

Do female politicians empower women to vote or run for office? A regression discontinuity approach[☆]



David E. Broockman

Department of Political Science, University of California, Berkeley, 210 Barrows Hall, Berkeley, CA 94720, USA

ARTICLE INFO

Article history:

Received 19 December 2012

Received in revised form 21 September 2013

Accepted 9 October 2013

Keywords:

Regression discontinuity

Quasi-experiment

Descriptive representation

Political participation

Women and politics

ABSTRACT

Persistent gender gaps in political officeholding and mass political participation jeopardize women's equal representation in government. This paper brings new evidence to the longstanding hypotheses that the presence of additional female candidates and officeholders helps address these gaps by empowering other women to vote or run for office themselves. With a regression discontinuity approach and data on 3813 US state legislative elections where a woman opposed a man, I find that the election of additional women in competitive US state legislative elections has no discernible causal effects on other women's political participation at the mass or elite levels. These estimates are precise enough to rule out even substantively small effects. These results stand in stark contrast to a number of findings from India, suggesting that although electing the first women in a society can have these empowering effects, remaining barriers to women's inclusion in American democracy go beyond what further increases in female officeholding can themselves erode.

© 2013 Elsevier Ltd. All rights reserved.

Less than one hundred years ago, women in the United States were denied the right to vote in federal elections and no women held federal office. Today, it is commonplace for more women than men to cast ballots in US Presidential elections, while thousands of women hold significant political offices in the US. Nevertheless, despite the remarkable progress in women's political inclusion that has been made over the last century, large gender gaps in American politics remain (e.g., Verba et al., 1995; ch. 8): women are markedly less likely than men to contact their elected officials, to affiliate with political

organizations and, most starkly of all, to run for and serve in elected offices (e.g., CAWP, 2010).

Such gender gaps in political participation have significant consequences: at the mass level, who participates in politics greatly determines who receives substantive representation in government (e.g., Griffin and Newman, 2005); and at the elite level, female politicians are significantly more likely to provide women with substantive representation than are their male counterparts (e.g., Chattopadhyay and Duflo, 2004).

A number of activists, policymakers, and scholars have posited that the election of more individual women to office and the presence of more female candidates on ballots holds crucial promise to help close gender gaps in participation (see Dolan, 2006a and next section for review). Specifically, female candidacies and officeholding have long been argued both to increase political empowerment among women in the mass public, leading more women to vote, and to demonstrate to political elites, voters, and women themselves what women can accomplish in office, leading more women to run. Recent findings from India's unique policy experiments have crucially bolstered these arguments by

[☆] I thank Miguel de Figueiredo, Andy Healy, Gabe Lenz, Francesca Jensenius, Eleanor Powell, Rob van Houweling, and participants at the 2012 State Politics and Policy Conference for helpful feedback. I further acknowledge the National Science Foundation Graduate Research Fellowship Program for support. I thank Dan Butler for his assistance in collecting the election results and Stacey Chen and Cameron Rotblat for excellent research assistance. I also express gratitude to the Carrie Chapman Catt Center for the Study of Women and Politics at Iowa State University for the Catt Prize for Research on Women and Politics.

E-mail addresses: broockman@berkeley.edu, david.broockman@gmail.com.

demonstrating that the election of women there dramatically increases other women's political participation in the mass public and presence in office (e.g., Beaman et al., 2009; Bhavnani, 2009; Bhalotra et al., 2013; Deininger et al., 2013). Thus, as Dolan (2006a) reviews, a large and still-growing body of work suggests that “women candidates...send[] the signal that politics is no longer an exclusive man's world,” thereby “stimulat[ing women's] activity and engagement” at the mass and elite levels.

This paper presents new evidence that casts doubt on this view with an empirical approach that is able to assess the causal impact of female officeholding and candidacies in the United States with greater precision and less bias than previous work has been able. Specifically, I employ a regression discontinuity approach and data describing 3813 US state legislative elections where a woman opposed a man to estimate the causal effects of the election of female officeholders and the presence of additional women on ballots.

This dataset and research design have several novel advantages over previous work. First, although previous work has struggled with teasing apart the causal impact of electing women from the pre-existing characteristics of the places that tend to elect women, I use a quasi-experimental design to identify the causal effects of women's presence on ballots and in office. In examining women's candidacies for state legislative office, I also focus on the most crucial training ground for future statewide and federal officeholders and where much systematic bias against women holding office first begins (Maestas et al., 2006). This is also the same level of government where substantial effects have often been found in India, allowing for a meaningful cross-national comparison to be conducted. Moreover, while women are just as likely to know who their state legislators are as they are their Member of Congress (Burns et al., 2001, p. 102), the state legislative level features uniquely plentiful data and variation, allowing for statistically precise estimates that could uncover even subtle effects. Last, the nature of the regression discontinuity design estimates the effect of women's victories in the most competitive contests, precisely where prevailing theories predict the largest effects.

The results cast doubt on the propositions that one woman's election causes other women in her district to vote or women in nearby districts to run or win office. First, in other districts nearby districts where women have won the previous election, other women are no more likely to run for office or be elected. Moreover, women who are represented by a woman instead of a man or who have the opportunity to vote for a woman at the polls are no more likely to turn out to vote as a consequence. The precision of these null estimates is considerable enough to rule out even substantively small effects: the mobilizing effect of being represented by a woman instead of a man on women's voter turnout is statistically zero and, at most, smaller than the one percentage point turnout increase yielded from simple GOTV postcards. Likewise, the effect of a woman's victory on the probability that other women run for similar offices in their area is, at most, more than an order of magnitude smaller than the effect of a woman being asked to run for office by party leaders. Sorting around the discontinuity cannot account for these patterns, which are also robust across a number of specifications and to a number of alternative explanations.

The results shed new light on the remaining barriers women face to equal representation in American politics, both in the electorate and in elected office. Even as a bevy of promising new results from India suggest that the election of women can sometimes have strong empowering effects in contexts where few women have held office before, electing additional individual women in the United States appears unable to itself break down the underlying barriers to equal representation in government that American women face.

1. Do female politicians and candidates empower women to participate in politics?

Women's political participation continues to fall behind men's in the United States in important respects. In the mass public, women are significantly less likely than men to contact their elected officials, contribute to political campaigns, and affiliate with political organizations (among other political acts), patterns that have clear and widely appreciated implications for women's political equality (e.g., Verba et al., 1995, p. 254). Among the ranks of elected officeholders, women's underrepresentation is even starker: as of 2012, only 17% of US Senators and 17% Members of the US House are women. These gaps in women's office-holding likewise have clear consequences for women's equal substantive representation: female legislators are more likely to sponsor and vote for women's interest legislation (e.g., Gertzog, 1995; Niven, 1998; Chattopadhyay and Duflo, 2004), and women have more positive evaluations of their female representatives (Lawless, 2004).¹

1.1. The empowering potential of female officeholders and candidates?

Seeking to understand how persistent inequalities in women's political voice can be addressed, scholars have devoted a great deal of attention to understanding the roots of women's underrepresentation in the mass public and among elected officeholders (see Dolan, 2006a for review). One novel hypothesis about how to increase women's participation has gained particular prominence: that the election of female officeholders and the presence of female candidates on ballots itself causes more women to politically participate, both in more routine acts of participation in the mass public (such as contacting one's representatives) and by running for elected office themselves.

At the mass level, scholars have long argued that historically underrepresented groups like women will participate in politics to a greater extent when they have descriptive representatives (e.g., Banducci et al., 2004; Beaman et al., 2012; Bobo and Gilliam, 1990; Gay, 2002; Mansbridge, 1999; Pantoja and Segura, 2003; Williams, 1998).² Supporting such expectations, a large empirical literature has uncovered

¹ Women's growing representation has more general consequences, as well: because barriers to entry for political office are higher for women than for men, the women who do enter politics are generally more talented than are men (Anzia and Berry, 2011).

² See also Harris et al. (2005, 2006), Washington (2006), and Broockman (2013).

correlations between the presence of women on ballots and in government with many aspects of women's political participation (e.g., Burns et al., 2001; Atkeson, 2003; Wolbrecht and Campbell, 2006, 2007; Karp and Banducci, 2008; Atkeson and Carrillo, 2007; Reingold and Harrell, 2010).

Scholars have also noted several compelling reasons to expect the election of one female politician or the presence of a competitive female candidate to 'break a glass ceiling' and lead to more participation at the elite level in the form of other women's candidacies or elections. First, party elites who witness women in prominent political roles are expected to decrease their well-documented biases against female candidates as a result of witnessing women vying for, winning, and holding office (e.g., Beaman et al., 2009; Bhavnani, 2009; see also Niven, 1998; Sanbonmatsu, 2006).³ In addition, just as women who might run for office have been found to often "underestimate" their own "qualifications to seek and win elective office" or to have absorbed sexist ideas about the role of women in the political sphere (Lawless and Fox, 2005; Fox and Lawless, 2011), this internalized sexism is hypothesized to diminish when women see other women holding office through a 'role model' process (e.g., Schramm, 1981; Gilardi, 2013). Both expectations are consistent with work in psychology suggesting that mere exposure to female leaders can reduce sexism and increase women's own expectations to their group (e.g., Dasgupta and Asgari, 2004) and with results from American politics suggesting that political elites learn from and seek to duplicate their strategies after winning close elections (e.g., Martin and Peskowitz, 2013; Brooks and Henderson, 2013).⁴

Pathbreaking findings from India's unique policy experiments have recently granted further support to these expectations (Beaman et al., 2009; Bhavnani, 2009; Deininger et al., 2013; Beaman et al., 2012). For example, Deininger et al. (2013) find that women in these reserved districts are significantly more likely to participate in politics in a variety of ways, and Bhalotra et al. (2013) demonstrate that women's electoral victories in India make the political environment more hospitable for female candidates in subsequent elections.⁵

1.2. Are there limits to women's empowering potential?

Despite the compelling evidence that the election of women to local and regional political bodies empowers women to participate in politics at the mass and elite levels

in India, there are also good theoretical reasons to doubt that the election of additional women or the presence of additional female candidates would do so in a country like the United States. Specifically, though the first women to hold office in the United States may have once had similarly large effects on women's political participation and office-holding as are women in India today, female officeholding is now commonplace enough in the United States that the empowering gains from female descriptive representation may have been largely realized; unlike most Indians, most Americans are already familiar with a number of prominent female politicians. In the context of the male-dominated US Senate, for example, voters, elites, and women might change their gender views very little in reaction to the election of hypothetical new 18th female Senator (there are currently 17), even if the election of the first female US Senator (Hattie Caraway, in 1931) did have large effects in mobilizing women to vote or in showcasing women's true potential to other women thinking about running for office, voters, and party leaders.

Supporting the notion that the empowering effects of female officeholding may diminish after the first cohort of pathbreaking female role models are elected, Gilardi (2013) finds that the first women who run for office in Swiss municipalities do generate spillovers that lead other women to run in nearby other areas, but that this effect erodes as further women are elected.⁶ Consistent with such doubts, several studies have also found no association between female officeholding or candidacies and women's political participation in the United States (Haynes, 1997; Lawless, 2004; Dolan, 2006b).

Deeper barriers to women's participation in American politics may persist that go beyond what the election of additional female officeholders can further erode (Duflo, 2012), such as culturally ingrained sexist ideas about leadership, deep-seated sexist views among party leaders and other political gatekeepers, and gender gaps in access to other resources, patterns that scholars have all documented have important effects on women's participation (see Dolan, 2006a for review, and also Arceneaux, 2001; Gneezy et al., 2009).

1.3. Methodological challenges

Despite the substantive importance and continuing scholarly debate on the empowering effects of female officeholders, few studies have persuasively identified the causal effect of women's candidacies or officeholding on women's mass and elite-level participation in the US. Empirically addressing these effects has proven challenging for two main reasons.

First, most existing work (e.g., Ferreira and Gyourko, 2013) has contended with limited data: the relatively small number of countries that have significant female representation has limited cross-country comparisons, and the continuing scarcity of female representatives at many levels of government has limited cross-district approaches

³ 64% of female local officeholders reported to Niven (1998) that "party leaders discouraged" them from running for office "because of their gender" and a substantial share of party leaders report believing that women are less electorally viable and less qualified to hold office than are men (Niven, 1998; Sanbonmatsu, 2006; see also Lawless and Fox, 2005; Fox and Lawless, 2010).

⁴ In addition, although many voters appear to apply sexist stereotypes (e.g., Koch, 2000), voters also appear to diminish their biases against female candidates as a result of witnessing a woman hold office (e.g., MacManus, 1981; Beaman et al., 2009; Bhavnani, 2009; Healy, 2013).

⁵ Findings from India are not unambiguous, however; some papers do find null results for some outcomes (e.g., Bhalotra et al., 2013), even though the balance of the literature still suggests the existence of these empowering effects.

⁶ Gilardi (2013) also provides a number of qualitative interviews consistent with this mechanism.

as well. Data on women's voter turnout is also difficult to gather in many areas, further limiting research.

Selection bias has proven a second persistent challenge. As scholars do not yet fully understand the reasons why women are elected in the places that they are, associations between a woman's candidacy or election in one district and the outcomes of interest (e.g., Healy, 2013) are difficult to convincingly tease apart because we cannot be sure that that all potentially confounding factors have been controlled for. Although scholars have found experimental evidence that female politicians have changed perceptions about women's candidacies in the context of particular case studies and in the lab (MacManus, 1981; Gitelson and Gitelson, 1981), the difficulty in identifying causal relationships between these intertwined phenomenon has limited the development of research that has been able to make strong causal claims. Supporting these methodological concerns, recent work reexamining the impacts of electing African-Americans to local and state legislative offices has found that strictly observational designs may overstate the causal effects of descriptive representation on participation (Hopkins and McCabe, 2013; Henderson et al., 2013).

In the next Section I describe how a quasi-experimental design can shed light on this longstanding question by identifying the effect of additional female officeholding in the US on other women's participation at the mass and elite levels.

2. Methodology

2.1. Research design

Although the United States does not feature randomized reservation systems that would allow for straightforward identification of the causal effect of women's service and candidacies (as is possible in India), a quasi-experimental approach is available: a regression discontinuity design. Regression discontinuity designs have grown increasingly common in political science and economics and have been applied to identify causal effects in a wide variety of contexts where traditional approaches have difficulty (e.g., Lee, 2008; Trounstein, 2011; see Caughey and Sekhon, 2011 for review). RDDs can estimate the causal effect of a treatment of interest when it is determined at a sharp discontinuity in another variable: for example, Lee (2008) finds that Democrats who "just win" Congressional elections receive a substantial increase in their vote shares in subsequent elections over those who have "just lost" the previous election (the incumbency effect). (For more on RDDs and for a formal proof of their properties, see Lee (2008).)

In this context, I use the discontinuity at the 50% point in the vote share garnered by women running in contests against men to identify the causal effects of women's victories. That is, I compare subsequent patterns of mass and elite participation in and near districts where women either "just won" and "just lost" elections against men to test whether other women are more likely (1) to vote in subsequent elections when a woman has just won the previous election (the mass empowerment hypothesis) or (2) to run for or win office in other districts nearby districts where a woman has just won the previous election.

Importantly, as some literature identifies female *candidates* as the crucial mobilizing force and not female *politicians*, I also show that this regression discontinuity approach in fact identifies both effects: because districts where a woman has just won the previous election are also dramatically more likely to have a female candidate in the next election (because the woman who won usually runs for re-election), this approach identifies the combined causal effect both of the presence of a female incumbent and of the resulting increased likelihood that a female candidate runs.⁷

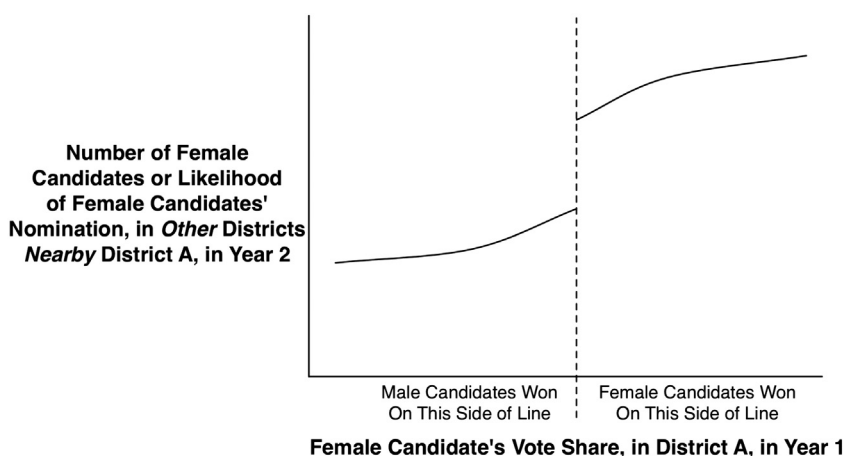
To illustrate how the discontinuity design identifies the effects of women's officeholding, Fig. 1 summarizes how it would uncover a "breaking of the glass ceiling" phenomenon whereby one woman's victory caused other women to be more likely to run for office in other districts in her area. The X-axis in Fig. 1 refers to the vote share a female candidate received in an election against a man in District A at Time 1. The Y-axis refers to the number of female candidates who run for or win office in *other* districts near District A at Time 2. As depicted in Fig. 1, a man won all elections at Time 1 in Fig. 1 to the left of the vertical dotted line, corresponding to areas where a woman's two-candidate vote share was below 50%; above 50% in two-candidate vote share, and to the right of the vertical dotted line, women won all races against men at Time 1. Although the sorts of districts that women tend to win and lose are endogenous, confounding factors are unlikely to systematically differ just at the discontinuity. This means that women's victories can be considered quasi-randomly assigned at the discontinuity (Lee, 2008) and thus differences in subsequent patterns across the discontinuity can be causally attributed to the election of a woman in District A. That is, any 'jump' in the dependent variable at the discontinuity can be attributed to the effect of crossing the discontinuity (i.e., of a women winning in District A) because there should be no systematic differences between the kinds of districts where women happen to have "just won" or "just lost" contests against men.⁸

In summary, the design compares two groups of districts – one where women are both serving in office at the time of the next election (and, as a consequence, are also usually on the ballot as well), and another where men serve instead – that are quasi-randomly assigned to these conditions (Lee, 2008). All factors that might be thought to be relevant to women's participation are hence naturally held constant, with no need for additional controls (see Green et al., 2009 for a validation of this quasi-experimental property of RDDs).

In addition to being able to isolate the causal impact of female candidacies and officeholding, the regression discontinuity approach also has the unique characteristic that it specifically identifies the effect of women's victories *in very competitive races* (i.e., those where a person of the opposite gender almost won). Although this is a real

⁷ Though this is a weakness of the approach for *disentangling* the causal effects of female officeholding and candidacy were they to exist, the null effects I find could only conceal a positive effect of one of these variables if there were in fact a large negative causal effect of the other.

⁸ Note that the data are specified at the level of randomization to accurately estimate the statistical uncertainty associated with the estimates (e.g., Green et al., 2001).



Notes: The Figure visualizes how a regression discontinuity design would discover the effect of a woman's victory on other women's candidacies in subsequent elections. The X-axis describes a woman's share of the two party vote in a district at Time 1; women won races to the right of the discontinuity. Even though the overall relationship is endogenous, the difference between the estimates of the data's true underlying form at the limit captures the causal effect of electing a woman in other districts near district A at Time 2.

Fig. 1. Hypothesized “breaking of the glass ceiling” pattern.

limitation of regression discontinuity approaches in many contexts, it is in these very close elections that scholars have traditionally expected the empowering effects of female descriptive representatives to be greatest (e.g., Burns et al., 2001). First, it is to these elections that voters and elite political observers alike generally pay the closest attention; thus Atkeson (2003) argues that it is the presence of female candidates in the most competitive elections who are most strongly associated with increase female participation. Elites and women considering running for office might thus be expected to glean the most about women's abilities to win such elections as well, and voters can be expected to be most acquainted with who is running for office in competitive elections as a result of greater cognitive engagement, media coverage, campaign communication, etc. (e.g., Kam and Utych, 2011). Elites concerned about women's abilities to compete in close elections might likewise glean most from watching women's performance in these races (e.g., Martin and Peskowitz, 2013). In summary, although the RD approach is restricted in its generalizability to a smaller set of cases, it is precisely these cases where existing theoretical work typically predicts the effects would be likeliest to materialize.⁹

With plentiful data, the ability to identify causal effects under minimal assumptions, and a unique focus on very competitive and engaging elections, the design therefore has

an excellent chance to detect any empowering effects of female descriptive representation and candidacies for other women's mass participation or officeseeking in US state legislative elections. Moreover, women are just as likely to know who their state legislators are as they are their Members of Congress (Burns et al., 2001, p. 102), suggesting that the statistical precision available at the state level also comes with a relatively strong degree of external validity. The results surely cannot unambiguously speak to the effect of electing women at other levels of government or in other kinds of elections, but close state legislative elections are much more salient to female voters than one might expect.

2.2. Data

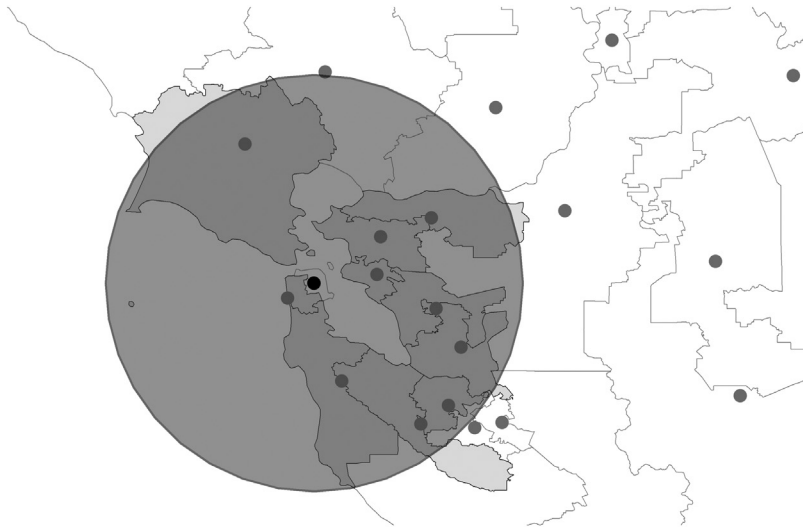
Requisite data to explore these questions came from several sources.

2.2.1. Female candidates

First, the Center on American Women and Politics (CAWP) at Rutgers University collects and graciously makes available data on all female candidates for state legislature since 1999. In order to conduct the regression discontinuity on observations where either a woman or a man might have won office, I first dropped all cases where a woman ran against another woman or a woman ran unopposed. I also restricted the data to races that occur in even-numbered years, since data on women's voter turnout for odd-numbered election years was not readily available.¹⁰ I finally dropped all legislative chambers where there are

⁹ One countervailing expectation may be that rational elites will not learn from women's close victories or close defeats precisely because these elections are decided quasi-randomly. However, empirical work suggests that even highly strategic American political elites do attempt to learn from close wins and losses in shaping future strategies and resource allocation decisions (Martin and Peskowitz, 2013).

¹⁰ This excludes Louisiana, Mississippi, New Jersey, and Virginia, who hold state legislative elections in odd-numbered years (e.g., 2001, 2003, 2005, 2007, 2009) instead of even-numbered years.



Notes: The Figure illustrates the procedure used to measure which other state legislative districts are nearby each state legislative district. The centroid of each district is calculated, then other districts with centroids within a certain distance of the master district's centroid are identified.

Fig. 2. District distance measurement procedure example.

multi-member districts since specifying a regression discontinuity is not straightforward in a multi-candidate race. This yields a dataset of 3813 state legislative elections where a woman opposed a man in 2002, 2004, 2006, and 2008. (The years 2000 and 2010 are excluded because of redistricting between 2000/2010 and 2002/2012.)

2.2.2. Election returns

Second, I matched these data to data on state legislative election returns gathered from state legislative websites. The resulting dataset describes the vote share garnered by the female candidate and the male candidate in each of the 3813 races.

2.2.3. Dependent variable I: women's candidacies in nearby districts

In order to assess the effects of a woman's election in one district on conditions for female candidates in nearby districts in subsequent elections, I matched the election return and CAWP data to data from the US Census that describe the geographic location and boundaries of state legislative districts. These geographic boundary files allow me to identify other districts 'nearby' each of the 3813 main districts and thus where elites and potential female candidates might learn of women's electoral victories and ultimately witness women serving in office.

To measure which districts were 'nearby' or 'in the area of' each other district, and thus where elites and women themselves might plausibly observe and interact with a female officeholder, I first created a dataset describing the distance between each of the 6652 state legislative districts in the US and every other district (describing roughly $6652^2/2 \approx 22$ million unique district pairings). There are multiple ways to express the distance between two two-dimensional objects: I chose to do so with the common

and simple method of comparing the distances between the centroids (that is, the geographic 'average location' or 'center of gravity') of each of the districts. Fig. 2 shows an example of how this procedure, executed using ArcGIS, determined which state legislative districts were within 50 miles of the state house district for San Francisco, California. In the Figure, the centroid of the San Francisco district is denoted by the dark black dot, with the large gray circle corresponding to the area within 50 miles of this centroid. Ten other state house district centroids fall within this area, corresponding to the ten shaded districts that are therefore considered to be 'within 50 miles' of the San Francisco district. Other districts with centroids beyond the shaded area are thus not considered to be 'within 50 miles' of the San Francisco district.¹¹

To construct the final dependent variable for this spillover analysis, I matched this linked distance data with the datasets describing every state legislative election since 2002 and the data on female candidates from CAWP, yielding an indicator variable for whether a woman was a candidate in or won every state legislative election since 2002. I then computed the total number of contests and the total number of female candidates and victors in those contests in other districts within an arbitrary distance of each district to calculate the final dependent variables. (The next section formalizes the calculation of this variable.)

2.2.4. Dependent variable II: women's voter turnout

To measure women's voter turnout behavior, I purchased data from Catalist, a well-known voter data clearinghouse. Catalist provided me with data on the total

¹¹ In the next section I show that the results are robust to a number of different district-to-district distance algorithms.

number of votes cast in the general election and the number of votes cast by women in every even-numbered election year between 2000 and 2010 from their comprehensive US voter files. This dataset yielded two variables of interest in each election: dividing the number of votes women cast by the total number of votes yields the share of the electorate which women comprised, and dividing the number of votes cast by women by the female population yields women's voter turnout.

3. Does electing women empower other women to vote?

3.1. Specifying the RD

To specify the regression discontinuity, I employed the standard approach of estimating a function on each side of the discontinuity and then estimating the difference between these functions at the discontinuity (Lee, 2008). General practice for doing so is employing a high-order polynomial on each side of the discontinuity or using local linear regression (Imbens and Lemieux, 2008); I present the results using both approaches.

The model for the hypothesis that the election of a woman in one district causes other women in that district to vote therefore takes the following form:

$$\frac{\sum \text{Female Voters}_i}{\sum \text{Women}_i} = \alpha + \beta_1 V_i + \beta_2 V_i^2 + \beta_3 V_i^3 + \beta_4 V_i^4 + \gamma F_i + \beta_5 V_i F_i + \beta_6 V_i^2 F_i + \beta_7 V_i^3 F_i + \beta_8 V_i^4 F_i + \varepsilon_i \quad (1)$$

where the left hand side of the equation describes women's voter turnout in district i at Time 2 (with Time 2 defined as whenever the next election takes place in district i), α is a constant, V_i is the *Woman's Two-Candidate Vote Share* within district i at Time 1, F_i is a dummy variable set to 1 if $V_i > \frac{1}{2}$ (that is, if the woman wins in i at Time 1) and 0 otherwise, and ε_i is the error term. γ is the coefficient of interest that captures the causal effect of a woman's prior victory on the dependent variable.¹²

The choice of 'bandwidth', or how far from the discontinuity to use data for estimating the functions' values at the limit, presents a tradeoff between variance and bias. Narrower bandwidths use fewer observations, limiting the estimation procedure to information on observations most similar to the exogenous elections right at the limit, but also with lesser precision. Conversely, wider bandwidths estimate the model using a greater number of observations by including those that are further from the discontinuity. In the text I present estimates for a 15 percentage point bandwidth, though Table A1 in the Appendix shows that the results for a variety of other bandwidths are essentially identical. This 15 percentage point figure means that only elections where a female candidate garnered between 35% and 65% of the final two-candidate vote are included in the estimation procedure.

The polynomial specifications are computed with robust standard errors; the Imbens and Lemieux (2008) results are computed using their standard error algorithms.

3.2. Women do appear on the ballot more frequently after winning the previous election

As some literature attributes the effects of female descriptive representation to women's *candidacies in competitive elections*, not women's actual presence in office, I first demonstrate that the discontinuity in whether a woman wins an election at Time 1 has a strong effect on whether a woman is a candidate at Time 2. In this way, the discontinuity can also be considered an exogenous instrument for women's presence on the ballot in the next election (Broockman, 2009): because most candidates who win their elections run for re-election, women are (exogenously) much more likely to be candidates for election at Time 2 when a woman has just won at Time 1. The first and second columns of Table 1 and Panel (c) of Fig. 3 thus show that when a woman just wins an election, a woman is about twice as likely to be a candidate in a subsequent election in the same district (namely, in most cases, that same woman running for re-election). The effects I estimate thus capture the combined effect of women's incumbency and resulting greatly increased likelihood of candidacy (as an increase in the former directly leads to an increase in the latter).¹³

3.3. Do female candidates and politicians mobilize women to vote?

Does the election of a woman or the presence of a woman on the ballot in the US cause other women to vote? The third and fourth columns of Table 1 present the estimates for the effect of electing a woman in a district on *women's voter turnout* in that district in the next election (that is, $P(\text{Voted}|\text{Women})$) and the last two columns estimate the effect of a woman's victory on the *proportion of voters who are women* in that district in the next election ($P(\text{Women}|\text{Voted})$). In each case, the line in bold represents the estimate of γ in equation (1), the causal effect of the election of a woman on the dependent variable. The coefficients on the polynomials (the β s in equation (1)) are not presented to conserve space, though in all cases I used a fourth-order polynomial consistent with Lee (2008). The constant term describes the average value for the dependent variable at the left-hand limit. Recall that the sample sizes are smaller than the full dataset because the procedure is limited to observations within 15 percentage points of the discontinuity; similar results for smaller and larger bandwidths are shown in Table A1 in the Appendix.

Columns 3 and 4 in Table 1 show that the effect of a woman's victory on women's voter turnout in US state legislative elections is statistically zero. Column 4 includes

¹² See Imbens and Lemieux (2008) for technical details on the local linear regression estimator.

¹³ Though this is of course a weakness of the approach for disentangling the causal effects of female officeholding and candidacy were they to exist, the null effects I find could only conceal a positive effect of one of these variables if there were in fact an equally large negative causal effect of the other.

Table 1

RD estimate of electing a woman on women's subsequent political participation.

Time	Time 2					
Dependent variable	Woman on ballot		Women's voter turnout		Female share of the electorate	
Woman won at time 1	0.431** (0.073)	0.432** (0.077)	−0.008 (0.029)	−0.007 (0.018)	0.004 (0.003)	0.004 (0.003)
Degree of polynomials	4	4	4	4	4	4
State × year FEs?	No	Yes	No	Yes	No	Yes
Constant	0.451** (0.062)	n/a	0.535** (0.002)	n/a	0.530** (0.002)	n/a
R ²	0.248	0.250	0.007	0.005	0.009	0.014
N	2588	2588	2588	2588	2588	2588

Notes: ** = $p < .001$, * = $p < .10$, all tests two-tailed. Bandwidth is 0.15 in all cases. The Table shows that women are not significantly more likely to vote or to comprise a greater share of the electorate due to being represented by a woman. This is additionally surprising given that women are twice as likely to appear on the ballot during the next election when they win.

state-year fixed effects to provide a more precise upper bound on the estimated effect of a woman's victory on women's voter turnout.

With fixed effects, the model implies with 95% confidence that the effect of a woman's election on women's voter turnout in subsequent elections is most likely zero and, at most, not more than 2.8 percentage points. The Imbens and Lemieux (2008) estimator (which is more efficient than polynomials and thus has smaller standard errors; see Table A1) similarly estimates with 95% confidence that women's voter turnout does not rise by more than 0.9 percentage points because of a woman's election. To put this latter estimate in substantive context, the mobilizing effect of being represented by a woman on women's turnout thus appears to be, at the most, even smaller than approximately 1 percentage point mobilizing effect of receiving a simple 'civic duty' GOTV postcard in the mail (Gerber and Green, 2000). This upper bound is also nearly an order of magnitude smaller than the estimated effect of being asked to vote face-to-face or being sent a 'social pressure' mailer (Gerber and Green, 2000; Gerber et al., 2008). In summary, the results show that the effect of being represented by a female state legislator or having a female state legislative candidate on the ballot on women's voter turnout in the US is statistically and substantively zero.¹⁴

Panel (a) of Fig. 3 displays these results graphically, with the data binned in 0.5-percentage-point wide bins and the model estimated in Column 3 of Table 1 superimposed. The X axis refers to women's share of the two-candidate vote in election 1, and the Y axis to women's voter turnout in election 2. The dark line shows the fitted values from the model on each side of the discontinuity. The vertical red line divides cases where women just won elections at Time 1 from those where women had just lost. If there were a large causal effect of electing women on other women's participation, women's voter turnout should increase for the observations just to the right of the vertical red line. As is clear from the raw data, there is no significant increase in women's voter turnout in districts

where a woman has just won the previous election instead of having just lost.

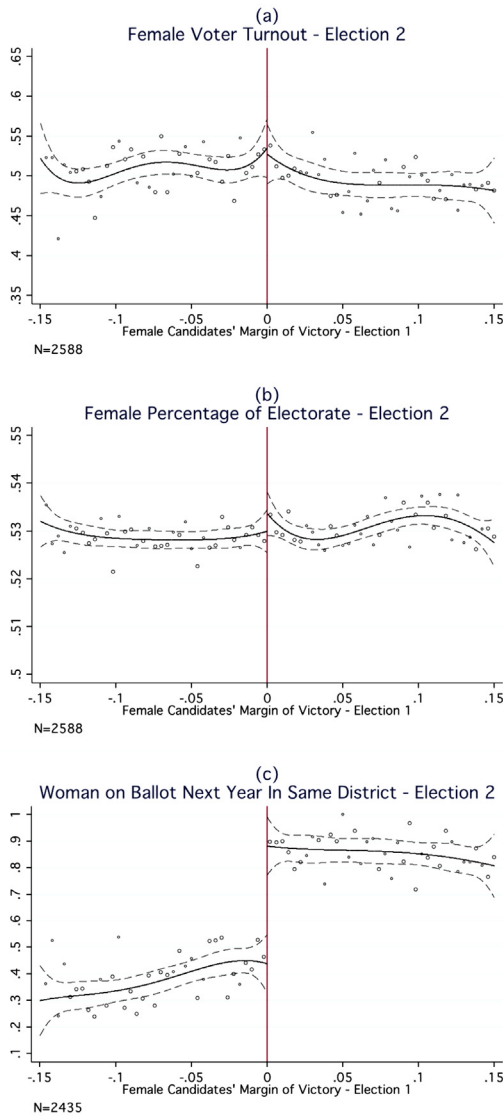
3.4. Women's share of the electorate

Voter turnout may not be the best proxy for women's empowerment, however: raw turnout statistics do not take into account effects that women's victories may have on men's turnout, and so it is also important to understand whether women represent a greater share of the electorate relative to men. The last two columns thus estimate the effect of a woman's victory on women's share of the electorate – that is, the proportion of all votes cast that were cast by women. The results again imply that the effect of electing a woman is statistically zero: furthermore, the estimates imply with 95% confidence that women make up no more than 0.9 percentage points more of the electorate due to a woman's victory in the previous election. The raw data and fitted model shown in Panel (b) of Fig. 3 makes this null result similarly clear. The election of women does not appear to be able to meaningfully increase women's presence in the electorate.

Table A1 in the Appendix shows that the results presented in this section are robust to a number of alternative bandwidths and consistent when using the bandwidth and estimation procedure recommended by Imbens and Lemieux (2008). Even when considering data only very near the discontinuity or including much more data, the estimates remain essentially identical and never approach statistical significance.

In summary, the results indicate that there are at best minimal causal effects of women's seeking and holding office on women's political participation in the electorate in US state legislative elections. Though by their nature no statistical procedures can establish that the effects of one variable on another are truly zero, the null estimates reached here are precise enough to rule out all but substantively minimal effects. Although there is an extremely strong correlative association between women's voter turnout and the performance of female candidates (indeed, in this data, the association between women's voter turnout and women's performance at the ballot box has a t-statistic of over 18), the regression discontinuity approach reveals that the election of women to local legislatures does not play a causal role in this association in the US as it does in India (Deininger et al., 2013). Underlying barriers to

¹⁴ Including lagged dependent variables only increases statistical precision slightly because patterns in off-year and on-year elections within districts are not highly prognostic of each other. In no cases does including a lagged dependent variable meaningfully alter the results.



Notes: The circles show the data's average values in 0.5-percentage point wide bins, with the size of the circles corresponding to the number of observations in each bin. The dark lines show the model estimated on each side of the discontinuity, which is shown in red. The distance between these lines at the discontinuity captures the causal effect of women's elections. Panels (a) and (b) show that the election of a woman does not cause more women to vote in subsequent elections. These null results hold despite the increased likelihood that women will appear on the ballot in subsequent elections. Female officeholding and campaigning thus do not appear to meaningfully increase women's voter turnout.

Fig. 3. Effect of women's victories on women's voter turnout. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

women's participation that effect both women's office-holding and women's voter turnout appear more responsible for this association in the US.

4. Do female politicians break glass ceilings for other women to run?

4.1. District distance criteria: where can one woman's victory be expected to cause other women to run?

Though the election of women does not appear to cause more women to vote, can the election of one woman cause other women to run for (and win) office in other areas nearby? If party leaders or individual women learn from or are inspired by women's victories or subsequent service in office, women might be more likely to run for and win offices in other districts in their area as a result (as Beaman et al., 2009; Bhavnani, 2009 document in India).

To test such hypotheses, I specify the following equation:

$$\frac{\sum \text{FemaleCandidatesNearby}_i}{\sum \text{ElectionsNearby}_i} = \alpha + \beta_1 V_i + \beta_2 V_i^2 + \beta_3 V_i^3 + \beta_4 V_i^4 + \gamma F_i + \beta_5 V_i F_i + \beta_6 V_i^2 F_i + \beta_7 V_i^3 F_i + \beta_8 V_i^4 F_i + \varepsilon_i \quad (2)$$

where the left hand side describes the proportion of elections with female candidates in *other* districts *near* district *i* at Time 2 (with Time 2 again referring to whenever the next election is held in district *i*), the other parameters refer to the election results in district *i* at Time 1 and are the same as in equation (1), and where γ now captures the causal effect of electing a woman in district *i* at Time 1 on whether other women run for office in districts nearby district *i* at Time 2.

I employ two different criteria to define 'nearby' districts – first, by the centroid distance measurement procedure described in the previous section and shown in Fig. 2, I consider whether a woman was a candidate in or won all elections in other districts within 75 miles of each district, and, second, estimate the same quantities for elections in the 10 other districts closest to each district. The latter approach may help balance out spatial irregularities across areas: some states have larger districts than others, some districts are larger than others, and some districts are so rural (such as that for northern Alaska) that there are no others within even 100 miles of its center. In all cases I only consider effects on elections for seats in the same chamber and the same state, though the results are the same when considering the effects on all districts.

4.2. Results: successful female candidacies do not generate more female candidacies nearby

The first two columns of Table 2 and panels (a) and (c) of Fig. 4 show the estimates for the effect of a woman's victory on the likelihood that a woman appears on the general election ballot in nearby districts in subsequent elections. Panel (a) and the first column of Table 2 show these estimates within the context of all districts within 75 miles, and Panel (c) and the second column of Table 2 show them

Table 2

Effect of women's victories on women's candidacies nearby.

Time	Time 2			
	Female candidates per contest		Female victors per contest	
Distance criteria	Contests within 75 miles	10 Closest contests	Contests within 75 miles	10 Closest contests
Woman won at time 1	0.028 (0.040)	0.007 (0.045)	0.021 (0.029)	0.004 (0.032)
Degree of polynomials	4	4	4	4
Constant	0.453* (0.028)	0.468* (0.030)	0.267* (0.021)	0.274* (0.022)
R ²	0.003	0.001	0.005	0.002
N	2404	2433	2404	2433

Notes: * = $p < .10$, all tests two-tailed. Sample sizes differ slightly between the columns because 29 state legislative districts in the US are so remotely located that no other districts exist within 75 miles of their centers. The Table shows that women's victories do not cause other women to run for office in other districts nearby.

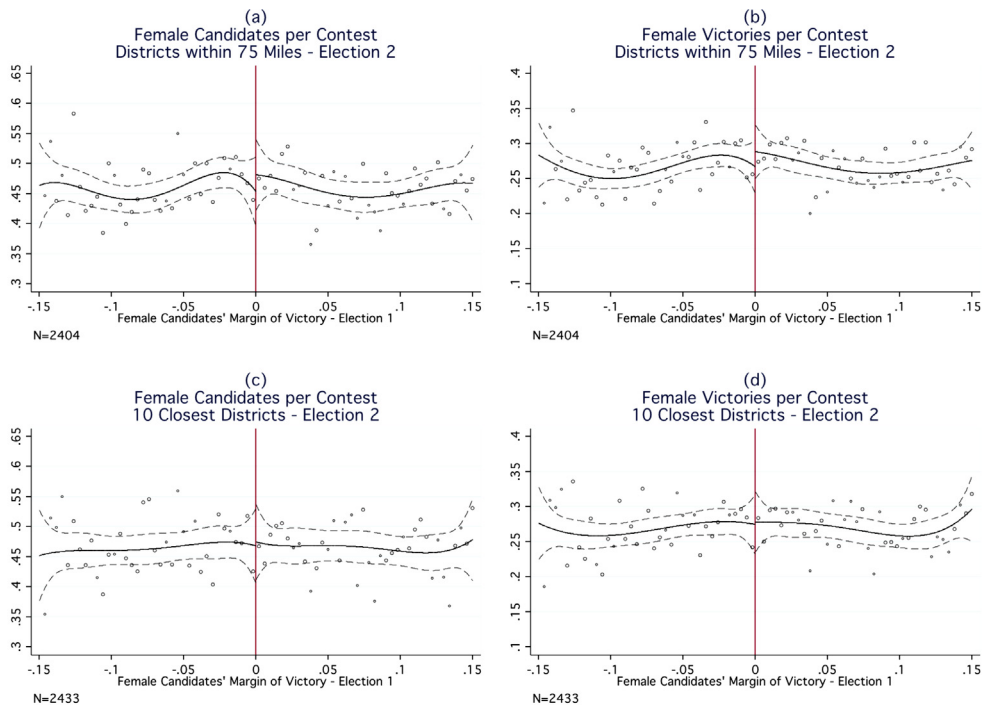
for the 10 closest district to each districts. In each case the results are statistically zero; there is at most a negligible effect of electing one woman on the likelihood that other women run for office. As with the panels in Figs. 3 and 4 shows the raw data binned in 0.5-percentage point wide bins with the fitted model superimposed. It is especially clear from the Figure that the effects of electing a women on other women's candidacies are essentially zero.

Substantively, this null result is especially stark in comparison to the effect of other factors on women's candidacies. While the 95% confidence interval from the Imbens and Lemieux (2008) (in Table A1) procedure estimates that women in the 10 closest districts are at most 2 percentage points more likely to run for office as a result of a woman's victory, Fox and Lawless (2010) find from their survey of likely candidates for office that women are about 37 percentage points more likely to seriously consider running for office when asked to do so by a political gatekeeper. Likewise, Lawless and Fox, 2005 estimate that women are up to 55 percentage points more likely to seriously consider running for office if they view themselves as more qualified, an estimate that again far outstrips even the most optimistic estimate for the impact of witnessing other women's victories.

4.3. Results: female victories

Columns 3 and 4 in Table 2 show that the estimates for the effect of electing a women on the share of subsequent elections nearby where women *win* office is likewise statistically zero. This demonstrates that the previous null result does not belie a quality effect whereby more talented women might run, increasing women's victories even though candidacy rates remained the same. Rather, in other districts nearby, women are at most a few percentage points more likely to win office as a result of a woman's victory in the previous election nearby; panels (b) and (d) in Fig. 4 display this null result graphically.

The results are identical when considering upper chamber elections only, the effect of upper chamber



Notes: The circles show the data's average values in 0.5-percentage point wide bins, with the size of the circles corresponding to the number of observations in each bin. The dark lines show the model estimated on each side of the discontinuity, which is shown in red. The distance between these lines at the discontinuity captures the causal effect of women's elections. The Panels show that women's victories in one district do not cause more women to run for or win office in other districts nearby in subsequent elections.

Fig. 4. Effect of women's victories on other women's candidacies nearby. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

elections on lower chamber elections, open seat elections only, and in districts both above and below the mean state legislative district size. Table A1 in the Appendix shows that the results also continue to hold with a number of different distance criteria, including in a smaller and larger geographic radius and a greater and fewer number of nearby districts included. Table A1 additionally demonstrates that these estimates remain robust to a number of different bandwidth choices and are identical when using the Imbens and Lemieux (2008) estimation procedure.

In summary, the results consistently find that the election of a woman in one district is expected to increase the likelihood that a woman runs for office in a nearby district by at most a few percentage points and most likely not at all. Women face numerous barriers to office in the United States; however, the presence of other women in office itself appears unlikely to erode them.

5. Evaluating potential obstacles to internal and external validity

5.1. Can sorting explain the null results?

The estimates presented in the previous sections turn on the assumption that women actually win and lose

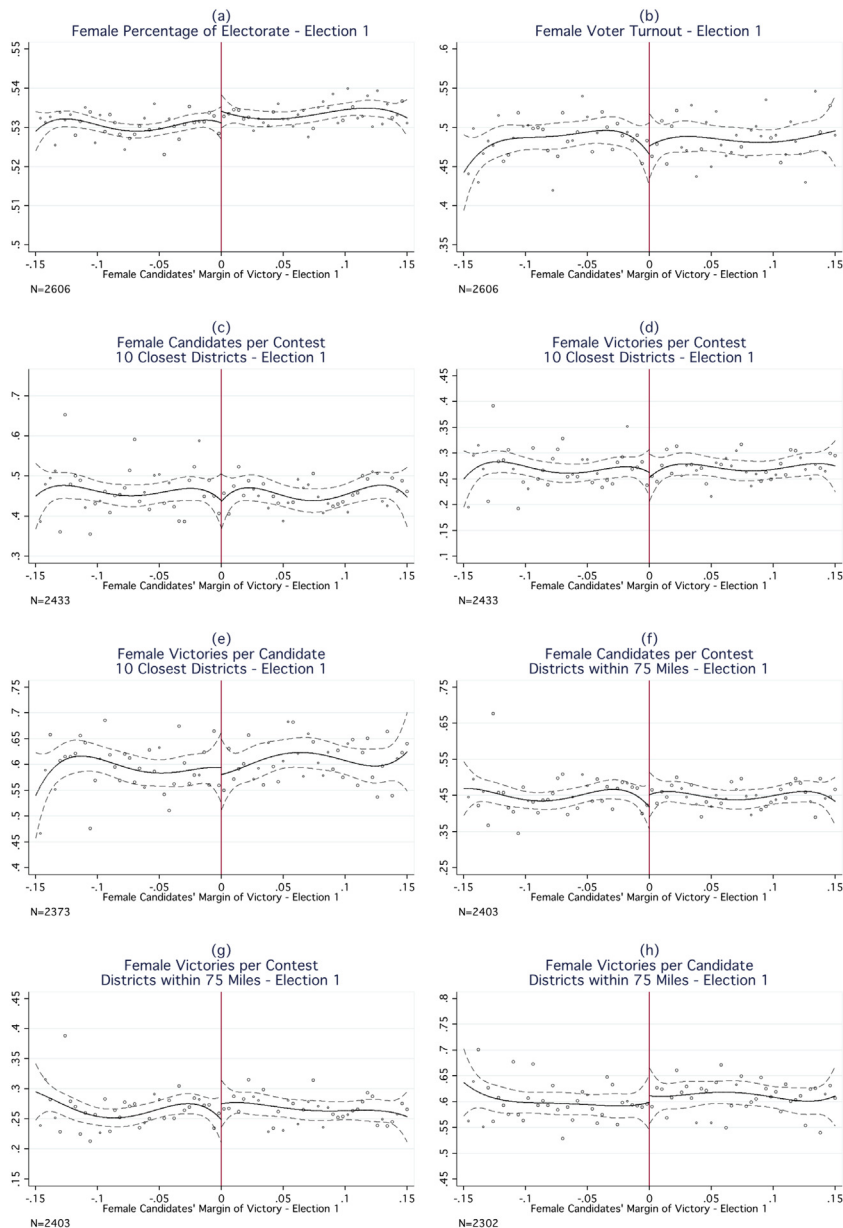
elections “near-randomly” at the discontinuity. Though the assumptions of the design do not require that there are no differences between districts where women tend to lose and win overall, they do require that there are no differences at the theoretical limit; that is, that parties and candidates are not so adept at manipulating elections that near-winners tend to have systematic advantages over near-losers. If parties and groups can forecast campaigns' expected vote shares with a high enough degree of precision, more powerful actors may be able to focus their resources intensely on races where they might otherwise just lose (or reverse an election result in legal wrangling afterward), leading to a systematic bias where more powerful parties and groups tend to be overrepresented right on the winning side of the discontinuity.

Caughey and Sekhon (2011) provide evidence that such a bias exists in US House elections, with parties that just win these contests much more likely to have had access to significant financial and other resources than near-losers. In this paper's case, were such a bias to exist in US state legislative elections it would likely tilt the results toward uncovering a false positive effect and thus is unlikely to be of concern. However, as these authors note, a strength of the RD design is that this identifying assumption can be tested, and I do so to further ensure the robustness of the

results. To do so, I conduct a placebo test estimating the ‘effect’ of a woman winning one contest on women’s voter turnout and the likelihood that women had been nominated for or won other contests nearby *at the same time*. We know that there can be no causal effect of a woman’s victory on other women’s nominations and victories *at the*

very same time; therefore, if this placebo procedure were to find significant effects it would be of great concern.

Fig. 5 shows the results of these placebo tests, using the same specifications as in Tables 1 and 2 yet replacing these dependent variables with the same measures calculated during the same year. Reassuringly, the tests correctly



Notes: The circles show the data's average values in 0.5-percentage point wide bins, with the size of the circles corresponding to the number of observations in each bin. The dark lines show the model estimated on each side of the discontinuity, which is shown in red. The distance between these lines at the discontinuity captures the pre-existing differences between districts on each side of the discontinuity. As expected, there are no significant pre-existing differences between districts on each side of the discontinuity.

Fig. 5. Placebo tests for sorting. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

estimate that there is no causal effect of female candidates' victories on other events that have occurred simultaneously: the estimates never approach statistical significance and are essentially identical in size to the coefficients estimated for differences in these variables Time 2. The design's assumptions appear to hold well, granting further confidence to the null results.

5.2. External validity

The regression discontinuity approach outlined here has substantial advantages over other potential approaches, but the broader implications of the result must be interpreted with care. This paper's RDD estimates a *local* average treatment effects in two senses – the estimates are specific to the kind of races that occur near the discontinuity, and, in this paper's case, to the kind of areas where women tend to oppose men in general elections in the first place. Both of these points deserve careful consideration.

First, the design estimates the causal effect specific to the kinds of races that occur near the threshold – in this case, very competitive elections. As described in Section 2, however, it is after these very close elections that scholars usually expect the hypothesized effects to be greatest. As noted, it may well be, however, that positive effects still do exist in places where women are seldom chosen to participate in competitive elections, such as in India.

In addition, the necessity of restricting the analysis to elections where the candidates were of the opposite gender somewhat limits the generalizability of the results to the sorts of areas where women already tend to be nominated for offices that they can plausibly win (i.e. where they are not merely 'sacrificial lambs'). On the one hand, focusing on these races underscores the theoretical argument that, in politics (like the US) where many women already hold office there are limited participatory externalities to the election of additional female officeholders – the existing biases against women's participation in these areas go beyond what their elections can erode alone. Thus the results do not suggest that the election of women can *never* empower women – such an effect clearly exists in India – but merely that it is unlikely to do so in politics like the United States where female candidates and officeholding is not uncommon.

With this caveat stated, one way to evaluate the wider generalizability of the results in light of these restrictions is by estimating the discontinuity only in the subset of the data from areas where few other women hold office nearby. Reassuringly, doing so yields the same results – even in the subsamples that feature the least amount of existing female descriptive representation, the effects remain statistically zero.

Last, although these results about state legislatures have importance in and of themselves, there is some question about whether they would generalize to contexts such as Congressional races. However, Burns et al. (2001, p. 102) find that women are just as likely to know who their state legislators are as they are their Member of Congress, suggesting that the statistical precision available at the state level also comes with a relatively strong degree of external

validity. Though more work will be needed to understand the degree to which this effect generalizes to other kinds of elections, existing data do not support the concern that potentially empowered women are simply ignorant that they are represented by women in their state legislatures.

In summary, these state legislative elections bear a strong resemblance to the key cases of interest the literature has identified, both in women's awareness of them and in their competitiveness. Moreover, the results also hold even in areas of the United States where few women currently serve. Though research using data from one context can never definitely establish its generalizability elsewhere, most aspects of this context bear strong resemblance to others. Future scholars should, however, seek to replicate these results in other contexts. The design described in this paper offers a way to do so with greater precision and less opportunities for bias.¹⁵

6. Conclusion

Reflecting hopes about what the growing presence of women in government might herald for women's political participation and presence in government – and thus for women's substantive representation – Burns et al. (2001, p. 9) write that “when women are in an environment where women seek and hold visible public offices, they are more politically interested and informed, and [gender] disparities in psychological orientations to politics shrink.” Numerous scholars, policymakers, and activists have mounted arguments like these about the causal effect of women's descriptive representation, recently buoyed by a bevy of new findings from India demonstrating that the election of women to local legislatures can have a number of empowering effects for other women's participation in politics at both the mass and elite levels. Nevertheless, empirical results in the United States have been mixed (Haynes, 1997; Lawless, 2004; Dolan, 2006b), while scarce data and the strictly observational nature of existing approaches have posed significant methodological barriers.

In this paper I shed new light on whether the presence of female politicians and candidates has such effects in the United States with a regression discontinuity analysis and data describing thousands of state legislative elections where a man opposed a woman.

First, the results uncovered no meaningful causal effect of electing additional women in the US on other women's voter turnout. These estimates are statistically zero and precise enough to rule out effects even smaller than those yielded by the receipt of a simple GOTV postcard (Gerber and Green, 2000). Although scholars and practitioners alike have expressed optimism that the election of more women might increase women's participation in politics at the mass level, these results imply that these gains appear

¹⁵ One intriguing possibility consistent with this result is the hypothesis offered by Atkeson and Carrillo (2007) that *collective* descriptive representation, but not *dyadic* descriptive representation, causes women's participation to increase. The approach taken in this paper can only speak to the effects of dyadic descriptive representation.

to have been fully realized in the United States and that other means will thus be necessary to further promote women's participation.

In addition, the results showed that a woman's victory in one district has no meaningful causal effect on the likelihood that other women run for or win office in other nearby districts in subsequent elections. These null estimates were also statistically precise, and implied that the effect of electing women on other women's candidacies in their area is, at most, more than an order of magnitude smaller than other scholars' estimates for the effect of a woman being asked by a party leader to run for office (Fox and Lawless, 2010). Despite the existence of associations between these outcomes and women's candidacies and victories, the election of women does not appear to play an important causal role in them.

These results were robust to a number of alternative specifications, explanations, and robustness checks. A placebo test validated the identifying assumptions of the

suggests that the same does not appear to be true in the United States. Rather, the results suggest that the biases that do continue to hold women from office in the US are disappointingly durable and insensitive to counterexample. Electing female role models appears most important for improving other women's participation in government in contexts where few women have held office before (Gilardi, 2013).

These results underscore that attention to the underlying barriers to women's equal participation in politics is essential. As the election of more women to office in the US appears unlikely to itself be able to meaningfully diminish the remaining barriers to officeholding and political participation that women face, efforts to elect individual women must also be complemented by a continuing attention to these underlying barriers (Duflo, 2012; Kanthak and Woon, 2013). Careful attention to both what can and cannot address these challenges is necessary to achieve what equality demands.

Table A1
Results for alternate bandwidths and geographic areas.

Specification	0.05	0.10	0.15	0.20	0.25	Imbens/Lemieux
<i>Dependent variable</i>						
Women's voter turnout	0.030 (0.052)	0.015 (0.036)	0.008 (0.029)	0.004 (0.025)	0.008 (0.022)	−0.011 (0.010)
Women's share of the electorate	0.004 (0.005)	0.004 (0.003)	0.004 (0.003)	0.003 (0.003)	0.002 (0.002)	0.001 (0.001)
Woman on ballot next year	0.435*** (0.121)	0.390*** (0.089)	0.431*** (0.073)	0.411*** (0.049)	0.414*** (0.059)	0.408*** (0.032)
Candidates/contests, 5 closest contests	−0.061 (0.096)	0.059 (0.072)	0.030 (0.059)	0.031 (0.051)	0.040 (0.046)	0.012 (0.022)
Victories/contests, 5 closest contests	−0.061 (0.072)	0.010 (0.053)	−0.010 (0.043)	0.005 (0.038)	0.017 (0.034)	−0.000 (0.015)
Candidates/contests, 10 closest contests	0.030 (0.078)	0.004 (0.055)	0.007 (0.045)	−0.007 (0.039)	0.002 (0.035)	−0.007 (0.018)
Victories/contests, 10 closest contests	0.005 (0.054)	0.009 (0.039)	0.004 (0.032)	−0.001 (0.028)	0.002 (0.025)	−0.003 (0.012)
Candidates/contests, 15 closest contests	0.027 (0.063)	0.018 (0.046)	0.029 (0.038)	0.019 (0.033)	0.015 (0.030)	−0.010 (0.016)
Victories/contests, 15 closest contests	0.016 (0.068)	0.014 (0.032)	0.015 (0.026)	0.007 (0.022)	0.001 (0.021)	−0.009 (0.010)
Candidates/contests, within 50 miles	0.019 (0.068)	0.002 (0.054)	0.018 (0.045)	0.026 (0.040)	0.028 (0.036)	−0.005 (0.019)
Victories/contests, within 50 miles	0.036 (0.045)	0.002 (0.036)	−0.014 (0.032)	−0.005 (0.027)	−0.002 (0.025)	−0.017 (0.012)
Candidates/contests, within 75 miles	0.036 (0.061)	0.010 (0.047)	0.028 (0.040)	0.023 (0.036)	0.012 (0.033)	−0.002 (0.014)
Victories/contests, within 75 miles	0.013 (0.040)	0.004 (0.032)	0.021 (0.029)	0.021 (0.025)	0.013 (0.023)	−0.001 (0.012)
Candidates/contests, within 100 miles	0.035 (0.060)	0.008 (0.043)	0.026 (0.036)	0.027 (0.032)	0.020 (0.029)	0.003 (0.013)
Victories/contests, within 100 miles	0.028 (0.038)	0.008 (0.029)	0.024 (0.025)	0.028 (0.022)	0.018 (0.020)	0.003 (0.010)

Notes: *** = $p < .01$, * = $p < .10$. The Table shows that the null estimates hold using a variety of other geographic distance criteria and bandwidth criteria. The bandwidth refers to the window of observations used for estimating the underlying model; for example, a bandwidth of 0.15 means that only observations where a female candidate captured between 35% and 65% of the two-candidate vote are included.

design, while the competitive state legislative elections described bear strong similarity to competitive elections featuring female candidates where existing literature has argued the strongest effects should be found. These results also hold even in areas of the United States where few women currently serve, even though women are just as likely to know who represents them in Congress as who represents them in their state houses.

These findings also shed new light on the context-dependent nature of when female officeholders can “break glass ceilings” and pave the way for other women to run for and win office. Exciting results from India show that the election of female politicians significantly decreases voters', elites', and women's own biases against female candidates and leads to more female officeholding and an expanded cultural role for women there (Beaman et al., 2009; Bhalotra et al., 2013; Bhavnani, 2009; Beaman et al., 2012). This paper

References

- Anzia, S.F., Berry, C.R., 2011. The Jackie (and Jill) Robinson effect: why do congresswomen outperform congressmen? *Am. J. Polit. Sci.* 55 (3), 478–493.
- Arceneaux, K., 2001. The ‘gender gap’ in state legislative representation: new data on an old question. *Polit. Res. Q.* 54 (1), 143–160.
- Atkeson, L.R., 2003. Not all cues are created equal: the conditional impact of female candidates on political engagement. *J. Polit.* 65 (4), 1040–1061.
- Atkeson, L.R., Carrillo, N., 2007. More is better: the influence of collective female descriptive representation on external efficacy. *Polit. Gen.* 3 (1), 79–101.
- Banducci, S.A., Donovan, T., Karp, J.A., 2004. Minority representation, empowerment, and participation. *J. Polit.* 66 (2), 534–556.
- Beaman, L., Chattopadhyay, R., Duflo, E., Pande, R., Topalova, P., 2009. Powerful women: does exposure reduce bias? *Q. J. Econ.* 124 (4), 1497–1540.
- Beaman, L., Duflo, E., Pande, R., Topalova, P., 2012. Female leadership raises aspirations and educational attainment for girls: a policy experiment in India. *Science* 335 (6068), 582–586, 1212382.
- Bhalotra, S., Clots-Figueras, I., Iyer, L., 2013. Path-Breakers: How Does Women's Political Participation Respond to Electoral Success? Working Paper Harvard Business School.

- Bhavnani, R.R., 2009. Do electoral quotas work after they are withdrawn? Evidence from a natural experiment in India. *Am. Polit. Sci. Rev.* 103 (1), 23–35.
- Bobo, L., Gilliam, F.D., 1990. Race, sociopolitical participation, and black empowerment. *Am. Polit. Sci. Rev.* 84 (2), 377–393.
- Broockman, D.E., 2009. Do congressional candidates have reverse coat-tails? Evidence from a regression discontinuity design. *Polit. Anal.* 17 (4), 418–434.
- Broockman, D.E., 2013. Distorted communication, unequal representation: constituents communicate less to representatives not of their race (in press). *Am. J. Polit. Sci.*
- Brooks, J., Henderson, J., 2013. Rain and Representation: the Effect of Margin of Victory on Incumbent Legislative Behavior. Working Paper. University of California, Berkeley.
- Burns, N., Schlozman, K.L., Verba, S., 2001. The Private Roots of Public Action: Gender, Equality, and Political Participation. Harvard.
- Caughey, D.M., Sekhon, J.S., 2011. Elections and the regression discontinuity design: lessons from close US house races, 1942–2008. *Polit. Anal.* 19, 385–408.
- Center for American Women and Politics (CAWP), 2010. Facts and Findings. Available at: <http://www.cawp.rutgers.edu>.
- Chattopadhyay, R., Duflo, E., 2004. Women as policy makers: evidence from a randomized policy experiment in India. *Econometrica* 72 (5), 1409–1443.
- Dasgupta, N., Asgari, S., 2004. Seeing is believing: exposure to counterstereotypic women leaders and its effect on the malleability of automatic gender stereotyping. *J. Exp. Soc. Psychol.* 40, 642–658.
- Deininger, K., Jin, S., Nagarajan, H.K., 2013. Can Political Reservations Affect Political Equilibria in the Long-term? Evidence from Local Elections in Rural India. Working Paper. World Bank.
- Dolan, K., 2006a. Women candidates in American politics: what we know, what we want to know. In: Paper Presented at the 2006 Meeting of the Midwest Political Science Association.
- Dolan, K., 2006b. Symbolic mobilization? The impact of candidate sex in American elections. *Am. Polit. Res.* 34 (6), 687–704.
- Duflo, E., 2012. Women empowerment and economic development. *J. Econ. Lit.* 50 (4), 1051–1079.
- Ferreira, F., Gyourko, J., 2013. Does Gender Matter for Political Leadership? the Case of US Mayors. Working Paper. University of Pennsylvania.
- Fox, R.L., Lawless, J.L., 2011. Envisioning a candidacy: gendered perceptions and political candidates: a central barrier to Women's equality in electoral politics. *Am. J. Polit. Sci.* 55 (1), 59–73.
- Fox, R.L., Lawless, J.L., 2010. If only They'd ask: gender, recruitment, and political ambition. *J. Polit.* 72 (2), 310–336.
- Gay, C., 2002. Spirals of trust? The effect of descriptive representation on the relationship between citizens and their government. *Am. J. Polit. Sci.* 46 (4), 717–732.
- Gerber, A.S., Green, D.P., 2000. The effects of canvassing, telephone calls, and direct mail on voter turnout: a field experiment. *Am. Polit. Sci. Rev.* 94, 653–663.
- Gerber, A.S., Green, D.P., Larimer, C.W., 2008. Social pressure and voter turnout: evidence from a large scale field experiment. *Am. Polit. Sci. Rev.* 102, 33–48.
- Gilardi, F., 2013. The Temporary Importance of Role Models for Women's Political Representation. Working Paper. University of Zurich.
- Gneezy, U., Leonard, K.L., List, J.A., 2009. Gender differences in competition: evidence from a matrilineal and a patriarchal society. *Econometrica* 77 (5), 1637–1664.
- Green, D.P., Yeon Kim, S., Yoon, D., 2001. Dirty pool. *Int. Organ.* 55, 441–468.
- Green, D.P., Leong, T.Y., Kern, H.L., Gerber, A.S., Larimer, C.W., 2009. Testing the accuracy of regression discontinuity analysis using experimental benchmarks. *Polit. Anal.* 17 (4), 400–417.
- Griffin, J.D., Newman, B., 2005. Are voters better represented? *J. Polit.* 67 (4), 1206–1227.
- Gertzog, I.N., 1995. Congressional Women. Praeger, Westport, CT.
- Gitelson, I., Gitelson, A., 1981. Adolescent attitudes toward male and female political candidates. *Women Polit.* 1, 53–64.
- Harris, F.C., Sinclair-Chapman, V., McKenzie, B.D., 2005. Macrodynamics of black political participation in the post-civil rights Era. *J. Polit.* 67, 1143–1163.
- Harris, F.C., Sinclair-Chapman, V., McKenzie, B., 2006. Countervailing Forces in African-American Civic Activism, 1973–1994. Cambridge University Press.
- Haynes, E., 1997. Women and Legislative Communication. Typescript. Harvard University.
- Healy, A., 2013. Does Prosperity under Female Leadership Help Other Women Win Elections? Working Paper Loyola Marymount University.
- Henderson, J.A., Sekhon, J.S., Titiunik, R., 2013. Cause of Effect? Turnout in Hispanic Majority-Minority Districts. Working Paper. University of California, Berkeley.
- Hopkins, D., McCabe, K.T., 2013. After It's Too Late: Estimating the Policy Impacts of Black Mayors in US Cities. Working Paper. Georgetown University.
- Imbens, G.W., Lemieux, T.W., 2008. Regression discontinuity designs: a guide to practice. *J. Econ.*, 615–635.
- Kam, C., Utych, S., 2011. Close elections and cognitive engagement. *J. Polit.* 73 (4), 1251–1266.
- Kanthak, K., Woon, J., 2013. Women Don't Run? Election Aversion and Candidate Entry. Working Paper. University of Pittsburgh.
- Karp, J.A., Banducci, S.A., 2008. When politics is not just a man's game: women's representation and political engagement. *Elect. Stud.* 27 (1), 105–115.
- Koch, J.W., 2000. Do citizens apply gender stereotypes to infer candidates' ideological orientations. *J. Polit.* 62, 414–429.
- Lawless, J.L., 2004. Politics of presence? Congresswomen and symbolic representation. *Polit. Res. Q.* 57 (1), 81–99.
- Lawless, J.L., Fox, R.L., 2005. It Takes a Candidate. Cambridge.
- Lee, D.S., 2008. Randomized experiments from non-random selection in US House elections. *J. Econ.* 142, 675–697.
- MacManus, S., 1981. A city's first female officeholder: coattails for future female officeholders. *West. Polit. Q.* 34, 88–99.
- Maestas, C.D., Fulton, S., Sandy Maisel, L., Stone, W.J., 2006. When to risk it? Institutions, ambitions, and the decision to run for the US House. *Am. Polit. Sci. Rev.* 100 (2), 195–208.
- Mansbridge, J., 1999. Should blacks represent blacks and women represent women? A contingent "Yes". *J. Polit.* 61 (3), 628–657.
- Martin, G.J., Peskowitz, Z., 2013. Career Concerns and the Behavior of Political Consultants in Congressional Elections. Working Paper. Stanford University.
- Niven, D., 1998. The Missing Majority: the Recruitment of Women as State Legislative Candidates. Praeger.
- Pantoja, A.D., Segura, G.M., 2003. Does ethnicity matter? Descriptive representation in legislatures and political alienation among Latinos. *Soc. Sci. Q.* 84 (2), 441–457.
- Reingold, B., Harrell, J., 2010. The impact of descriptive representation on women's political engagement: does party matter? *Polit. Res. Q.* 63 (2), 280–294.
- Sanbonmatsu, K., 2006. Do parties know that 'women win'? Party leader beliefs about women's electoral chances. *Polit. Gend.* 2, 431–450.
- Schramm, S.S., 1981. Women and representation: self government and role change. *West. Polit. Q.* 34, 46–59.
- Trounstein, J., 2011. Evidence of a local incumbency advantage. *Legis. Stud. Q.* 36 (2), 255–280.
- Verba, S., Schlozman, K., Brady, H.E., 1995. Voice and Equality: Civic Voluntarism in American Politics. Harvard University Press.
- Washington, E.L., 2006. How black candidates affect voter turnout. *Q. J. Econ.* 121 (3), 973–998.
- Williams, M.S., 1998. Voice, Trust, and Memory. Princeton University Press.
- Wolbrecht, C., Campbell, D.E., 2006. See Jane run: women politicians as role models for adolescents. *J. Polit.* 68 (2), 233–247.
- Wolbrecht, C., Campbell, D.E., 2007. Leading by example: female members of parliament as political role models. *Am. J. Polit. Sci.* 51 (4), 921–939.