Do Voters or Politicians Choose the Outcomes of Elections? Evidence from the Struggle to Control Congressional Redistricting

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January 27, 2017
First Version: June 20, 2016

Abstract

We study whether political parties exert precise control over the outcomes of legislative elections. We test for discontinuities in two outcomes that, in the absence of precise control, should be smooth at the threshold that determines control of the legislature: the identity of the party that previously held a majority, and the probability density of the election outcome. We apply these tests to high-stakes state elections that determine which party controls Congressional redistricting. We find overwhelming evidence of precise control, suggesting the majority party can—through legal means—ensure it barely retains enough seats to stay in power. (JEL Codes: D72,D73,J11)

Preliminary and incomplete.
Comments and suggestions welcome.

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1 Introduction

One hallmark of a true democracy is that the outcome of an election is the choice of voters rather than politicians. Though politicians can influence the outcome by choosing a popular platform or running an effective campaign, the precise outcome depends on the attitudes of voters and thus remains uncertain. It is only in sham democracies—those in which the polls are rigged—that politicians can choose the precise outcome they want. It is typically assumed such precision is impossible in a real democracy.

This paper presents evidence to the contrary. We show that political parties can exert remarkably precise control over the outcomes of elections even in the U.S., typically considered among the most free and fair of democracies. We study not the outcomes of individual races, which may have little import for policy, but the aggregate outcome that determines which party controls a state legislature. We show that when the stakes are sufficiently high, the party that holds a majority before the election can nearly eliminate the uncertainty around its reelection. We do not claim the majority party rigs the election. We argue that it does not have to; by targeting campaign funds and ensuring its incumbents seek reelection, it can achieve comparable control over the outcome.

We subject election outcomes to two tests adapted from the literature on regression discontinuities for manipulation of a continuous variable. We focus on the outcomes of “high-stakes” elections where the benefit of winning a bare majority is especially high—to be precise, elections that determine control of U.S. Congressional redistricting. The U.S. Supreme Court mandates that Congressional districts must be redrawn every ten years to ensure all districts contain the same number of people. The boundaries of a district determine how many left- or right-leaning voters a candidate will face. The party that controls redistricting can potentially redraw boundaries to favor its own candidates, reaping a windfall in Congress.

The rules of redistricting hand great influence to whichever party wins even a bare majority. In most states, a redistricting plan is passed as regular legislation by the state legislature. The party that controls any chamber of the legislature—in particular, the lower house—has at least a veto over any redistricting plan. Control of the lower house passes discontinuously from Republi-
cans to Democrats when their share of seats crosses the threshold of 50 percent. If they win these seats in the state election just prior to redistricting, they also discontinuously gain a veto over redistricting. In these high-stakes elections, each party has a strong incentive to choose an outcome on one or the other side of this 50 percent threshold.

We test for whether the majority party can ensure the outcome falls on the winning side of this threshold. Our first test checks for whether the identity of the majority party—the party that held a majority before the election—changes discontinuously at the threshold. The test is akin to asking whether, knowing only the outcome of the election, our prediction of whether the Democrats previously held a majority is radically different if the Democrats win 51 percent versus 49 percent of the seats. As long as there is any meaningful uncertainty about the outcome, there should be no difference. A discontinuity would suggest the majority party is able to effectively eliminate uncertainty. To show this directly we run a second test, adapted from McCrary (2008), for a discontinuity in the density of the majority party’s share of seats won. Such a discontinuity suggests the majority party is far more likely to barely win than barely lose the election.

Checking for discontinuities in pre-determined outcomes and in the probability density of outcomes are common tests for manipulation of a forcing variable around a threshold. They have often been used to test for whether teachers manipulate grades to pass their favorite students, or workers manipulate taxable income to keep themselves in a lower tax bracket. What is novel about our context is that the running variable—the outcome being manipulated—is the outcome of an election. If there is a discontinuity in predetermined outcomes, it suggests the outcome of the election—that is, the identity of the ruling party—is nearly void of uncertainty.

Could a lack of uncertainty be a natural feature of elections rather than the result of conscious effort by the majority party? We answer this question by exploiting the timing of redistricting. It is the state assembly election just prior to decennial redistricting that determines which party controls redistricting. If uncertainty is a natural feature of elections, our tests should reject in every election. But if they reject only in high-stakes elections, it suggests precise control is no accident but a strategic choice.
We find strong evidence of precise control in high-stakes elections. The probability that Democrats held a majority in the previous election jumps by 44 percent at the threshold. The discontinuity suggests the majority party is able to ensure with great precision that it remains on the proper side of the threshold. The discontinuity is visible in probability density of the election outcome. We find that the majority party is almost 4 times as likely to barely win than to barely lose a high-stakes election. These large and statistically significant discontinuities appear only in high-stakes elections. In elections that do not determine control of redistricting, there is no evidence of a discontinuity.

We provide suggestive evidence that precise control is the result not of rigging but of better campaign tactics and more campaign finance. We find that in high-stakes elections there is a decrease in the rate at which incumbents choose not to seek reelection in the lower house. The decrease is steepest in competitive elections where both parties have a similar number of incumbents. We find a similar pattern in total campaign contributions to candidates for the lower house. We also find that the parties target these resources more narrowly. The Democrats in particular concentrate their resources on vulnerable incumbents, especially in elections where they previously held a majority. Among both parties financial support rises and exit rates fall in some states but not others, suggesting the parties concentrate on a few elections at the cost of throwing away others. That is precisely what we find in the election outcomes. There is a sharp decrease in the probability the majority party loses just barely, but an increase in the probability it loses spectacularly.

Which elections do they choose to win and which do they choose to lose? We show that the parties choose to control redistricting in states where they have suffered recent losses in U.S. House elections. We show that these losses are partly reversed immediately after redistricting, though the effect is soon eroded by the trends. Assuming the negative trends do not for other reasons arbitrarily reverse just after redistricting, this result suggests the mechanism for the reversal is redistricting.

To provide further evidence that parties exploit their control of redistricting, we provide evidence that they redraw district boundaries to favor their candidates. We match geocoded census data to Congressional district boundaries. We show that in states where Republicans control redistricting, African Ameri-
cans, who overwhelmingly support Democrats, are discontinuously more likely to be moved to a new district. This pattern does not hold for other demographic groups. Conditional on being moved, African Americans are more likely to be packed into racially segregated districts that minimize the number of House races they can influence. Given that states are sorted around the threshold on pre-existing trends, it is impossible to say with certainty that this treatment is caused by Republican control of redistricting. However, we find no evidence to support the most plausible alternative explanations. For example, we find no evidence that African Americans in Republican-controlled states are more likely to live in over- or under-populated districts that need to be redrawn.

Our key contribution is to show that the majority party in a U.S. state election can, through legal but costly means, eliminate the uncertainty of an election. They choose to almost guarantee victory in some elections at the cost of throwing away others. They are willing to accept this trade-off when the outcome of the election determines control of a key institution that can itself make elections less competitive. Prior work has shown that elites may sway elections by misappropriating public spending or public goods, but that such efforts succeed mainly in immature democracies. (e.g. Akhmedov and Zhuravskaya, 2004; Brender and Drazen, 2008). Our work suggests that modern campaign tactics can be no less effective when applied to even a democracy as mature as the United States. Without resorting to fraud, political parties can effectively choose the desired outcome.

1.1 Related Literature

This paper most directly contributes to the literature on how politicians use legal or illegal means to maintain control of elected office. This literature has found that incumbents will increase spending in election years (Nordhaus, 1975; Drazen and Eslava, 2010); allocate jobs, public goods or popular reforms to swing districts (Folke et al., 2011; Bardhan and Mookherjee, 2006; Baskaran et al., 2015; Nagavara and Sekhri, 2014); exploit the control of one level of government to increase the odds of winning at another (Curto-Grau et al., 2011); or alter the electoral system to marginalize opposition (Trebbi et al., 2008). These studies have found tactics to be effective.
But as noted earlier, other work has shown that the attempt may fail or even backfire in mature democracies and in the presence of independent institutions (Peltzman, 1992; Akhmedov and Zhuravskaya, 2004; Brender and Drazen, 2008; Matsusaka, 2009; Durante and Knight, 2012; Fujiwara and Wantchekon, 2013). Our work suggests these may simply be the wrong tactics for a mature democracy. By exploiting campaign financing and the overwhelming electoral advantage of incumbent candidates, the ruling party can maintain its majority.

Our work is also related to the recent literature in political science on whether outcomes of close elections are as good as random. Using an approach similar to ours, several papers have found evidence of sorting in close elections for the U.S. House (Snyder, 2005; Caughey and Sekhon, 2011; Grimmer et al., 2012). Other work has disputed their conclusions or shown that they are not a general feature of close elections in other contexts (Eggers et al., 2015; de la Cuesta and Imai, 2016). Our work is distinct in two ways. First, the papers cited largely focus on the methodological question of whether the “close elections” approach first used by Lee et al. (2004) is valid. They are less concerned with the broader question of whether political parties can manipulate outcomes to seize control of crucial institutions. Their focus on methodology is in part because of the second distinction: they focus on the outcomes of individual races between candidates rather than the aggregate outcomes of elections. That the more experienced or better financed candidate can edge out victory in a close election may have little impact on the composition or the policies enacted by the legislature as a whole. By contrast, we test whether the incumbent party can edge out victory to remain in control of the legislature.

Finally, our work extends the vast empirical literature on partisan redistricting in the U.S. The literature has generally taken two approaches. The first uses simulations to evaluate the fairness of a redistricting plan (Gelman and King, 1990, 1994a,b; Engstrom, 2006; Glazer et al., 1987; McCarty et al., 2009; Chen and Rodden, 2013; Chen, 2016). The second compares actual election outcomes under different redistricting plans (Brunell and Grofman, 2005; Hetherington et al., 2003; Grainger, 2010; Ansolabehere and Snyder Jr, 2012; Carson

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1 There is a related but distinct literature on incumbent redistricting. Abramowitz et al. (2006), Friedman and Holden (2009), and Carson et al. (2014) study whether politicians redraw districts not to favor one party but to favor incumbents of all parties.
et al., 2007; McCarty et al., 2009; Lo, 2013).

To our knowledge, however, the literature has not studied what actions political parties take to seize control of redistricting. Moreover, the most common conclusion of the literature—that control of redistricting yields little benefit—seems inconsistent with our finding that political parties take pains to control it. The inconsistency may arise because, as we show, the parties aim to control redistricting in states where they are losing seats in Congress. A research design that does not account for this pre-existing trend may conclude that control of redistricting has zero or even negative benefit.²

2 Background: What is Redistricting and Why is it Worth Controlling?

Why does the chance to control Congressional redistricting raise the stakes of an election? As noted in the introduction, the boundaries of a district may be drawn to favor one party over another. Partisan redistricting, or “gerrymandering,” is at least as old as the Republic. Its first victim was James Madison, the mastermind of the U.S. Constitution, who was forced to run for office in a district drawn by his political opponents (Weber, 1988).³ Ironically it was Madison’s future running mate, Elbridge Gerry, who as governor of Massachusetts signed into law the politically favorable but salamander-shaped district that was first called the “Gerrymander.”

Figure 1.A shows a simple example of how gerrymandering might work. The top and bottom panel show the same hypothetical state under two redistricting plans. In the first plan, the state’s 6 Democratic and 3 Republican voters are split evenly between three Congressional districts. Assuming all of them vote, the Democrats will win all three seats. In the second plan, the lines are contorted to give Republicans a bare majority in one district (labeled 1). As a result, an equally contorted second district is created with only Democrats (la-

²This paper is also related to theoretical work that identifies how a party should gerrymander. See, for example, Owen and Grofman (1988); Friedman and Holden (2008); Puppe and Tasnádi (2009); Cox and Holden (2011); Gul and Pesendorfer (2010); Shotts (2001, 2002).

³The district was drawn by the Anti-Federalists, led by Patrick Henry, as punishment for Madison’s defense of the Constitution. Despite Henry’s efforts, Madison won nevertheless.
beled 2). This practice is commonly called “packing and cracking.” In this case, Democrats have been packed into District 2 and cracked (given bare minorities) in District 1. As a result the Republicans, without gaining any additional support, have gained a seat.

Such gerrymandering has two visible consequences. The first appears in the distribution across districts of the opponents of the party that controls redistricting. As shown in Figure 1.B, the party would move opponents out of districts in which they form a slight majority. This reduces the mass of districts just above 0.5. They would then combine these opponents into districts where they form the overwhelming majority (like District 2 in Figure 1.A), increasing the mass at the top of the distribution. Though these districts would be lost with certainty, there would be an increase in districts in which opponents are a minority (like District 1 in Figure 1.A). As a result, mass shifts from just above to just below 50 percent.4

The other visible consequence of gerrymandering is in the district boundaries themselves. Contorted districts, like those in the bottom panel of Figure 1.A, often have longer boundaries without having a larger area. One measure of such contortion is the ratio of the perimeter to the square root of the area. (Taking the square root ensures both numerator and denominator have comparable units.) Figure 2.A shows several examples of this perimeter-area ratio. A square has a perimeter-area ratio of 4. A relatively simple district, like the rectangular Kansas 3rd district, has a perimeter-area ratio of 4.9—not much more complex. But the Texas 18th district, with its irregular lines and gaps, has a ratio of over 36.

Figure 2.B plots the median perimeter-area ratio of all districts over time. In the early part of the past century, many state legislatures left district lines unchanged to avoid making incumbents face new voters. As a result, the ratio changes little up through the 1960s. Only after the Supreme Court ruled in Baker v. Carr 369 (1962) and Wesberry v. Sanders 376 (1964) that their failure to redistrict was unconstitutional did states start redistricting regularly. After

4The “optimal” way to gerrymander, as described in Friedman and Holden (2008), is actually rather more sophisticated than this. It requires using the party’s most ardent supporters to neutralize its most ardent foes. However, the common perception is that parties do not attempt this more complex approach. As we show below, our results are consistent with the simpler practice of packing and cracking. It is possible that constraints of both geography and information—the would-be gerrymanderer might not be able to identify the strength of a voter’s left-right bias—prevents optimal gerrymandering.
Figure 1
The Objective of Gerrymandering

A. An Example of Gerrymandering

Republicans win 0 seats

Republicans win 1 seat

Figure 2
Simple and Complex Districts

A. Perimeter Area Ratio of Simple and Complex Districts

Perfect Square

Texas 18th District
103rd - 104th Congress

Kansas 3rd District
78th - 87th Congress

B. District Boundaries Grow Increasingly Complex

Pre-Redistricting
Post-Redistricting

Note: Perimeter-Area ratio is defined as \[\frac{\text{Perimeter}}{\sqrt{\text{Area}}}\].
the ruling nearly all states that were apportioned more than one Congressional district started redrawing their districts in the year after the decennial census.\textsuperscript{5}

Starting in 1971, the ratio jumps in the years ending in 1. By and large it jumps upward, suggesting districts have become increasingly contorted.\textsuperscript{6} Though these contortions do not prove there is gerrymandering, it is clear that the party in power can and does make major revisions in each redistricting. It is hard to imagine that party would not be tempted to skew the revisions in its favor.

\section{Research Design}

Suppose you were dropped into an unknown state in an unknown year the day after the election. You are told nothing except the margin of seats won in the lower house by the Democrats. If you then had to predict whether the Democrats held a majority before the election, how would your prediction vary with the margin of victory? Clearly you would assign higher probability as the margin increased. A state that elected many Democrats this election probably did so in the previous election, making it more likely they held a majority. But would your prediction change \textit{discontinuously} when the Democrats’ margin crosses zero? Are the Democrats far more likely to have been the majority party if they eke a close win rather than a close defeat?

The answer is no, in the absence of manipulation. The natural uncertainty of the election outcome ensures the optimal prediction is smooth at the threshold. It also ensures the probability density of the margin won by the party that previously held a majority should be smooth at the discontinuity. We show that the failure of either condition implies there is manipulation, meaning the majority party can exert precise control over the outcome.

\textsuperscript{5}The states may redistrict in the year after the census, but may not always succeed in passing a bill. There are some cases (e.g. Texas in 2003) when states have chosen to redistrict again later in the cycle. We do not exploit this variation, as the decision to redistrict may itself be endogenous to the outcome of lower house elections.

\textsuperscript{6}The year 1991 is an exception. This may be because in that year states tried to make their districts more compact, or it may be a shortcoming of the perimeter-area ratio as a measure of contortedness.
3.1 Two Tests for Precise Control by the Majority Party

The two parties contest a unit measure of elections identified by the state $i$ and election-year $t$. In the absence of manipulation the margin of seats won by Democrats is

$$X_{i,t}^* = \alpha (2M_{i,t-1} - 1) + v_{i,t}$$

where $M_{i,t-1}$ is a dummy for whether the Democrats held a majority before the election and $v_i$ is a mean zero shock to the outcome. Assume $v_{i,t}$ is distributed according to the cumulative distribution function $F$, which is twice-continuously differentiable at $F(-\alpha)$ and $F(\alpha)$. The term $\alpha > 0$ gives the expected margin of the party that holds a majority before the election.

For the sake of simplicity this model assumes away many features of an actual election. But one could allow the outcome to vary with demographics or the state of the economy, allow the advantage of the majority party to vary continuously with the number of incumbents, and allow the parties to influence the outcome through their choice of platform or through electioneering. We require only that neither party can perfectly foresee $v_{i,t}$, which guarantees it cannot condition its choices on the realized value of $v_{i,t}$.

Suppose the majority party can exert precise control over the outcomes of a fraction of elections $\kappa$. Let $C^D$ and $C^R$ be the set of elections controlled by Democrats and Republicans. Let $m(\cdot)$ denote a measure defined over sets of elections. Then $C^D$ and $C^R$ satisfy

$$m(C^D) = m(C^R) = \kappa$$

and

$$\{i \in C^D_i \mid M_i = 0\} = \{i \in C^R_i \mid M_i = 1\} = \emptyset$$

When the majority party controls the outcome of election $i$ it wins a margin $u_{i,t}^C$, which has a uniform distribution over half-open interval $[0, \nu)$ for a small

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McCrary (2008) notes the difference between “partial” and “complete” manipulation, where complete manipulation implies the running variable is completely controlled by the agent. The agent can only exert precise control in the case of complete manipulation. If the majority party has perfect foresight it can condition its choices on the realized value of $v_{i,t}$, which puts the running variable under its complete control. But as long as there is any noise in its prediction of $v_{i,t}$, some part of the running variable is outside its control.
number $0 < \nu < 1$. Then the realized outcome is

$$X_{i,t} = \begin{cases} 
  u_{i,t}^C & \text{if } i \in C^D \\
  -u_{i,t}^C & \text{if } i \in C^R \\
  X_{i,t}^* & \text{otherwise}
\end{cases}$$

Then it is a straightforward application of Proposition 2 from Lee (2008) to prove:

**Lemma 1** If $\kappa = 0$ then $X_{i,t}$ has an absolutely continuous conditional distribution function $G(X_{i,t} \mid M_{i,t-1})$. The conditional density $g(X_{i,t} \mid M_{i,t-1})$ is continuous at $X_{i,t} = 0$. Finally,

$$\lim_{x \to 0} \left\{ \mathbb{E}[M_{i,t-1} \mid X_{i,t} = x] - \mathbb{E}[M_{i,t-1} \mid X_{i,t} = -x] \right\} = 0 \quad (1)$$

Equation 1 states that, in the limit, the optimal prediction of whether the Democrats were the majority party before the election is similar on either side of the threshold. To be precise, it should not change discontinuously when the Democrats switch from losing to winning the election. This result is akin to the falsification test used to verify a regression discontinuity design. If the design is valid—that is, if there is no manipulation in the running variable—no predetermined outcome should change at the threshold.

To derive a test for manipulation, take the contrapositive of Lemma 1.

**Test 1** If

$$\lim_{x \to 0} \left\{ \mathbb{E}[M_{i,t-1} \mid X_{i,t} = x] - \mathbb{E}[M_{i,t-1} \mid X_{i,t} = -x] \right\} \neq 0 \quad (2)$$

then the majority party can exert precise control over a strictly positive fraction $\kappa > 0$ of elections.

This test is based on the usual specification check for whether the running variable of a regression discontinuity has been manipulated. But the test clarifies what it means to reject the null when the running variable is the outcome of an election. Rejection does not imply that the majority party merely has an advantage in winning elections, which is true as long as $\alpha > 0$ regardless of whether $\kappa > 0$. Rather a rejection implies that the majority party can almost
guarantee victory in some elections. As noted in the introduction, it implies the
majority party can exert precise control over the outcome.

Lemma 1 implies another test based only on the density function of a suit-
able transformation of $X_{i,t}$. Define

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\tilde{X}_{i,t} = \begin{cases} 
X_{i,t} & \text{if } M_{i,t-1} = 1 \\
-X_{i,t} & \text{if } M_{i,t-1} = 0
\end{cases}
$$

which gives the margin of seats won by whichever party held a majority be-
fore the election. Lemma 1 implies that in the absence of manipulation
$\tilde{X}_{i,t}$ has a probability density $h(\tilde{X}_{i,t})$ that is continuous at 0. The contrapositive of this
statement is

**Test 2** If $h(\tilde{X}_{i,t})$ is discontinuous at $\tilde{X}_{i,t} = 0$ then the majority party can exert
precise control over a strictly positive fraction $\kappa > 0$ of elections.

This test is based on the usual check for a discontinuity in the density of
the running variable (McCrary, 2008). The key, as noted first in Caughey and
Sekhon (2011), is that even in the presence of manipulation there may not be a
discontinuity in the density of the original running variable $X_{i,t}$. That is because
Lemma 1 deals only with the conditional density $g(X_{i,t} | M_{i,t-1})$. But since the
definition of $\tilde{X}_{i,t}$ is itself conditioned on $M_{i,t-1}$, manipulation would create a
discontinuity in its unconditional density $h(\tilde{X}_{i,t})$.

### 3.2 Implementing the Tests

The main concern with applying these tests is that they are conditional on as-
sumptions made about the natural uncertainty of elections. If the outcomes
of elections are generally predictable, a discontinuity may be a natural feature
of democracy. The problem is compounded by the fact that in a legislature
with a finite number of seats, the running variable—the fraction of seats won
by Democrats—is to some extent discrete.

Our solution is to compare the outcome of the tests across elections that
differ in the stakes for winning a bare majority. We exploit the natural exper-
iment created by the opportunity to control Congressional redistricting. This
approach yields two sources of variation: the timing of redistricting, which makes
winning the election just before redistricting far more important; and the rules of redistricting, which in most states allow redistricting through normal legislation.

Since the court rulings discussed in Section 2, each state is required to redistrict regularly. The key input to redistricting is the decennial census, which not only makes it possible to create districts with equal populations, but allows the party in power to gerrymander on demographics. As shown in Figure 3, the census is completed in years ending in 1.\(^8\) Whichever party wins the election to the state legislature just before this year has the opportunity to pass its own redistricting plan.\(^9\)

This accident of timing raises the stakes of these elections. Even though the local party in each state may care about retaining control of the legislature in any election, the full resources of the national Republican and Democratic parties will likely be marshalled only when state elections have consequences for national elections—that is, in elections that determine which party controls Congressional redistricting. Moreover, unlike on issues of substance (taxes or infrastructure), on a procedural issue like redistricting parties are more likely to vote along strict party lines.\(^{10}\) That makes retaining a bare majority, as opposed to maximizing the number of seats won, especially important in these elections.

Retaining a bare majority matters because in most states redistricting is done through regular legislation. Control of the lower house of the state legislature grants a measure of control—at least a veto—over redistricting.\(^{11}\) Control switches discontinuously away from Republicans when Democrats win at least 50 per-

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\(^8\)The redistricting bill may not be passed in the year ending in 1 if, for example, the legislature is divided and the bill is particularly contentious. As a result, the date of passage is both unpredictable and endogenous to our outcome of interest. Instead we focus on the opportunity to redistrict, which comes with the completion of the census. It is more likely that this opportunity, which is known and exogenous, is what drives the decisions of parties before the election.

\(^9\)In many states the election is in years ending in 0, but a few states are irregular. We define the most recent election before a year ending in 1 as a high-stakes election.

\(^{10}\)Snyder and Groseclose (2000), for example, study the difference in party discipline across procedural versus substantive votes in the U.S. House.

\(^{11}\)We focus on the lower house because most states stagger the terms of members of the upper house (much like the U.S. Senate). Only a fraction of seats are contested in the election before redistricting, making the definition of a high- versus low-stakes election less clear.
Figure 3
Redistricting Cycle

In most states:
State legislature proposes redistricting plan as a regular law

1970: Decennial Census Completed
1972: First U.S. House election under plan passed in 1971
1980: Last U.S. House election under plan passed in 1971

1970 1980
Early 1971: Decennial Census Completed
Elections to state legislature [High stakes election]
Assembly serves...

In most states:
State legislature proposes redistricting plan as a regular law

1970: Decennial Census Completed
1972: First U.S. House election under plan passed in 1971
1980: Last U.S. House election under plan passed in 1971
Cycle Repeats...
More elections to state legislature [Low stakes elections]

Note: The figure shows the redistricting cycle for a typical state (i.e. a state with lower house elections in even years).

cent of seats. Define the seat margin as

\[ X_{i,t} = \frac{[\text{Democrats in State Assembly}]_{i,t} - \frac{1}{2}[\text{Total Assembly Members}]_{i,t}}{[\text{Total Assembly Members}]_{i,t}} \times 100\% \]  

(3)

If there is an uneven number of seats in the assembly we round \( \frac{1}{2}[\text{Total Assembly Members}]_{i,t} \) up to the next integer. This ensures that the margin turns non-negative when the Democrats switch from losing to winning the election.\(^\text{12}\)

Passing this cutoff gives a party leverage over redistricting. In most states the party that wins a majority is allowed to appoint the Speaker, who in turn appoints committee chairs. Committees, which review legislation before it reaches the floor, can in most states prevent unwanted bills from ever being up for a vote. Though the powers of the majority party vary across states, in all cases the majority party can vote down an unfavorable bill, giving the majority party in the lower house a veto.

This logic assumes the majority party can marshall the support of all of its legislators. Otherwise there may not be a discontinuous change in the redist-

\(^{12}\)In states where there is an even number of seats, a value of zero implies neither party has a majority. Democrats effectively have a veto over redistricting. For example, after the 2000 election left Washington with a perfectly divided house the two parties elected co-speakers and assigned each committee co-chairs from the two parties.
tricting plan. If at all points near the cutoff the two parties pass a bipartisan plan, there would be no reason for the parties to guarantee themselves a bare majority. But if plans near the cutoff were passed with bipartisan support, one would expect a similar proportion of Democrats (or Republicans) to vote for the redistricting bill on either side of the cutoff.

Figure 4 shows that this is not the case. Using data from the 2011 redistricting cycle—the only one for which we have consistent roll call votes—we divide the running variable into 5 percentage point bins. We plot the average fraction of Democrats and Republicans that vote in favor of the redistricting bill. When Democrats gain control of the assembly they switch from near universal opposition to near universal support for the redistricting bill. The response of the Republicans, though slightly less extreme, is stark nevertheless. This reversal of support suggests that control of the assembly triggers a sharp change in the type of plan proposed. Moreover, it suggests there is strong party unity—just below the cutoff, 100 percent of Republicans and 0 percent of Democrats vote for the bill. Such unity implies winning 50 percent of the seats really does confer control over whatever redistricting plan ultimately passes the lower house.

At this cutoff, control of the assembly switches from Republicans to Democrats. But since the redistricting bill is typically passed as regular legislation, it requires approval of not only the lower house but the upper house and the governor. Passing the threshold is best interpreted as giving the Democrats a veto over redistricting. This veto is important for Democrats because in most states in which the Democrats control the lower house they do not control the governorship. At the threshold they control the governorship in roughly one-quarter of cases, meaning in the other three-quarters they cannot rely on a friendly governor to veto a hostile redistricting plan. They control the upper house in only about half. Their weakness in the other chambers gives them a strong incentive to take control of the lower house, as it may be their only veto over redistricting. Likewise, the Republicans have a strong incentive to deny them such a veto.

To apply Test 1 we estimate a regression discontinuity using a local linear regression with a rectangular kernel, as proposed in Lee and Lemieux (2010). As we discuss in Appendix A.3, choosing an “optimal” bandwidth is compli-

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13These data were constructed from Vote Smart (2016), which has roll call votes on 51 bills from 21 states for the most recent redistricting cycle.
DO VOTERS OR POLITICIANS CHOOSE THE OUTCOMES OF ELECTIONS?

Figure 4
State Assembly Members Vote Along Party Lines

![Graph showing Democrats and Republicans voting patterns](image)

cated. The most widely-cited methods disagree on the optimum. Instead, we use as our baseline a bandwidth of 18, which lies between the optima of the different methods, and show that the main results are robust to any reasonable bandwidth.\(^{14}\) As in Section 3.1, let \(M_{i,t}\) be a dummy for whether the Democrats’ margin \(X_{i,t}\) is greater than or equal to 0. The estimating equation is

\[
M_{i,t-1} = \gamma_0 + \gamma_1 X_{i,t} + \gamma_2 X_{i,t} M_{i,t} + \beta M_{i,t} + [\text{Error}]_{i,t}
\]

which we estimate separately for high-stakes and low-stakes elections. The coefficient \(\hat{\beta}\) gives the estimated difference between the right and left limit of \(\mathbb{E}[M_{i,t-1} \mid X_{i,t} = x]\). If we reject the null \(\hat{\beta} = 0\) it is evidence that the majority party can exert precise control over the outcome.

Implementing Test 2, which is essentially a McCrary Test (2008) run on a transformation of the margin of victory, creates additional challenges. The first is defining \(\bar{X}_{i,t}\), the share of whichever party held a majority before the election. It is not clear how to define this variable when there are independent

\(^{14}\)This check is in the main text for our main result; we show the robustness of other outcomes in Appendix A.3.
legislators (neither Democrats nor Republicans). Thus, for Test 2 we drop all elections in which independents won seats in either the current or the previous election. The other challenge is that unlike testing for a discontinuity in a pre-determined outcome, testing for a discontinuity in the density of \( \tilde{X}_{i,t} \) requires choosing both a bandwidth and a bin size. This is especially problematic because the default bin size suggested by McCrary (2008) is large relative to the bandwidth. Instead we follow his suggestion of choosing a bin size by inspection and testing the results for robustness. In the main text we use a bin size of 1 and the default bandwidth (roughly 10), and show in Appendix A.3 that the results are robust to different bin sizes and bandwidths. However, these two caveats make Test 1 our preferred test; we present Test 2 as supplementary evidence.

3.3 Measuring the Motives and the Consequences of Control of Redistricting

As we show in Section 6, the majority party does not win all elections but guarantees victory in some at the cost of throwing away others. This suggests control of redistricting is more valuable in some states than in others. If those states differ systematically in some pre-determined characteristic, that characteristic will change discontinuously at the threshold.

The most likely such characteristic is the trend in U.S. House elections leading up to the high-stakes election. Let \( \Delta [\text{Total Rep. Wins}]_{i,t} \) denote the average change in the total U.S. House seats won by the Republicans between each of the five House elections leading up to redistricting (e.g. 1962, 1964, ..., 1970 are used for the 1971 redistricting). We estimate a specification analogous to Equation 4 using \( \Delta [\text{Total Rep. Wins}]_{i,t}^{\text{Pre}} \) as the outcome. In this specification the estimate \( \hat{\beta} \) gives the difference in the trends of Congressional outcomes between states Democrats versus Republicans choose to win.

Though studying pre-trends in U.S. House outcomes gives some sign of the motives of the parties, to fully understand it we study how outcomes change from before to after redistricting. Let \( \Delta [\text{Total Rep. Wins}]_{i,t}^{\text{Diff}} \) be the difference in the number of House races won by Republicans in the election just before to the election just after the census is completed (e.g. from 1970 to 1972 for the 1971
DO VOTERS OR POLITICIANS CHOOSE THE OUTCOMES OF ELECTIONS? 19

redistricting). Again we estimate a specification similar to Equation 4, where the outcome is $\Delta[Total\ Rep.\ Wins]_{i,t}^{Diff}$ and the running variable is the seat share won by Democrats in the lower house of the state assembly in the high stakes election just before redistricting (e.g. 1970). By comparing the discontinuity in the pre-trend to the discontinuity in the pre-to-post difference, we detect whether redistricting can reverse pre-existing trends.

To increase precision we also study pre- and post-trends using race-state-year data (a race is the contest for a single U.S. House seat). Define $R^U(t)$ as the year of the state lower house election that determines control of the upcoming redistricting, and define $R^P(t)$ analogously for the previous redistricting. For example, in a state that holds lower house elections in even years, $R^U(1984) = 1990$ and $R^P(1984) = 1980$. Let $[Rep. Wins]_{r,i,t}$ be a dummy for whether a Republican wins race $r$ in state $i$ in election year $t$. We estimate equations of the form

$$[Rep. Wins]_{r,i,t} = \tau_0 + \tau_1 X_{i,R^U(t)} + \tau_2 X_{i,R^U(t)} \times M_{i,R^U(t)} + \beta U M_{i,R^U(t)} + [Error]_{r,i,t} \quad (5)$$

$$[Rep. Wins]_{r,i,t} = \tau_0 + \tau_1 X_{i,R^P(t)} + \tau_2 X_{i,R^P(t)} \times M_{i,R^P(t)} + \beta P M_{i,R^P(t)} + [Error]_{r,i,t} \quad (6)$$

where (5) is estimated on elections 7 to 9 years before redistricting or 1 to 5 years before redistricting; (6) is estimated on the election immediately after redistricting or 7 to 9 years after redistricting. The estimates of $\beta U$ are informative about whether the parties choose to control redistricting in states where they have sustained recent wins or losses in the House. The estimates of $\beta P$ let us trace out the consequences of their choice and of the redistricting itself. Finally, to test directly for the effect of Republican versus Democratic control over redistricting on the racial composition of districts, we study census outcomes by tract or House district. We estimate a specification similar to Equation 6, except the unit of observation is either the tract or the district rather than the race.

4 Data

Our main results use data compiled by Klarner (2013b) on the number of Democrats, Republicans, and independents elected to the lower and upper house of the state legislature. We restrict our attention to elections after 1962, the year of Baker v. Carr 369 (1962), which yields elections leading up to the 1970, 1980,
1990, 2000, and 2010 redistricting cycles. We also have elections through 2015, which add to our set of low stakes elections. Not all states allow their Congressional districts to be drawn by the state legislature. We identify and remove the exceptions from our sample using the comprehensive dataset on redistricting rules compiled by Levitt (2016). The exceptions are generally independent or appointed commissions.\textsuperscript{15} We also discard states that have only a single House representative, as these states have a single district that consists of the entire state.\textsuperscript{16}

To test for sorting on the outcomes of Congressional elections before redistricting we compile a dataset on the vote share and party of each candidate that ran for each district of the U.S. House from 1970 through 2012. We combine the data from the Inter-university Consortium for Political and Social Research (1995), which covers 1962 through 1990, with data from Kollman et al. (2016), which covers 1991 through 2012.\textsuperscript{17} We use this same dataset for measuring the change from before to after redistricting, and the post-trend after redistricting.

We draw on data for campaign finances and career paths for state legislators from Bonica (2013), and ideology from Bonica (2014). The ideology score (called the common-space campaign finance score, or CFscore) measures the “ideal point” of candidates using campaign contributions. The method assumes there is a univariate measure of ideology (“conservativeness”), and that donors contribute more to candidates who are closer on that measure (for details see Bonica, 2014). We compute the incumbent exit rate of state legislators using a dataset of state legislative elections compiled from Klarner et al. (2013) and Klarner (2013a). Finally, we measure racial gerrymandering by combining tract-level census data with Congressional district boundaries. The census data come from the National Historical Geographic Information System (Minnesota Population Center, 2011). District boundaries for every U.S. Congress come from


\textsuperscript{16}Alaska, Delaware, Wyoming, and North Dakota are excluded. Montana is excluded after 1991 reapportionment and South Dakota after 1981 reapportionment.

\textsuperscript{17}The ICPSR’s dataset includes the vast majority of House elections but, like any dataset, is incomplete. However, it also contains several elections not contained in other data, such as that of Lee et al. (2004). For that reason we choose the ICPSR data over other options. Nevertheless, these two datasets agree on the vast majority of elections. Using the data of Lee et al. (2004) for the years 1972 to 1992 (the years it covers) does not change the main results (see Appendix A.5).
Lewis et al. (2013). We assign each tract to whichever district contains its centroid; we do this for the district boundaries both before and after redistricting to get the old and new district of each tract.

5 Can Parties Exert Precise Control?

Figure 5 shows the main result. We split the running variable—the margin of seats won by Democrats in the lower house—into bins with a width of 2 percentage points. Each dot shows the fraction of elections within one bin in which Democrats were the majority party before the election. This fraction can be interpreted as the probability, conditional on the outcome of this election, that the democrats were the majority party before the election. We estimate Equation 4 and plot the predicted values, which appear as lines on either side of the cutoff (at zero).

We report the regression discontinuity estimate ($\beta$ in Equation 4) and its standard error. Rejecting that this coefficient is zero is equivalent to rejecting Test 1, and thus evidence of precise control by the majority party. The left-hand panel applies the steps to low-stakes elections. The right-hand panel shows the result when these steps are applied to high-stakes elections (those that determine which party will control the lower house during redistricting).

In low-stakes elections we are unable to reject the null of no precise control. As expected, the conditional probability that Democrats held a majority before the election is increasing in the margin of seats they win in the current election. States that elect more Democrats in the current election probably elected more in the previous election, making it more likely the Democrats held a majority in the lower house. But there is no statistically significant discontinuity at the threshold, meaning the probability is similar in elections just barely won and lost by Democrats. Regardless of which party holds a majority going into the election, the uncertainty of the outcome is great enough to hand it narrow defeats as well as narrow victories.

By contrast, we find strong evidence of precise control in high-stakes elections. The incumbent party is far more likely to enjoy a narrow victory than a narrow defeat. The discontinuity suggests that in these high-stakes elections
there is far less uncertainty about the outcome. The incumbent party is able to sort itself onto the more favorable side of the discontinuity with remarkable precision.

The result is not driven by the choice of bandwidth. Figure 6 re-estimates Equation 4 for every bandwidth \( h = \{4, 4.5, \ldots, 21.5, 22\} \). We plot the regression discontinuity estimate and the 90 percent confidence interval against the bandwidth. The left-hand panel confirms that at any but the widest choice of bandwidth, there is no discontinuity in non-redistricting elections. By contrast, there is always a large discontinuity in redistricting elections, though the estimates grow large and noisy when the bandwidth falls below 10.

Table 1 reports the estimates from the baseline specification and several robustness checks. Columns 1 and 2 give the same baseline estimates shown in Figure 5.\(^{18}\) One possible concern with these estimates is that the presence of independent legislators (those unaffiliated with either major party) muddies

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\(^{18}\) All standard errors are clustered by state-redistricting year, the level at which there is variation in the running variable.
Figure 6
Results of Test 1 are Robust to Choice of Bandwidth

Note: Figure plots the estimate and confidence interval for the discontinuity using every bandwidth \( h = \{4, 4.5, \ldots, 21.5, 22\} \). Standard errors are clustered by state-redistricting cycle.

the partisan narrative of Section 3. Columns 3 and 4 show that dropping elections in which independents either win seats or held seats before the election makes little difference in the estimates. Next we redo our estimates excluding the so-called preclearance states. These states are required to submit changes to their voting rules for preclearance to the U.S. Department of Justice (as per Section 5 of the 1965 Voting Rights Act).\(^{19}\) Columns 5 and 6 shows that the coefficient is effectively unchanged. Column 7 and 8 report the RD estimate using as the running variable the margin of seats won by Republicans rather than Democrats. The Republican margin is not precisely equal to the negative of the Democratic margin because there are a few assembly members unaffiliated with either party. Nevertheless, the coefficient is essentially the negative of that in the baseline specification.

Next we apply Test 2, which tests for a discontinuity in the probability density of the margin of seats won by the party that held a majority before the elec-

\(^{19}\)These are Alabama, Alaska, Arizona, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia. As a result of *Shelby County v. Holder*, 133 S. Ct. 2612 (2013), this requirement was lifted in 2013.
### Table 1
Test 1: Main Results and Robustness

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>No Ind. Leg.</th>
<th>Drop VRA States</th>
<th>Republican Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low-Stakes</td>
<td>High-Stakes</td>
<td>Low-Stakes</td>
<td>High-Stakes</td>
</tr>
<tr>
<td>RD Estimate</td>
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<td>0.438***</td>
<td>0.119</td>
<td>0.559***</td>
</tr>
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<td></td>
<td>(0.080)</td>
<td>(0.136)</td>
<td>(0.084)</td>
<td>(0.135)</td>
</tr>
<tr>
<td>Observations</td>
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<td>137</td>
<td>466</td>
<td>118</td>
</tr>
<tr>
<td>Clusters</td>
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<td>137</td>
<td>163</td>
<td>118</td>
</tr>
<tr>
<td>Control Mean</td>
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<td>0.35</td>
<td>0.46</td>
<td>0.27</td>
</tr>
<tr>
<td>Test: Low=High</td>
<td>0.04</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Outcome is a dummy for whether Democrats held a majority before the election (to be precise, whether they won the previous election). “Baseline” is the same specification used to construct Figure 5. “No Ind. Legislators” drops elections in which independent legislators are elected. “Drop VRA States” drops states that require pre-clearance from the Justice Department for any change in election law. “Republican Margin” defines the running variable as the Republican rather than Democratic margin.

The left-hand panel of Figure 7 shows that in low-stakes elections there is a small and statistically insignificant difference in the density of outcomes around the cutoff. The point estimate implies the majority party is about 36 percent more likely to barely win than barely lose. We cannot reject that this estimate is zero.

But as shown in the right-hand panel of Figure 7, a large and statistically significant discontinuity appears in high-stakes elections. The point estimates imply that the majority party is nearly 4 times as likely to barely win than barely lose the election. As noted in Section 3.2, the estimates of any density test may depend not only on bandwidth but bin size. For this reason we consider Test 1 the primary piece of evidence. Nevertheless we show in Appendix A.3 that across different combinations of bandwidth and bin size the results are robust.

We also report in Appendix A.2 several other tests to verify our interpretation. We show that Test 1 does not reject in elections before the decennial census in the years before Baker v. Carr 369 (1962) made redistricting mandatory. We show that Test 1 still does not reject in low-stakes elections when they are disaggregated by 1 election prior to high-stakes, 2 elections prior, and so on. We show using rolling regressions that the estimate of (4) in high-stakes elections is reasonably consistent over time (there is some slight evidence it may have grown smaller in recent years). Finally, we show that, as expected, there is
also a discontinuity in the density of outcomes conditional on majority party.

The aggregate consequence of precise control is an increase in the persistence of the majority party’s control of the assembly. We estimate that the autocorrelation in the identity of the majority party rises from less than 0.4 in low-stakes elections to over 0.6 during high-stakes elections. Thanks to the majority party’s control over the outcome, a high-stakes election is far more likely to return the majority party to power.

6 How Do They Achieve Precise Control?

Three explanations for our results come to mind, only one of which seems plausible. The first potential explanation is the incumbent advantage, which Lee (2008) found to be large in individual U.S. House races. This cannot explain our results because, as noted earlier, there is a difference between the incumbent advantage and precise control of outcomes. The incumbent advantage is the extra votes received by the incumbent because she is familiar to voters or has served them in the past (Ansolabehere et al., 2000). These extra votes do not imply precise control of the election outcomes; indeed, in the model of Section
Figure 8
Stylized Fact 1.1: The Incumbent Exit Rate Falls in High-Stakes Elections

![Graph showing incumbent exit rate against margin of seats won by Democrats in high-stakes elections.]

*Note:* We plot the running average of the incumbent exit rate against the margin of seats won by Democrats in the previous election.

### 3.1 there is an incumbent advantage regardless of whether there is precise control. In the presence of uncertainty, the probability the incumbent barely wins or barely loses should be similar even in the presence of a large incumbent advantage.\(^{20}\)

The second explanation is that the majority party somehow abuses its power to ensure it barely wins the election—for example, by rigging the election. Though impossible to rule out, most studies in the U.S. have found little evidence of voter fraud (see, for example, Levitt, 2007; Caughey and Sekhon, 2011). Moreover, it is not clear why control of the lower house of the state legislature would allow influence over the tallying of votes, which is done by local officials of both parties in each precinct. Another possibility is that control of the lower house gives a party the means to precisely predict the outcome of any particular race, which allows the party to divert resources to that race. It is hard to imagine what source of information is available to the assembly’s majority party that is not available to the public.

\(^{20}\)For example, Lee (2008) runs several tests to show that there is no evidence of precise control in U.S. House elections—a pre-condition for his design to give valid estimates of the incumbent advantage. By contrast, we show in Appendix A.2 that there is little or no evidence of an incumbent advantage in the aggregate outcomes of lower house elections.
The third explanation is that the party that won a majority in the previous election has, by definition, more incumbent legislators than the minority party. This advantage is critical because incumbents are almost certain to be re-elected. In lower house elections from 1968 to 2012, incumbents won 93 percent of the elections they contested (compared to 26 percent for non-incumbents). To get a sense of the potential advantage, suppose the incumbent reelection rate is 0.93 and that every incumbent runs for re-election. If the majority party holds 55 out of 99 seats, it retains control with roughly 97 percent probability. If its number of seats falls to 52 out of 99, it still wins with 81 percent probability.

Of course, this example assumes every incumbent seeks re-election. In fact roughly 22 percent of lower house incumbents do not seek re-election. In part that is because many politicians see the lower house of the state assembly as a stepping stone to higher office. Among lower house members who won office in 2002, roughly 15 percent sought higher office over the next 10 years. Nearly 80 percent of them ran for the upper house of the state legislature, and over 10 percent ran for the U.S. House. But while these ambitions of higher office make incumbent exit more likely, they also give the state and national political parties leverage over their incumbents. If running for higher office is easier with the
support of the party, the party might be able to pressure incumbents to remain in the lower house in the crucial redistricting elections.

Aside from incumbents, who provide human capital in the production of electoral success, parties can also apply financial capital. Campaign spending can sway the outcomes of elections. Gerber (2004) and Gerber et al. (2011) report that randomized campaign mailings and television ads, two of the most common uses for campaign spending, can have substantial effects on vote totals. Campaign finances might then be a complementary input that helps majority parties retain their majorities.

We present five stylized facts that suggest the selective use of these two levers—preventing incumbent exit and targetted campaign spending—might explain our results. The first is that in high-stakes elections, the parties reduce incumbent exit and increase the level of campaign contributions, especially in elections where the margin of incumbency is narrow. Define the margin of incumbency as the Democrats’ margin of seats won in the previous election ($X_{i,t-1}$ in the notation of Section 3). Figure 8 plots the local average of the exit rate of incumbents against the margin of incumbents held by Democrats. The figure shows that, as expected, the rate of incumbent exit is lowest in elections where the margin of incumbency is narrow. This is especially true in high-stakes elec-
Figure 11
Stylized Fact 2.2: Inter-Quartile Range in State-Wide Party Contributions Widens

Note: We plot the top and bottom quartile of contributions to state lower house members from party committees. We plot the quartiles as a function of the margin of seats won by Democrats in the previous election.

Figure 9 shows a similar pattern for campaign finances. In high-stakes elections there is a spike in the total contributions to lower house members in states where the margin of incumbency is slight. There is no similar spike in low-stakes elections. The spike is especially pronounced among Republicans. In states where they enter the high-stakes elections with a bare majority of incumbents, their receipts among all candidates in the state spikes at roughly 10 million (in 1983 dollars). In low-stakes elections their receipts are only 3.5 million dollars.

The second stylized fact is that the parties concentrate their efforts during high-stakes elections. For each election we calculate the average exit rate of each party's incumbents. Figure 10 shows a histogram of exit rates among incumbents of party that held a majority before the election. Whereas in low-stakes elections the density is unimodal, in high-stakes elections mass shifts both downwards and upwards from the center to make a bimodal distribution. There is a cluster of states with very low incumbent exit rates (less that 0.15 for Democrats and 0.2 for Republicans), and a cluster of states with somewhat higher exit rates (over 0.2 for Democrats and over 0.3 for Republicans). This bimodality may be evidence that in high-stakes elections the parties concentrate
Figure 12
Stylized Fact 3: Democrats Channel Funds to Incumbents in States Where they Hold a Majority

![Graph showing contributions vs margin of incumbents held by Democrats](image)

Note: Outcome is contributions to Democratic incumbents from Democratic party committees.

there efforts to retain incumbents in a few states. The other states are ignored.

There is a similar concentration of campaign funds. Figure 11 plots the upper and lower quartile of total contributions to lower house candidates from party committees, which best reflects the parties’ strategic priorities. For both parties the upper quartile rises drastically in high-stakes elections even as the lower quartile remains largely unchanged. Moreover the interquartile range grows largest in elections where the party holds a majority, previewing the next stylized fact.

The third stylized fact is that, in the case of Democrats, these extra funds are channeled towards protecting incumbents. The funding is especially generous in states where Democrats hold a majority before the election. Figure 12 plots the average contributions from Democratic party committees to Democratic incumbents against the margin of incumbency. It suggests these contributions may be discontinuously higher in states where Democrats hold a majority before the election. This discontinuity must be treated with caution, as the number of elections for which we have data is small. But as we show below, a discontinuity in strategies is not necessary to create a discontinuity in election outcomes. What matters is that Democrats focus heavily on protect-
ing incumbents, especially in states where they already hold a majority. We do not find a similar pattern in Republican contributions, suggesting the parties pursue asymmetric strategies. We show further evidence in Appendix A.1 that Democrats channel their funds to protect their most vulnerable incumbents.

As a result of these three changes in campaign strategy, the majority party is more likely to hang onto control in most elections, though at the cost of throwing away others. This increase in the dispersion of outcomes is the fourth stylized fact. We calculate the change in the margin of seats held by Democrats from the election prior to the high-stakes election. It is essentially the seats gained by the Democrats. Figure 13 plots the histogram of the change within states where Democrats initially held the majority. The left-hand panel restricts the sample to states where the Democrats contest the high-stakes election with a margin of incumbency less than 5 percent; the right-hand panel restricts to elections where their margin of incumbency is between 5 and 10 percent. The grey histogram shows the density among low-stakes elections, while the red shows high-stakes elections.

The left-hand panel shows that although the modal low-stakes elections features either no change or a slight (less than 2.5 percent) gain for the Democrats, there is also a smooth distribution around this point. By contrast, roughly the majority of high-stakes elections feature no change. But when the Democrats sustain losses, they are more likely to be large losses. In high-stakes elections
the Democrats are more likely to lose 10 to 15 percent than to lose less than 5 percent—very much the opposite of what happens in low-stakes elections. The right-hand panel shows a similar pattern when the Democrats have a slightly larger margin of incumbency. The majority of elections feature either gaining seats or losing less than 5 percent. Since their margin of incumbency is at least 5 percent, they can afford to lose 5 percent of the seats without losing control of the chamber. But there is also a long tail of more spectacular losses. As the number of observations is small, the results must be interpreted with some caution. Nevertheless they are consistent with the other three stylized facts. Taken together, they suggest the parties strive to guarantee victory in some elections at the cost of being wiped out in others.

Can these actions induce a discontinuity like that seen in Figure 5? It may seem unlikely, as most of the changes in party strategy are continuous, meaning they are similar regardless of whether the party holds a majority before the election. But by running simulations (described in Appendix B), we show that it is possible for continuous actions to yield a discontinuity in outcomes. The key is that the actions taken are complementary to the chance that incumbents are re-elected. Encouraging incumbents to seek reelection and channeling campaign funds to incumbents clearly fit this criterion. As shown in Figure 14, which is

Figure 14
Continuous Strategic Intervention Can Create a Discontinuity

\[ \text{Discontinuity} \quad 0.116 (0.116) \]
\[ \text{Discontinuity} \quad 0.503 (0.085) \]

Note: This is the analog of Figure 5, constructed from simulated data. See Appendix B for details of the simulation.
constructed exactly like Figure 5 but from simulated data, such a strategic intervention can allow precise control and thus create a discontinuity.

If these tactics are so effective, why are they used only in high-stakes elections? The most obvious reason is that the benefit of winning is much higher. The parties are willing to bear greater costs if doing so ensures victory, which explains why total spending and the overall incumbent exit rate falls in more contested elections. But the more subtle reason is that parties change their objective. When control of redistricting is at stake the party’s aim is to maximize the probability it retains a majority, whereas normally its aim may instead be to maximize the number of seats it wins.21

These two objectives may be best met with different tactics. For example, suppose there are 3 seats in the legislature. The Democrats can choose either of two strategies: they spread their resources equally across all three, winning each with 80 percent probability; or they concentrate on two of the three districts, winning those with certainty while losing the third with certainty. If their objective is to maximize the number of seats won they will spread their resources evenly, which in expectation yields 2.4 seats versus 2. If their objective is to maximize the probability of holding a majority they will concentrate their resources, retaining control with probability 100 percent versus 90 percent.

Snyder (1989) shows more generally that the campaign tactics that maximize the expected number of seats need not be the same as the tactics that maximize the chance of keeping control of the legislature. That may explain why the parties change how they allocate their funds, and why they choose to focus on holding power in some states at the expense of others. Focusing on protecting incumbents, for example, may be optimal when the goal is retaining a bare majority, but it may be a losing strategy when the goal is to maximize the number of seats won.

21In other elections the parties’ ultimate aim is to pass substantive laws that match their ideology. But not all members of the party have the same ideology. In the elections for which Bonica (2014) measures ideology for state legislators, we find that in half at least one elected Democrat was more conservative than at least 5 percent of elected Republicans. Such rogue members may not vote with their party on tax bills or social policies. Then the party would be foolish to retain only a bare majority, as maximizing the number of seats won is more likely to ensure a governing majority. But on a purely partisan issue, party discipline is less likely to slip (Snyder and Groseclose, 2000, for example, show as much in the U.S. House). As we show in Section 3.2, legislators vote on a redistricting bill almost perfectly along party lines. That makes a bare majority enough.
7 Where Do They Choose to Retain Control?

If parties choose to win some high-stakes elections while throwing away others, what distinguishes those they choose to win? Given that control of Congressional redistricting is at stake in these elections, it is natural that they would condition their choice on outcomes or trends in the outcomes of recent U.S. House races. To test whether these outcomes drive their choices we estimate the regressions described in Section 3.3.

The left-hand panel of Figure 15 suggests that the parties choose to retain control in states where they have recently lost U.S. House elections. We take the change in Republican victories in between each of the five U.S. House elections preceding redistricting (there are five elections within a ten-year redistricting cycle). We average this change within each redistricting cycle, then plot the average against the margin of seats won by Democrats in the state legislature in the election that determines control of the next redistricting cycle. In states just barely won by the Democrats, Republicans have increased their House wins by half a seat per election (or 2.5 seats over the entire 5-election cycle) relative to states just barely won by Republicans. Given that the median state has 6 U.S. House races, these are sizeable losses in a typical state. Since these are pre-trends, the discontinuity must be caused by sorting around the threshold. Each party ensures it wins in states where it has sustained recent losses.

The right-hand panel of Figure 15 suggests the parties take these losing states and at least temporarily reverse some of their losses. We plot the change in Republican seats from before to after redistricting against the same running variable as the left-hand panel, the Democratic margin in the election that determines control of redistricting. It is the reverse of the pattern in the left-hand panel. In the same states where Republicans suffered sustained losses leading up to redistricting, they now enjoy an immediate gain. Crossing the threshold from Republican to Democratic control costs the Republicans 1.2 seats. Given that there are pre-existing trends, one must be cautious in interpreting this effect. One can never prove it is caused by partisan control over redistricting. But given that the pre-existing trends are working against the party that controls the legislature, it is hard to find a plausible alternative explanation for the sudden reversal of fortune.
DO VOTERS OR POLITICIANS CHOOSE THE OUTCOMES OF ELECTIONS?

Figure 15
There is Negative Sorting on the Pre-Existing Trend; It is Partially Reversed by Redistricting

![Graph showing sorting and redistricting effects](image)

**Note:** Left: The outcome is the average change in Republican wins (seats) between the 5 regular Congressional elections leading up to redistricting. Right: The outcome is the change in Republican wins between the Congressional election just before redistricting to the election just after. All standard errors are clustered by state-redistricting cycle. Bin size is 4 percentage points.

To make clear the timing of the effects and increase the precision of our estimates, we next estimate the race-level specifications (5) and (6). The top-left panel of Figure 16 shows that there is no sorting on outcomes in the U.S. House 4 to 5 elections before redistricting. But the top-right panel shows that the parties sort themselves to control redistricting in states where they have lost House races in the 1 to 3 elections before redistricting. Republicans win 10 percentage points fewer races in the states where they barely won the state legislature in redistricting elections.

But the bottom-left panel of Figure 16 shows that these losses are reversed in the House election immediately after redistricting. Since the running variable is effectively consistent across the figures, the races within each bin are always from the same state-redistricting years. To the left of the threshold, averages within these bins shift upward (towards a high fraction of Republican wins); the opposite happens to the right of the threshold. This reversal suggests the parties may use redistricting to reverse their losses. However, the bottom-right panel suggests the trends are not forestalled permanently. By the fourth and fifth elections after redistricting, the gaps have re-opened.

The trend reversal shown in Figures 15 and 16 suggests the efforts taken by
Figure 16
Race-Level Estimates Confirm Sorting on Trends, which are Temporarily Reversed by Redistricting
parties to control redistricting is at least temporarily rewarded. But without direct measures of how the parties have redrawn districts, one may still doubt that the reversal of trends is caused by redistricting. We construct such direct measures from geocoded census data. We test for whether certain demographic groups are more likely to be moved under Republican versus Democratic redistricting. As before, these results come with the caveat that, since there is sorting around the discontinuity, it is impossible to be certain any effects we see are not caused by selection bias. However, we provide evidence that the demographic characteristics of states on either side of the discontinuity are similar, making it unlikely a non-partisan redistricting plan would differ across the discontinuity.

Recall from Figure 1.B that a party aiming to gerrymander would want to move its opponents—those very likely to vote for the other party—to minimize their influence. The demographic group whose party preference is most easily identified is arguably African Americans. In the 2014 election, 89 percent of African Americans voted for a Democrat running for Congress—support comparable to that of registered Democrats (92 percent).\footnote{According to CNN (2016), whose data are based on National Election Pool exit polls.} Since an African American is likely to support Democrats, Republicans may try to move African Americans to minimize their influence.\footnote{The ideal test would be to look at actual registered Democrats and registered Republicans. But we do not have historical data on the number of registered Republicans and Democrats by precinct or census tract.}

We can say a voter has been “moved” if her new Congressional district contains many voters that were not in her old Congressional district. To be precise, for each census tract we define the fraction of the population in the new Congressional district that is “unfamiliar,” meaning the fraction not in the original district. The benefit of this measure is that it by definition measures intent; census tracts will only have high values on the measure if district boundaries are changed. If existing districts are kept largely intact the measure will on average be low. If a district is dissolved and its constituent tracts are distributed between adjoining districts, all of the tracts will have high value in this measure.

We test for a discontinuity in the measure using tract-level census data. Column 1 of Table 2 restricts the sample to tracts in which African Americans are a majority; Column 2 uses all other tracts. When Republicans control redistricting, the new boundaries put majority black census tracts into districts with 9
Table 2
Republicans Redistrict African Americans to Minimize Their Impact

<table>
<thead>
<tr>
<th>Fraction of District Unfamiliar</th>
<th>Conditional on Moving</th>
<th>Pre-Redistricting Char.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Tracts</td>
<td>Other Tracts</td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>RD Estimate</td>
<td>-0.093**</td>
<td>-0.014</td>
</tr>
<tr>
<td>(0.046)</td>
<td>(0.041)</td>
<td>(0.054)</td>
</tr>
</tbody>
</table>

| Observations                  | Control Mean          |                         |
|-------------------------------|                       |                         |
| 19473                         | 0.46                  |                         |
| 184291                        | 0.36                  |                         |
| 2842                          | 0.18                  |                         |
| 1550                          | 0.11                  |                         |
| 19614                         | 0.11                  |                         |

Note: Standard errors are clustered by state-redistricting year. The unit of observation is a U.S. House district in Column 4 and a census tract in all other columns. A figure showing the bin averages and estimates for all regressions may be found in Appendix A.2.

percentage points more unfamiliar people. This holds only for African American tracts; other tracts show no discontinuity.

Are they being moved to districts that minimize their influence? We restrict the sample to African American tracts put in districts in which more than half of the population is unfamiliar, taking this to mean the tract has been “moved.” Column 3 of Table 2 tests for whether, conditional on being moved, majority black tracts are drawn into districts in which African Americans form an overwhelming (more than 75 percent) majority. Recall from Figure 1.B that “packing” African Americans into a small number of districts minimizes the number of elections in which their votes are pivotal. The estimate suggests a large decrease in packing when Republicans lose control of redistricting.24

Figure 17 shows the effect of Republican control on the density of the African American population share in the new district. To make the figure directly comparable to the prediction in Figure 1.B we adjust the estimates to show the effect of Republican control. As predicted, there is an increase in the density of overwhelmingly black districts and districts in which blacks are barely outnumbered. Meanwhile, the density of districts in which African Americans are a slight majority decreases. In summary, the results suggest African Americans are moved into districts that minimize the number of elections they sway.

But as noted earlier, the states on either side of the threshold are not nec-

24The regression in Column 3 of Table 2 and those used to construct Figure 17 narrow the bandwidth to 10 because there is essentially no “packing” further away from the discontinuity.
DO VOTERS OR POLITICIANS CHOOSE THE OUTCOMES OF ELECTIONS?

Figure 17
Conditional on Being Moved, Where Are African Americans Moved?

Note: We restrict the sample to tracts in which more than half of the population is unfamiliar (see note of Figure 20). Coefficients give the estimated shift in the density of the districts to which African Americans are moved by redistricting. We rescale the coefficients to show the effect when Democrats lose control of the assembly. Standard errors are clustered by state-redistricting cycle.

essarily comparable. At the very least they differ in the identity of the incumbent party and in the pre-trends of election outcomes for the U.S. House. Is it possible that they also differ in their demographics? For example, if the original districts in states barely controlled by Republicans on average contain more African Americans, it may be almost mechanical that they would be more likely to be moved during redistricting. We test for whether at the threshold there is a discontinuity in the fraction of a district’s population that is African American. We use the old district boundaries to avoid contaminating the estimates with the effect of redistricting. Column 4 of Table 2 shows that there is no evidence of a discontinuity.

Though African Americans may comprise a similar portion of the total population near the threshold, is it possible that they are distributed less evenly than the rest of the population? For example, if migration patterns differ across the threshold, it is possible that in Republican-controlled states African Americans have segregated themselves into heavily over- or under-populated districts. These districts would have to be broken up during redistricting. We test
this hypothesis by calculating for each census tract the absolute deviation from the mean in the population of its pre-redistricting district. If African Americans are concentrated in malapportioned districts before redistricting in Republican states, majority-black census tracts should have a higher absolute deviation to the left of the threshold. Column 5 of Table 2 suggests no such deviation exists.

8 Conclusion

Even in a democracy as mature as the United States, political parties can exert remarkably precise control over the outcomes of elections. They need not resort to fraud, but rather can exploit the near-certain re-election of their incumbents and the power of campaign spending. Our claim is not that parties can guarantee the outcome of every election, but that they can ensure a disproportionate share yield the desired outcome at the cost of thoroughly losing others. When such an election determines control of an institution that itself determines whether elections are competitive, voters may be left with even less sway over elections. Whether these patterns may be reversed by policy—term limits or caps on campaign finance—is a question we leave to future research.

References


A Empirical Appendix

This appendix shows additional figures, tables, and analyses referenced in the main text.

A.1 Retargeting of funds

This appendix shows that strategic priorities change in high-stakes elections—in particular, Democrats channel extra funds to their most vulnerable incumbents. For each candidate we define “vulnerability” as the absolute difference between the average ideology score of her party and the average ideology score of all candidates contesting the district. Assuming candidates choose platforms centered on the district’s median voter, this distance is a rough measure of how far is the district’s median voter from the party. It will be high among Republicans who contest liberal districts and Democrats who contest conservative districts. We run regressions to test for whether party committees allocate more or less funds to vulnerable candidates in high-stakes elections.

Table 3 reports these estimates separately for incumbents, challengers, and open seats. Once again we find asymmetry between the parties. The first two coefficients show how Republicans allocate funds in low-stakes elections. The coefficients labeled “High-Stakes” show how Republican allocations change in high-stakes elections. The next four coefficients, which are estimated from an interaction of the first four variables with a dummy for Democratic candidates, show how Democrats differ from Republicans in their allocations. Compared to Republicans, Democrats increase their allocations to incumbents during high-stakes election at the expense of challengers. In particular, they invest heavily to protect vulnerable incumbents. Perhaps as a result, Republicans pull back from supporting vulnerable incumbents (which is less necessary if Democrats stop supporting their challengers). Republicans instead seem to increase their overall support to challengers in high-stakes elections, though the effect is only marginally significant. Though it is rational for one party to focus on chal-
lengers if the other focuses on incumbents, it is not clear why Republicans typi-
cally choose the first strategy and Democrats respond with the second. The
magnitudes of the coefficients suggest, however, that the increase in support
for vulnerable Democratic incumbents outweighs the additional funds Repub-
licans give their challengers.

A.2  Additional Tables and Figures Referenced in the Text

A.2.1  Additional Figures Referenced in Section 5

Figure 18 shows that precise control creates a visible discontinuity in the con-
ditional density of the election outcome. Each panel shows a histogram for the
seat margin of Democrats in elections that meet the condition given in the ti-
tle. Each dot plots the fraction of observations that falls within a 3-percentage
point bin. Atop these dots we plot the line of best fit. The left-hand panels show
the density for elections in low-stakes elections. Regardless of which party held
a majority before the election, there is no large discontinuity in the density. By
### Table 4
Interpreting Test 1

<table>
<thead>
<tr>
<th></th>
<th>Incumbency Effect</th>
<th>Pre-Redistricting</th>
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<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
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<tr>
<td></td>
<td>$BW = 18$</td>
<td>$BW = 10$</td>
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<tr>
<td>RD Estimate</td>
<td>0.281*</td>
<td>0.121</td>
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<tr>
<td></td>
<td>(0.156)</td>
<td>(0.219)</td>
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<tr>
<td>Observations</td>
<td>129</td>
<td>77</td>
</tr>
<tr>
<td>Clusters</td>
<td>129</td>
<td>77</td>
</tr>
<tr>
<td>Control Mean</td>
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<td>0.29</td>
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### Table 5
Disaggregating Low-Stakes Elections

<table>
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<tr>
<th></th>
<th>Lead: 0</th>
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<td>$BW = 10$</td>
<td>$BW = 18$</td>
<td>$BW = 10$</td>
</tr>
<tr>
<td>RD Estimate</td>
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<td>0.409**</td>
<td>0.196</td>
<td>-0.049</td>
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<tr>
<td></td>
<td>(0.136)</td>
<td>(0.195)</td>
<td>(0.159)</td>
<td>(0.230)</td>
</tr>
<tr>
<td>Observations</td>
<td>137</td>
<td>84</td>
<td>120</td>
<td>56</td>
</tr>
<tr>
<td>Clusters</td>
<td>137</td>
<td>84</td>
<td>120</td>
<td>56</td>
</tr>
<tr>
<td>Control Mean</td>
<td>0.35</td>
<td>0.35</td>
<td>0.41</td>
<td>0.50</td>
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</tbody>
</table>

### Table 6
Discontinuity Persists Across Time

<table>
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<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
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<tr>
<td>RD Estimate</td>
<td>0.621****</td>
<td>0.518***</td>
<td>0.567****</td>
<td>0.211</td>
<td>0.319*</td>
</tr>
<tr>
<td></td>
<td>(0.216)</td>
<td>(0.181)</td>
<td>(0.186)</td>
<td>(0.183)</td>
<td>(0.181)</td>
</tr>
<tr>
<td>Observations</td>
<td>49</td>
<td>78</td>
<td>82</td>
<td>88</td>
<td>59</td>
</tr>
<tr>
<td>Clusters</td>
<td>49</td>
<td>78</td>
<td>82</td>
<td>88</td>
<td>59</td>
</tr>
<tr>
<td>Control Mean</td>
<td>0.11</td>
<td>0.20</td>
<td>0.43</td>
<td>0.63</td>
<td>0.57</td>
</tr>
</tbody>
</table>
**Figure 18**
Conditional on the Party that Held a Majority, there is a Discontinuity in the Probability Density

![Histograms showing probability density](image)

*Note:* Each panel shows a histogram for the seat margin of Democrats in elections that meet the condition given in the title. The right-hand panels show the probability mass in each bin for observations in high-stakes elections, while the left-hand panels show low-stakes elections. The top panels show elections in which Republicans previously held a majority, while the bottom panels show elections in which Democrats previously held a majority.

In contrast, the right-hand panels show that there are large discontinuities in high-stakes elections. When Republicans previously held a majority, there is far more mass just to the left of the threshold—that is, far more elections are barely won than barely lost by Republicans. The converse is true when Democrats previously held a majority; there is far more mass just to the right of the threshold.

Figure 19 shows the aggregate consequence of precise control. For both high- and low-stakes elections we estimate the autocorrelation of the indicator for whether Democrats hold a majority. To be precise we estimate

$$M_{i,t} = \rho_0 + \rho_1 M_{i,t-1} + \zeta_{i,t}$$

for $t \in \{High - stakes\}$ or $t \in \{Low - stakes\}$.
and plot $\hat{\rho}_1$ with its 90 percent confidence intervals. The autocorrelation rises from less than 0.4 to over 0.6 during high-stakes elections. A high-stakes election is far more likely to return to power the party that previously held a majority.

A.2.2 Additional Figures Referenced in Section 7

Figure 20 shows how the average unfamiliar population changes at the discontinuity. The left-hand panel restricts the sample to tracts in which African Americans are a majority; the righthand panel shows all other tracts. When Republicans control redistricting, the new boundaries put majority black census tracts into districts with 9 percentage points more unfamiliar people. This holds only for African American tracts; other tracts show no discontinuity.

Are they being moved to districts that minimize their influence? We restrict the sample to African American tracts put in districts in which more than half of the population is unfamiliar, taking this to mean the tract has been "moved." In the lefthand panel of Figure 17 we test for whether, conditional on being moved,
**Figure 20**
African Americans are More Likely
to Be Moved to Unfamiliar Districts

![Graph showing the relationship between the fraction of new district that is unfamiliar and the margin of seats won by Democrats.](image)

*Note: Outcome: For each census tract we define the fraction of the population in the new Congressional district that is “unfamiliar,” meaning the fraction not in the original district. We define a “black census tract” as one with a population at least 50 percent African American. Standard errors are clustered by state-redistricting cycle.*

majority black tracts are drawn into districts in which African Americans form an overwhelming (more than 75 percent) majority. Recall from Figure 1.B that “packing” African Americans into a small number of districts minimizes the number of elections in which their votes are pivotal. When Republicans barely control redistricting, an African American census tract that is moved has nearly a 35 percent probability of being moved into an overwhelmingly black district. When Republicans lose the lower house this probability drops to zero.\(^{25}\)

The righthand panel of Figure 17 shows the effect of Republican control on the density of the African American population share in the new district. To make the figure directly comparable to the prediction in Figure 1.B we adjust the estimates to show the effect of Republican control. As predicted, there is an increase in the density of overwhelmingly black districts and districts in which blacks are barely outnumbered. Meanwhile, the density of districts in which African Americans are a slight majority decreases. In summary, the results suggest African Americans are moved into districts that minimize the number of

---

\(^{25}\)The regressions in Figure 17 narrow the bandwidth to 10 because there is essentially no “packing” further away from the discontinuity.
Figure 21
Conditional on Being Moved, Where Are African Americans Moved?

Note: We restrict the sample to tracts in which more than half of the population is unfamiliar (see note of Figure 20). Righthand panel: Coefficients give the estimated shift in the density of the districts to which African Americans are moved by redistricting. We rescale the coefficients to show the effect when Democrats lose control of the assembly. Standard errors are clustered by state-redistricting cycle.

But as noted earlier, the states on either side of the threshold are not necessarily comparable. At the very least they differ in the identity of the incumbent party and in the pre-trends of election outcomes for the U.S. House. Is it possible that they also differ in their demographics? For example, if the original districts in states barely controlled by Republicans on average contain more African Americans, it may be almost mechanical that they would be more likely to be moved during redistricting. The left-hand panel of Figure 22 suggests this is not so. We test for whether at the threshold there is a discontinuity in the fraction of a district’s population that is African American. We use the old district boundaries to avoid contaminating the estimates with the effect of redistricting. There is no evidence of a discontinuity.

Though African Americans may comprise a similar portion of the total population near the threshold, is it possible that they are distributed less evenly than the rest of the population? For example, if migration patterns differ across the threshold, it is possible that in Republican-controlled states African Americans have segregated themselves into heavily over- or under-populated dis-
Figure 22
No Evidence that African Americans Need to be Moved More on One Side of the Threshold

<table>
<thead>
<tr>
<th>Fraction of Population Black is Similar at Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margin of Seats Won by Democrats (%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deviation in District Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margin of Seats Won by Democrats (%)</td>
</tr>
</tbody>
</table>

Black tracts. These districts would have to be broken up during redistricting. We test this hypothesis by calculating for each census tract the absolute deviation from the mean in the population of its pre-redistricting district. If African Americans are concentrated in malapportioned districts before redistricting in Republican states, majority-black census tracts should have a higher absolute deviation to the left of the threshold. The right-hand panel of Figure 22, which tests for such a deviation in African American census tracts, suggests no such deviation exists. There is no clear non-partisan reason why African Americans must more often be redistricted in states controlled by Republicans. Moreover, it is hard to see a non-partisan reason why, as shown in Figure 17, they must be moved into racially segregated districts.

A.3 Verifying the Results are Not Driven by Choice of Bandwidth

Standard methods of choosing optimal bandwidth give wildly different suggestions for the optimal bandwidth of the regression. In the case of Equation 4, for example, the cross-validation method suggested in Ludwig et al. (2007) and
Lee and Lemieux (2010) chooses a bandwidth of 22 percentage points or higher. The method of Calonico et al. (2014) suggests bandwidths closer to 10. Finally, the method of Imbens and Kalyanaraman (2011) suggests a bandwidth close to 1 (which contains very few observations). The disagreement may arise because our sample is relatively small. Even the smallest example considered in Imbens and Kalyanaraman (2011) used 500 observations, several times as many as in our sample of high-stakes elections.

Given that the methods disagree, we opt instead to show that all of our results are robust to a different choices of bandwidth. This appendix shows the results of these robustness checks. In all cases, the estimate produced by different choices of bandwidth are little different from those reported in the text. For the density test used to run Test 2, we also check the robustness to different choices of bin size.
Figure 23
Robustness to Bin Size and Bandwidth: Figure 7
Figure 24
Robustness to Bin Size and Bandwidth: Figure 7
Figure 25
Robustness to Bandwidth: Figure 15

Pre-Trend

Before to After
Figure 26
Robustness to Bandwidth: Figure 16
Figure 27
Robustness to Bandwidth: Figure 20

Black Census Tracts

Non-Black Census Tracts
Figure 28
Robustness to Bandwidth: Left-hand Panel, Figure 17
Figure 29
Robustness to Bandwidth: Right-hand Panel, Figure 17

Density of Black Population Share [Bw=10]

Density of Black Population Share [Bw=8]

Density of Black Population Share [Bw=6]
Figure 30
Robustness to Bandwidth: Figure 22

Fraction of Population Black is Similar at Threshold

Blacks are No More Likely to Live in Large or Small Districts
A.4 Verifying the Results are Not Mechanical because of Small Sample Size

This appendix verifies that the main result—the estimate of Equation 4—is not driven by small sample size. One may worry that it is mechanically more likely that we would find a larger discontinuity in high-stakes elections because there are fewer of them. To test this hypothesis we test for whether we can produce an equally large discontinuity by discarding some of the low-stakes elections.

To be precise, we start with the dataset of all low-stakes elections. We randomly select a subsample of these elections of the same size as the set of high-stakes elections. We then estimate the discontinuity. We repeat this procedure 2000 times. Figure 31 plots the histogram of the 2000 estimates. The red line marks the actual estimate from the high-stakes elections. Only a negligible fraction of the 2000 estimates is larger than the actual estimate, suggesting it is very unlikely our result is driven by sample size. It is unlikely that the high-stakes elections are drawn from the same data-generating process as the low-stakes elections.

A.5 Verifying the Results with Different Data

As noted in Section 4, the ICPSR Constituency data we use for our analysis is not a complete dataset of all elections. To validate that these missing elections do not bias the results we merge our data with that of Lee et al. (2004) for the years 1972 to 1992 (the years for which the two datasets overlap). The two datasets have in common 4,544 elections. Their data contain 114 elections not contained in ours, whereas our dataset contains 186 elections not contained in theirs. Among the elections contained in both the two datasets agree on the outcome of 99.45 percent of elections.

To verify that the results are not driven by these minor discrepancies, we redo our analysis by replacing our data with that of Lee et al. (2004) for the years that they overlap. In the main text we restrict our attention to elections in which there is only one Democrat and one Republican. Since the data of Lee et al. (2004) do not identify these elections we use all elections in this analysis. (The main results using our dataset are unchanged if we use all elections.) Figure 32
Figure 31
Subsamples of the Low-Stakes Elections Rarely Produce Discontinuities as Large as in the High-Stakes Elections

Note: See text for details.
shows that the main results are unchanged when we use the alternative dataset.

**B Simulation Appendix**

This appendix describes the simulation we use to demonstrate that strategies that are continuous in the margin of incumbency can generate a discontinuity in election outcomes. To be precise, we consider strategies that do not change discontinuously when the party switches to holding a majority before the election.

We generate 250 simulated legislatures—roughly equal to the full sample of high-stakes elections (before discarding those outside the bandwidth used to estimate Equation 4). The size of each legislature is a discrete random vari-
able $N_i$ distributed uniformly over \{21, 22, \ldots , 99\}. The number of seats held by Democrats before the election is distributed uniformly over \{0, 1, \ldots , N_i\}. From this number we construct $X_{i,t-1}$ and $M_{i,t-1}$ exactly as described in Section 3.2.

Each incumbent exits with some probability $q_{i,t}$. If the incumbent does not exit she wins with probability $p_{i,t}^I$. If the incumbent exits the district is open, in which case the Democrat wins with probability $p_{i,t}^O$. This probability varies by election to simulate aggregate swings towards the Democrats or Republicans. We assume $p_{i,t}^O$ has a uniform distribution over the interval $[0,1]$. When the state swings towards the Democrats, $p_{i,t}^O > \frac{1}{2}$; when it swings towards the Republicans, $p_{i,t}^O < \frac{1}{2}$.

The incumbent exit rate $q_{i,t}$ and the incumbent re-election rate $p_{i,t}^I$ depend on whether the parties make a strategic intervention. We assume the exit rate is

$$q_{i,t} = \begin{cases} 0.12 & \text{if no strategic intervention} \\ \frac{1}{2}X_{i,t-1}^2 + 0.05 & \text{if strategic intervention} \end{cases}$$

and the re-election rate is

$$p_{i,t}^I = \begin{cases} 0.92 & \text{if no strategic intervention} \\ 0.97 - |X_{i,t-1}| & \text{if strategic intervention} \end{cases}$$

These functional forms aim to match the stylized facts that as the margin of incumbency narrows, exit rates fall and campaign contributions (which raise re-election prospects) increase. To keep the simulation simple, we assume all strategic intervention focuses on incumbents. This assumption makes it clear that, as noted in the text, what matters is that the intervention is complementary to incumbency.

The top panel of Figure 33 is identical to Figure 14 in the main text. The bottom panel shows the incumbent exit rate with and without strategic intervention. The figure suggests the size of the decrease is comparable to that found in the data (See Figure 8).

This result is not meant as proof that we have completely isolated the mechanism for the effects we see. But it does show that a continuous intervention, as
Figure 33: Smooth Strategic Intervention Can Create a Discontinuity

Smooth Strategic Intervention Can Create a Discontinuity

Discontinuity

0.116 (0.116)

0.2
0.4
0.6
0.8
1

Probability Democrats Held Majority Before Election

-20
-10
0
10
20

Margin of Seats Won by Democrats (%)

No Strategic Intervention

0.116 (0.116)

0.2
0.4
0.6
0.8
1

Probability Democrats Held Majority Before Election

-20
-10
0
10
20

Margin of Seats Won by Democrats (%)

Strategic Intervention

kernel = epanechnikov, degree = 0, bandwidth = 5.17

No Strategic Intervention

kernel = epanechnikov, degree = 0, bandwidth = 4.69

Incumbent Exit Rate

-50
0
50

Democrat Margin of Incumbency (%)

kernel = epanechnikov, degree = 0, bandwidth = 5.17

0
2
4
6

Incumbent Exit Rate

-50
0
50

Democrat Margin of Incumbency (%)
long as it is complementary to incumbency, can create a discontinuity.