column title as the outcome. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for Democrat control of the state house and governorship "Democratic House + Gov". State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. FTE = full-time equivalent. *$p<.01$, **$p<.05$, ***$p<.01$.

In general, Democratic states and Republican states do not exhibit significant differences from one another at baseline, including for governmental expenditures on public education and downstream outcomes. The one exception that emerges is for party control of state senates; barely Democratic states based on house and gubernatorial elections are more likely to have a Democratic senate by about 21 percentage points.[10] Thus, in our preferred models, we control for all these factors and in sensitivity analyses we also explore whether results differ when we omit observations around the margin of victory threshold using a donut RD. Results omitting covariates and/or observations are largely consistent with those from our preferred models.

Next, we demonstrate that the partisanship of states' governments is independently determined from the margin of victory threshold. In order to interpret β_2 as a causal estimate, there should be no manipulation of the margin of victory score, which determines party control of both the state legislature and governorship. Some may question the validity of using close elections to identify quasi-random variation in party control of different branches of government more broadly because incumbents tend to have advantages in terms of political relationships and resources that may confound estimates. Our RD design may alleviate those concerns because our running variable depends on multiple separate close district-level elections occurring at the same time as well as gubernatorial voting results (Grimmer et al., 2011). By leveraging results from several elections, we are less concerned about manipulation related to pre-election behavior or characteristics of candidates, such as resource advantages, and post-election advantages, such as vote-tallying (de la Cuesta & Imai, 2016). Extant evidence also suggests that these challenges are less relevant for state legislative elections in particular, further supporting their use in RD

[10] When considering the proportion of senate seats held by Democrats at baseline as an outcome in our preferred RD model, this difference is much smaller. Barely Democratic states show that prior to elections, senates are three percentage points more Democratic. That is, the difference at baseline between "treated" and "control" observations in our data is substantially smaller in practical terms with regards to senate partisanship.

approaches (Eggers et al., 2015). A McCrary Test testing the density across the cut-off provides additional support that the paper's RD design satisfies the identifying assumption.

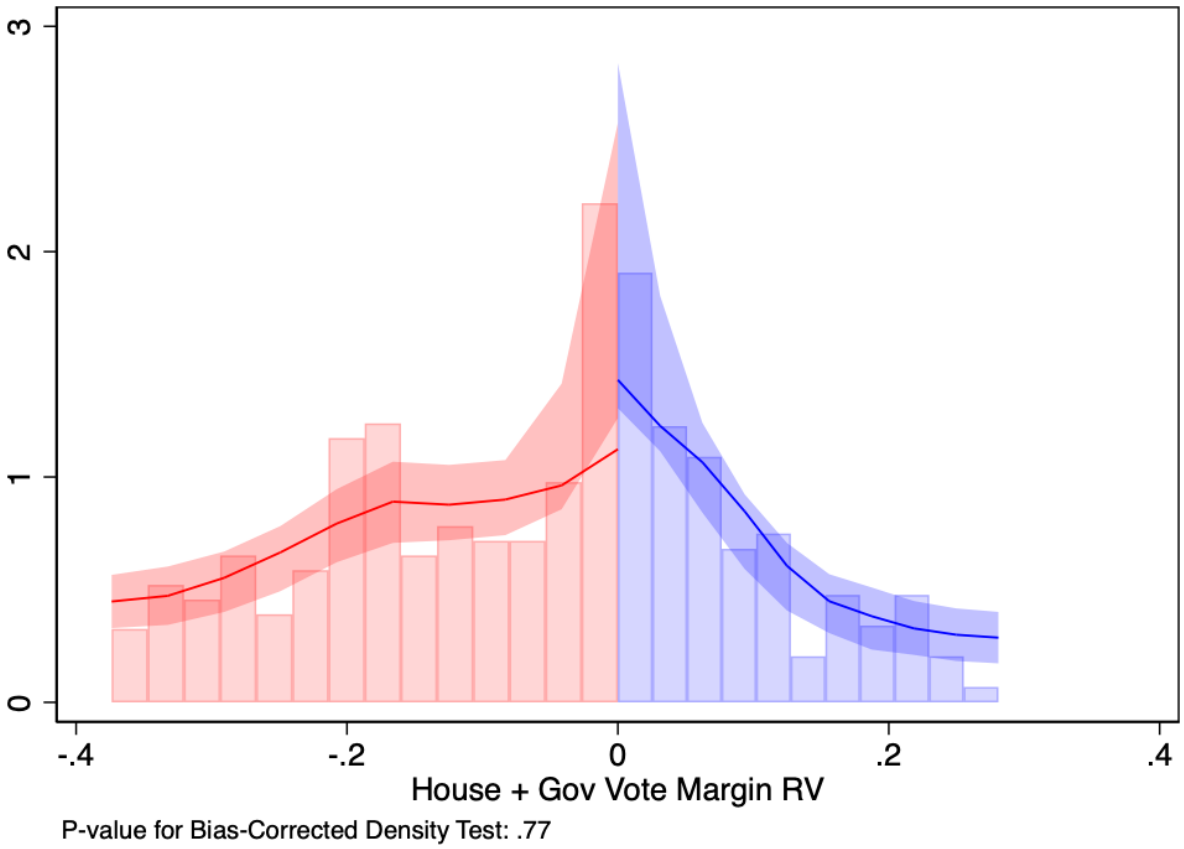


Figure 2. Distribution of the regression discontinuity running variable capturing the Democratic vote margin of victory at the state-election level

Note: Vote margins above zero indicate that Democrats control both the state house and the governorship. Local linear approximation and triangular weights are used to construct the density estimator.

In Figure 2 we show visual and empirical evidence that there is no bunching in observations above or below the cut-off, which might occur if vote margins scores can be manipulated to ensure just barely securing (or losing) majority Democratic status.

Table 2. Impact of a Democratic governor and house majority on state expenditures in K-12 and higher education

	K-12	K-12	K-12	K-12	Higher Education	Higher Education	Higher Education	Higher Education
				Panel A. All election years				
Democratic House + Gov	-20.11	-38.19**	-37.39**	-28.47**	0.299	-0.375	17.18**	5.684
	(17.54)	(16.16)	(16.85)	(14.24)	(8.211)	(7.381)	(8.411)	(7.186)
Years Since Election	1	2	3	1 to 3	1	2	3	1 to 3
Observations	575	575	575	1,725	575	575	575	1,725
N Left of 0	143	134	134	402	145	142	143	429
N Right of 0	108	106	104	318	108	107	108	324
Bandwidth	0.261	0.234	0.226	0.232	0.271	0.253	0.258	0.263
				Panel B. Non-presidential election years				
Democratic House + Gov	34.91	43.44	39.64	50.31*	11.60	10.76	28.18***	17.73**
	(33.00)	(32.29)	(27.89)	(27.75)	(9.068)	(10.25)	(9.426)	(7.665)
Years Since Election	1	2	3	1 to 3	1	2	3	1 to 3
Observations	295	295	295	885	295	295	295	885
N Left of 0	66	69	69	198	70	69	71	213
N Right of 0	57	57	58	171	58	58	58	174
Bandwidth	0.237	0.243	0.259	0.235	0.267	0.262	0.273	0.273
				Panel C. Presidential election years				
Democratic House + Gov	-107.6***	-90.61***	-123.5***	-113.7***	-8.368	-16.20	3.239	-8.209
	(22.24)	(22.27)	(27.52)	(22.73)	(10.36)	(10.30)	(10.55)	(9.638)
Years Since Election	1	2	3	1 to 3	1	2	3	1 to 3
Observations	280	280	280	840	280	280	280	840
N Left of 0	58	66	65	192	70	73	70	210
N Right of 0	44	46	46	138	50	50	50	150
Bandwidth	0.194	0.216	0.205	0.202	0.240	0.254	0.244	0.245

Note: Each cell represents results from the estimation of a separate regression predicting per capita state expenditures measured in 2019 dollars, with the column title indicating the area of spending. The main predictors in the regression are the relationship between

our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house and governorship "Democratic House + Gov". Covariates included in all models: Democratic senate at baseline, proportion Black, unemployment rate, and personal income per capita. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. *$p<.01$,**$p<.05$, ***$p<.01$.

4. Results

We first present the impact of political party control of state government on public K-12 and higher education finance. In Table 2, we present the bias-corrected, robust estimates for the effect of Democratic control from estimation of the RD model represented by Equation (1). Each column in each panel represents the estimate from a separate regression predicting either K-12 or higher education expenditures (direct plus intergovernmental) made by state governments in fiscal years post election. To improve precision of effects, we also stack data from each post year and estimate our preferred model predicting all three post-year finance measures concurrently while also controlling for dummy variables that capture the year since election for each outcome.

In Panel A, we document the overall RD results when using data across all election cycles. From the panel, we observe that when Democrats barely control state houses and governorships, K-12 state spending shrinks. Though this result is only significant when considering post-years two, three, and one through three combined, the Democrat-Republican difference is always negative, with decreases ranging from approximately 20 to 38 dollars per capita. In contrast, we find a less consistent pattern for higher education spending. Democratic states only significantly impact postsecondary public expenditure three years after elections, at an increase of about 17 dollars per capita.

In Panels B and C, we explore the heterogeneity of RD results by estimating the model represented by Equation (1) separately for elections that occur either concurrently with a presidential election or during off years. As noted in the introduction, the timing of when elections occur can affect the policies and budget decisions pursued by elected officials for several reasons. In Appendix Figure A2, we show that, at the very least, turnout appears

extremely dependent on election timing, with noticeably larger turnout rates for state house elections in presidential election years.

Results from the heterogeneity analyses indicate that the variation in voting patterns may matter substantially for how political party control of state governments affects public education spending. In Panel B specifically, we find suggestive evidence that, after off-year elections, barely Democratic states increase—not decrease—expenditures on both public K-12 and higher education. Combining data from all three years following an election leads to significant partisan differences. When Democrats barely secure control of state houses and governorships, K-12 spending increases by 50 dollars per capita while higher education spending increases by 18 dollars per capita. When analyzing each post-election year separately, results are not always significant, but Democrats consistently appropriate more to K-12 and higher education, and magnitudes of RD effects are similar across models.

The RD results in Panel C show that the main negative effects for K-12 documented in Panel A are primarily driven by the impacts of Democratic state control observed following elections that occur during presidential election years. In all of these specific RD models predicting public K-12 state expenditures, Democrats significantly decrease K-12 spending relative to Republicans—from 91 to 124 dollars per capita. Similar partisan differences emerge for higher education after presidential election years; barely Democratic houses and governorships appear to spend less on average, but none of these differences are statistically significant.

Table 3. Impact of a Democratic governor and house majority on downstream educational outcomes

	K-12 Class Size	K-12 Diploma Rate	Higher Education FTE Enrollment
Panel A. Non-presidential election years			
Democratic House + Gov	-0.619***	-0.0106**	10,761*
	(0.139)	(0.00454)	(5,764)
Observations	818	480	885
N Left of 0	183	116	207
N Right of 0	141	84	174
Bandwidth	0.201	0.192	0.265
Panel B. Presidential election years			
Democratic House + Gov	-0.0527	-0.0363***	4,161
	(0.110)	(0.00487)	(7,101)
Observations	790	440	840
N Left of 0	178	90	234
N Right of 0	130	62	162
Bandwidth	0.202	0.163	0.297

Note: Each cell represents results from the estimation of a separate regression predicting a downstream educational outcome measured one to three years post elections, with the column title indicating the outcome. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house and governorship "Democratic House + Gov". Covariates included in all models: Democratic senate at baseline, proportion Black, unemployment rate, personal income per capita, and the year of outcome measurement. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. FTE = full-time equivalent. *$p<.01$,**$p<.05$, ***$p<.01$.

We next conduct the same analyses but investigate in our RD approach how state political party control affects education outcomes downstream from changes in education finance. Table 3 displays the results from these analyses. We pool all post-election years improve precision and distinguish the impact of political party based on presidential and non-presidential election years, given the sensitivity of results to election timing depicted in Table 2. We find that

Democratic impacts on direct measures and proxies of student success in K-12 and higher education are slightly more promising in post periods following off-cycle elections than in presidential election years.

For K-12, we test whether Democratic control of state houses and governorships matters for students' future high school diploma rates and class size, which itself has been demonstrated in other settings to influence academic outcomes (e.g., Chetty et al., 2011). In Democratic states after off-year elections, class size decreases significantly by about .6 students. Post presidential year elections, this effect is still negative but insignificant and substantially smaller. We find a similar result for diploma rates, which, though falling approximately 1 percentage point under Democrats after off-cycle elections, fall nearly four times more after on-cycle ones. For higher education outcomes, we focus on full-time equivalent enrollment in public postsecondary institutions. We find that higher education enrollments increase under barely Democratic governments, but Democratic houses and governors (once again) only increase enrollment significantly after state elections that do not occur concurrently with presidential elections. Put differently, in the same years that Democrats appear to spend more on public higher education, enrollment in public colleges and universities increase.

In results documented in the Appendix, we subject our main RD results for the impact of Democratic control of states on education finance and outcomes to various robustness tests and present findings from a set of additional analyses. In Appendix Tables A2 and A3, we show that our results are generally not sensitive to reasonable variations of our preferred RD model. For public K-12 following off-cycle (on-cycle) elections, we find that Democrats always increase (decrease) appropriations—though not always significantly—when adjusting the RD model to: consider a functional form for the relationship between the running variable and outcome to be

quadratic or cubic instead of linear; exclude covariates; use data from observations in a slightly smaller or bigger bandwidth; and omit observations close to the threshold for Democratic control (i.e., donut RD). For postsecondary spending, results are generally robust as well, with state appropriations to institutions of higher education increasing under Democrats after off-cycle elections and less consistency in magnitude and direction after on-cycle ones. With regards to downstream outcomes, students continue to appear to benefit from Democratic control only after off-cycle elections.

In Appendix Table A4, we rescale our spending measures to capture the proportion of total state expenditures tied to public education. Thus, when using these rescaled outcomes in our preferred RD model, we explore political party differences in K-12 and higher education school finance relative to differences in overall expenditures. Our main results persist, with Democrats spending a smaller share of their budgets on K-12 education following presidential election years. This suggests that decreased K-12 spending is unlikely explained by less spending overall. Finally, we estimate our RD models using only the house margin of victory measure for Democrats as our running variable. In doing so, our identification strategy reflects more commonly used RD approaches that only investigate the impact of political party control on a single branch of state government (e.g., Feigenbaum et al., 2017; Hill & Jones, 2017; Ortega, 2020). We again find that the results from the simpler analyses reflect those in our main investigation: Democratic houses spend more and outcomes are better off-cycle (see Appendix Table A5). Notably, the magnitude of some of these effects appear smaller than those observed when using the combined house and governor running variable, which matches the intuition that party control over more branches of state government should lead to more sizeable party impacts.

5. Discussion

In this study, we show that though state governments under weak Democratic control on average lead to decreases in state expenditures on public K-12, these average party impacts mask substantial heterogeneity. We find that state governments with marginal Democratic control spend less than Republicans on K-12 education if they have been elected during a presidential election year—but spend more than Republicans in all other election cycles. Under Democrats we also find more consistent evidence of increased spending in higher education after off-cycle elections, in addition to reduced class size, (relatively) higher diploma rates, and expanded postsecondary enrollment. Observing positive impacts simultaneously for public education expenditures and downstream educational outcomes thus mirror those seen in the recent school finance literature (Baron, 2022; Candelaria & Shores, 2019; Jackson et al., 2021; Jackson et al., 2016; LaFortune et al., 2018).

In addition to identifying the causal impacts of Democratic control of both state houses and governorships, a primary contribution of our study highlights the importance of considering how party differences vary across election cycles. Expanding on prior studies that use RD methods to analyze the impact of political party control of state governments on education finance (Hill & Jones, 2017; Ortega, 2020), we introduce new results that show average effects mask differences based on election timing. Indeed, our results converge to some extent with these prior studies' findings that show that Democratic governors spend more than Republicans. Following non-presidential year elections, the years where the majority of state gubernatorial elections are held, we find positive effects for Democrats on both K-12 and postsecondary spending (see Appendix Table A6).

By leveraging an RD approach and showing the robustness of our results to a variety of internal validity and sensitivity checks, we contribute credibly causal evidence to a rather sparse set of studies investigating the impacts of political party control of state government on education finance and outcomes. Our RD design may limit the generalizability of our results to only the state-election observations on the cusp of flipping from Democratic to Republican control and vice versa. However, given the prevalence of close election results and decreasing government unification (Ansolabehere et al., 2006), this study's context remains an important setting affecting states' budgetary and policy decisions.

While our study documents partisan differences in spending and outcomes (and heterogeneity by election cycles), future work can explore several remaining questions: how and whether these partisan differences are driven by budgetary versus legislative decisions; potential explanations for why presidential election years influence different partisan spending choices; and reasons for partisan differences in state education spending and outcomes when they may be absent from other budget categories.

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Declaration of Interest

Declarations of interest: none.

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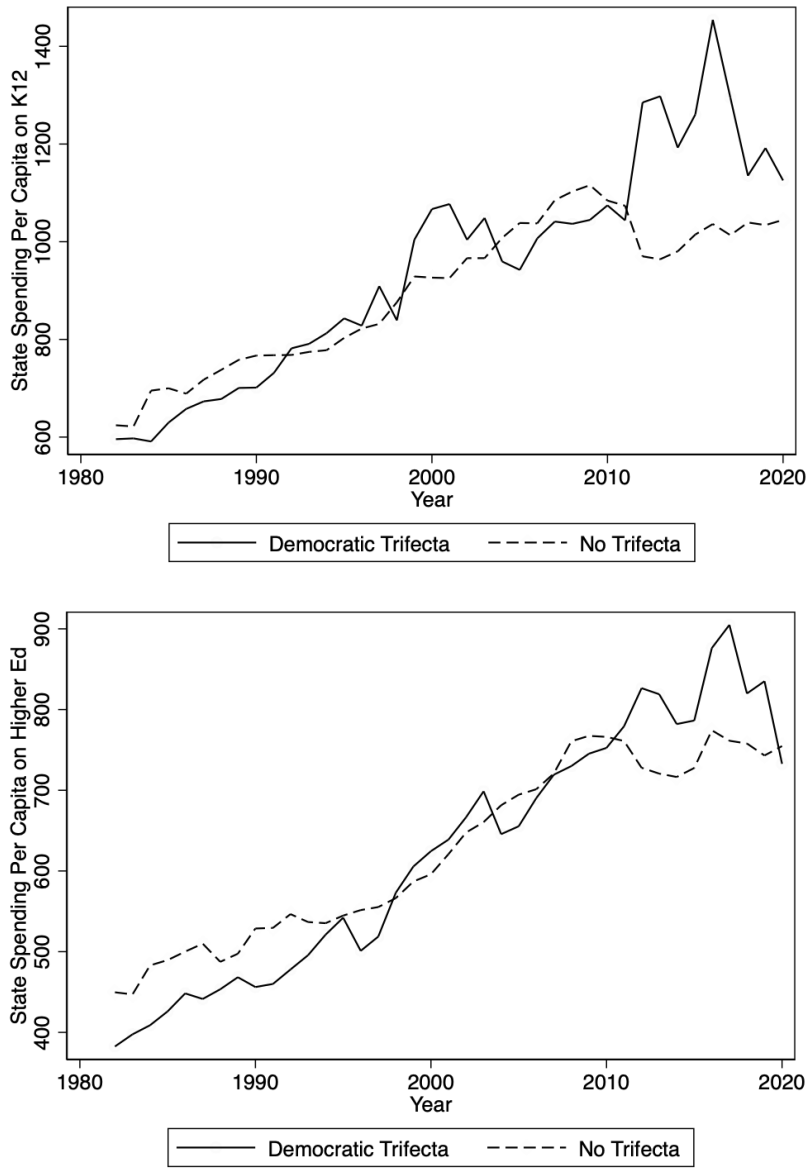
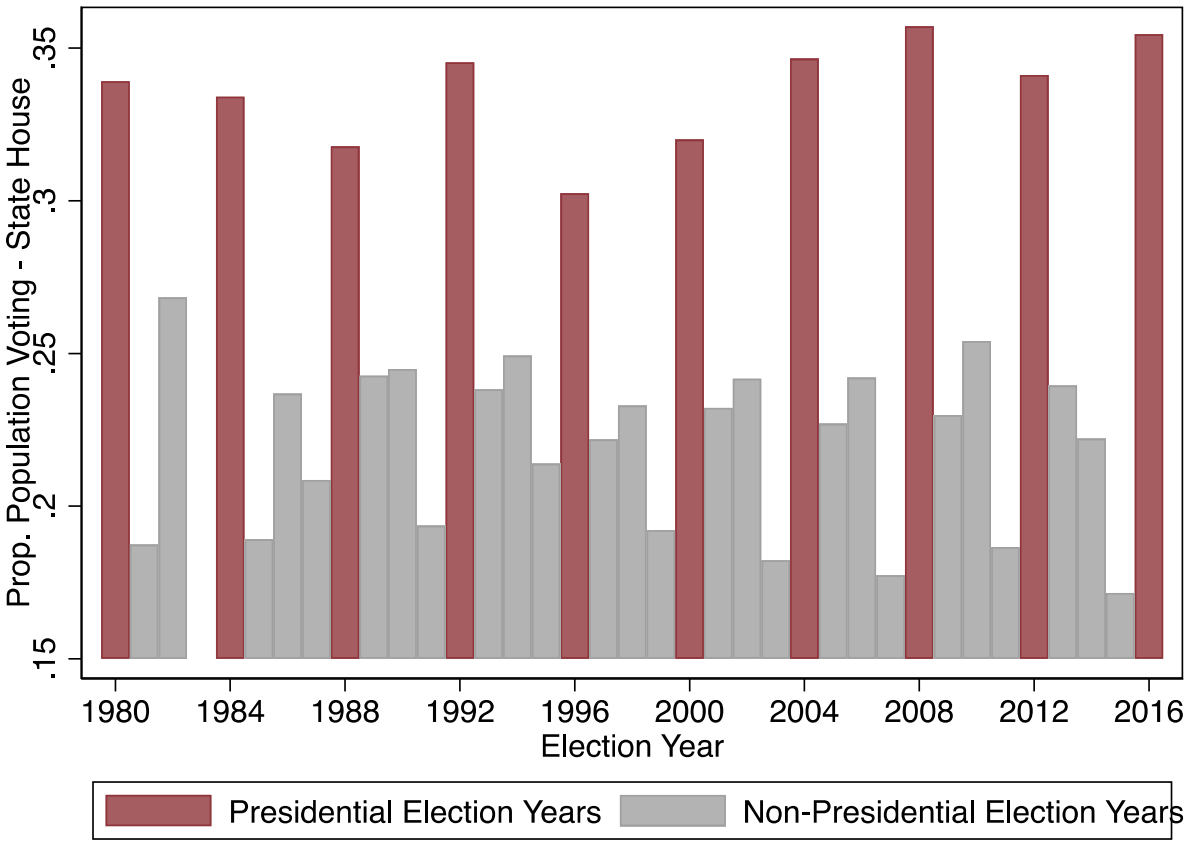
Online Appendix



Appendix Figure A1. Average state spending on K-12 and higher education by Democratic trifecta status of state government

Note: All dollars are in 2019 dollars.



Appendix Figure A2. Average proportion of the population with votes cast for state house elections across state-election cycle observations

Appendix Table A1. Baseline summary statistics

	Non-Democratic Trifecta (N=400)		Democratic Trifecta (N=175)			
	Mean	SD	Mean	SD	Difference	*p*-value
Unemployment Rate	5.76	(1.85)	6.29	(1.98)	0.53	0.00
Prop. Population - Black	0.10	(0.08)	0.10	(0.07)	0.00	0.58
Personal Income	37000.63	(6404.38)	36326.50	(8244.82)	-674.13	0.29
Democratic Senate	0.42	(0.49)	0.77	(0.42)	0.35	0.00
K-12 State Expenditures	918.03	(320.08)	865.60	(318.86)	-52.43	0.07
Higher Education State Expenditures	633.57	(190.66)	572.58	(201.30)	-60.99	0.00
K-12 Class Size	15.95	(2.40)	16.22	(2.47)	0.28	0.26
K-12 Diploma Rate	0.79	(0.07)	0.77	(0.06)	-0.02	0.07
Higher Education FTE Enrollment	207867.60	(236839.65)	230003.24	(286799.68)	22135.64	0.33

Note: All dollars are in per capita 2019 dollars. SD = standard deviation. FTE = full-time equivalent. *P*-values describe two-sample t-tests comparing means between Democratic and non-Democratic trifecta state-election observations.

Appendix Table A2. Impact of a Democratic governor and house majority on state expenditures in K-12 and higher education: Robustness checks

	K-12 Expenditures: Non-presidential Election Years	K-12 Expenditures: Presidential Election Years	Higher Education Expenditures: Non-Presidential Election Years	Higher Education Expenditures: Presidential Election Years
	Panel A. Local Quadratic Polynomial			
Democratic House + Gov	61.23**	-111.7***	17.97*	1.362
	(30.25)	(23.55)	(9.855)	(12.01)
Observations	885	840	885	840
N Left of 0	255	234	255	258
N Right of 0	195	162	195	171
Bandwidth	0.346	0.296	0.348	0.354
	Panel B. Local Cubic Polynomial			
Democratic House + Gov	80.95**	-148.6***	15.41	-1.368
	(34.45)	(30.81)	(10.64)	(11.44)
Observations	885	840	885	840
N Left of 0	294	258	318	237
N Right of 0	210	171	216	165
Bandwidth	0.452	0.357	0.482	0.307
	Panel C. No Covariates			
Democratic House + Gov	33.98	-56.51*	11.59	21.76
	(36.02)	(33.24)	(10.26)	(15.16)
Observations	885	840	885	840
N Left of 0	264	237	246	267
N Right of 0	201	165	192	174
Bandwidth	0.373	0.311	0.327	0.393
	Panel D. Optimal Bandwidth times .8			
Democratic House + Gov	46.78*	-191.2***	18.07*	-18.47**
	(24.50)	(30.79)	(10.05)	(8.003)
Observations	885	840	885	840
N Left of 0	168	141	195	189
N Right of 0	150	126	162	132
Bandwidth	0.188	0.161	0.218	0.196

	Panel E. Optimal Bandwidth times 1.2			
Democratic House + Gov	47.52	-104.3***	20.65**	-0.339
	(30.03)	(25.87)	(8.153)	(10.83)
Observations	885	840	885	840
N Left of 0	216	210	246	234
N Right of 0	180	150	192	159
Bandwidth	0.282	0.242	0.327	0.294
	Panel F. Donut			
Democratic House + Gov	78.04	44.99	50.89***	114.3***
	(55.77)	(88.09)	(16.26)	(26.88)
Observations	804	759	795	747
N Left of 0	159	147	171	156
N Right of 0	129	102	126	111
Bandwidth	0.235	0.202	0.273	0.245

Note: Each cell represents results from the estimation of a separate regression predicting per capita state expenditures measured in 2019 dollars, measured one to three years post elections, with the column title indicating the area of spending and election cycle. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house and governorship "Democratic House + Gov". Covariates included in all models (unless specified): Democratic senate at baseline, proportion Black, unemployment rate, personal income per capita, and the year of outcome measurement. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. *$p<.01$,**$p<.05$, ***$p<.01$.

Appendix Table A3. Impact of a Democratic governor and house majority on downstream educational outcomes: Robustness checks

	K-12 Class Size: Non-presidential Election Years	K-12 Class Size: Presidential Election Years	K-12 Diploma Rate: Non-presidential Election Years	K-12 Diploma Rate: Presidential Election Years	Higher Education FTE Enrollment: Non-Presidential Election Years	Higher Education FTE Enrollment: Presidential Election Years
Panel A. Local Quadratic Polynomial						
Democratic House + Gov	-0.567***	0.0116	0.00763	-0.0235***	39,225***	-1,840
	(0.183)	(0.140)	(0.00654)	(0.00450)	(7,417)	(6,494)
Observations	818	790	480	440	885	840
N Left of 0	207	206	104	106	231	246
N Right of 0	150	142	81	62	183	168
Bandwidth	0.274	0.265	0.177	0.176	0.295	0.331
Panel B. Local Cubic Polynomial						
Democratic House + Gov	-0.531**	-0.0298	0.00495	-0.0159**	33,326***	-19,913***
	(0.217)	(0.219)	(0.00352)	(0.00622)	(6,829)	(6,359)
Observations	818	790	480	440	885	840
N Left of 0	249	244	107	136	258	246
N Right of 0	168	160	81	71	198	168
Bandwidth	0.363	0.379	0.187	0.255	0.359	0.333
Panel C. No Covariates						
Democratic House + Gov	-0.403*	0.216	-0.0160***	-0.0121*	34,135***	-12,278
	(0.206)	(0.148)	(0.00606)	(0.00692)	(6,613)	(7,812)
Observations	818	790	480	440	885	840
N Left of 0	261	295	156	138	216	315
N Right of 0	168	178	96	71	177	195
Bandwidth	0.389	0.485	0.333	0.259	0.278	0.491
Panel D. Optimal Bandwidth times .8						
Democratic House + Gov	-0.451***	-0.282*	-0.0130***	-0.0248***	20,930***	-6,073
	(0.106)	(0.168)	(0.00294)	(0.00421)	(3,704)	(4,345)
Observations	818	790	480	440	885	840
N Left of 0	138	127	84	74	195	204
N Right of 0	129	118	69	58	156	147
Bandwidth	0.161	0.162	0.154	0.130	0.212	0.237

	Panel E. Optimal Bandwidth times 1.2					
Democratic House + Gov	-0.572***	0.0902	-0.00993**	-0.0277***	19,424***	-5,382
	(0.152)	(0.140)	(0.00418)	(0.00409)	(4,836)	(6,253)
Observations	818	790	480	440	885	840
N Left of 0	201	196	128	128	243	258
N Right of 0	147	142	90	65	189	171
Bandwidth	0.241	0.242	0.231	0.195	0.318	0.356
	Panel F. Donut					
Democratic House + Gov	0.0618	1.421***	0.0634***	-0.0392***	6,002	-10,596
	(0.354)	(0.302)	(0.0132)	(0.00473)	(11,490)	(12,518)
Observations	743	717	435	403	801	738
N Left of 0	147	139	98	65	168	174
N Right of 0	102	96	57	50	129	120
Bandwidth	0.201	0.202	0.192	0.163	0.265	0.297

Note: Each cell represents results from the estimation of a separate regression predicting a downstream educational outcome measured one to three years post elections, with the column title indicating the outcome and election cycle. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house and governorship "Democratic House + Gov". Covariates included in all models (unless specified): Democratic senate at baseline, proportion Black, unemployment rate, personal income per capita, and the year of outcome measurement. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. FTE = full-time equivalent. *$p<.01$,**$p<.05$, ***$p<.01$.

Appendix Table A4. Impact of a Democratic governor and house majority on state expenditures in K-12 and higher education: Proportion of total state expenditures

	K-12 Expenditures	Higher Education Expenditures
Panel A. Non-presidential election years		
Democratic House + Gov	0.00551	0.00356*
	(0.00442)	(0.00205)
Observations	885	885
N Left of 0	171	174
N Right of 0	0.255	0.259
Bandwidth	0.255	0.259
Panel B. Presidential election years		
Democratic House + Gov	-0.0252***	-0.00168
	(0.00452)	(0.00247)
Observations	840	840
N Left of 0	141	150
N Right of 0	0.223	0.244
Bandwidth	0.223	0.244

Note: Each cell represents results from the estimation of a separate regression predicting the proportion of per capita state total expenditures that are spent on education, measured in 2019 dollars, measured one to three years post elections, with the column title indicating the area of spending. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house and governorship "Democratic House + Gov". Covariates included in all models: Democratic senate at baseline, proportion Black, unemployment rate, personal income per capita, and the year of outcome measurement. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process.
*$p<.01$,**$p<.05$, ***$p<.01$.

Appendix Table A5. Impact of a Democratic house majority on state expenditures in K-12 and higher education and downstream educational outcomes

	K-12 Expenditures	Higher Education Expenditures	K-12 Class Size	K-12 Diploma Rate	Higher Education FTE Enrollment
		Panel A. Non-presidential election years			
Democratic House	34.63*	17.70**	-0.283**	-0.0202**	9,288***
	(18.90)	(7.141)	(0.123)	(0.00805)	(2,753)
Observations	885	885	818	480	885
N Left of 0	219	192	192	123	174
N Right of 0	0.149	0.123	0.155	0.147	0.0922
Bandwidth	0.149	0.123	0.155	0.147	0.0922
		Panel B. Presidential election years			
Democratic House	-30.55	-13.19**	0.00614	-0.0120**	-8,793
	(23.75)	(6.357)	(0.0842)	(0.00534)	(6,595)
Observations	840	840	790	440	840
N Left of 0	228	243	263	76	210
N Right of 0	0.155	0.194	0.248	0.0552	0.143
Bandwidth	0.155	0.194	0.248	0.0552	0.143

Note: Each cell represents results from the estimation of a separate regression predicting per capita state expenditures measured in 2019 dollars or a downstream educational outcome measured one to three years post elections, with the column title indicating the outcome. The main predictors in the regression are the relationship between our regression discontinuity running variable and outcome (varying for Democrat-controlled states and Republican-controlled states) and a dichotomous variable for control of the state house "Democratic House". Covariates included in all models: Democratic senate at baseline, proportion Black, unemployment rate, personal income per capita, and the year of outcome measurement. State and election fixed effects included in all models. Standard errors clustered at the state level in parentheses. Results reported come from Stata command *rdrobust*'s bias-corrected and robust point estimates after specifying a local linear regression discontinuity with triangular kernel weights and the default bandwidth (BW) selection process. FTE = full-time equivalent. *$p<.01$,**$p<.05$, ***$p<.01$.

Appendix Table A6. State election observations by year and cycle

Election year	Presidential year?	House elections	Gubernatorial elections
1982		22	24
1983			1
1984	YES	25	4
1985		1	1
1986		26	22
1987		2	2
1988	YES	27	5
1989		1	1
1990		24	27
1991		2	2
1992	YES	30	6
1993		1	1
1994		30	26
1995		1	1
1996	YES	29	4
1997		1	1
1998		33	28
1999		2	2
2000	YES	31	6
2001		1	1
2002		34	29
2003		2	3
2004	YES	34	6
2005		1	1
2006		34	29
2007		2	2
2008	YES	35	6
2009		1	1
2010		34	29
2011		2	2
2012	YES	35	6
2013		1	1
2014		35	29
2015		2	2
2016	YES	34	7

Note: Number of states with house and gubernatorial elections by year and on-cycle status.