Journal of Economic Behavior and Organization 176 (2020) 42–62

Contents lists available at ScienceDirect

Journal of Economic Behavior and Organization

journal homepage: www.elsevier.com/locate/jebo

Are educated leaders good for education? Evidence from India

Rahul Lahoti[a], Soham Sahoo[b,*]

[a] Azim Premji University, Bangalore, India
[b] Indian Institute of Management Bangalore, India

ARTICLE INFO

Article history:
Received 18 August 2019
Revised 4 March 2020
Accepted 20 March 2020

JEL classification:
D72
H11
H75
I25

Keywords:
Education
Learning Outcomes
Political Economy
Leaders
Close Elections
India

ABSTRACT

Formal education is often viewed as a proxy for the quality of leaders. Recently, candidates with low education levels have been disqualified from contesting local elections in some states in India. But there is no conclusive evidence linking education to the effectiveness of leaders. Against this backdrop, we investigate whether having educated political leaders in the state legislatures in India improves education outcomes. Using comprehensive data on various outcomes such as learning levels, enrollment, school funding and infrastructure, we find that the effectiveness of educated leaders depends on the initial level of development of the state. Educated leaders yield better education outcomes for their constituents only in those states where the initial level of development is high. There is no impact of educated leaders in less-developed states or in the overall sample. Our identification strategy is based on an instrumental variable that exploits the quasi-experimental election outcomes of close elections between educated and less-educated politicians. The results are consistent throughout various robustness analyses. These findings have implications for recent policy changes mandating minimum education requirements on candidates in two states and similar proposed changes in other states.

"Those who insist on literacy as a test and insist upon making it a condition precedent to enfranchisement in my opinion, commit two mistakes. Their first mistake consists in their belief that an illiterate person is necessarily an unintelligent person Their second mistake lies in supposing that literacy necessarily imports a higher level of intelligence or knowledge than what the illiterate possesses." – Dr. B. R. Ambedkar, Chairman of the drafting committee of the Indian Constitution, in 1928 to Simon Commission.

"It is only education which gives a human being the power to discriminate between right and wrong, good and bad." – The Supreme Court of India in 2015 upholding the law mandating minimum education level for candidates in local elections.

1. Introduction

Two states in India – Haryana and Rajasthan – recently mandated minimum education requirements for contesting local body elections, and another state, Assam, has proposed that candidates to state legislature should be at least college graduate.[1] These requirements alter the identity of citizens who enter politics, change political selection, political competition

* Corresponding author.
E-mail addresses: rahul.lahoti@gmail.com (R. Lahoti), soham.sahoo@iimb.ac.in (S. Sahoo).

[1] The policy was implemented in the local body election of Rajasthan in 2015 and Haryana in 2016. However, the ruling party of the state government in Rajasthan was changed in the 2018 state-election, and the new government has decided not to implement the policy in future local body elections in Rajasthan. Regarding the proposal in Assam, see: http://economictimes.indiatimes.com/news/politics-and-nation/only-graduates-those-with-up-to-2-kids-may-get-to-fight-assam-polls/articleshow/58212862.cms

https://doi.org/10.1016/j.jebo.2020.03.026
0167-2681/

and the role of dominant groups in the society.[2] Also by changing who is elected as leader it would also have an impact on the efficiency of political office and the priorities of leaders. The Supreme Court of India upheld the law observing that education was a precondition for efficiency and honesty and that it would "enable the candidates to effectively discharge duties of the panchayat".

The education requirement and the Supreme Court judgment have been controversial. Many have argued in articles and debates that the law and decision are discriminatory, retrograde, disenfranchising, elitist, unconstitutional and undemocratic (Baxi, 2015; Abdul, 2015; Jaffrelot, 2016; NDTV, 2016). The argument for imposing education requirements on candidates contesting elections rests on the premise that formal education makes leaders competent, honest and accountable. Formal education is seen as a desirable characteristic which is argued to increase the quality of politicians. Educated politicians are seen as more effective at designing and implementing policy, understanding concerns of citizens, dealing with complex policy issues and are considered more accountable. We do not directly test the likely impact of this particular policy in this paper, but analyze the underlying rationale behind the policy that links formal education of the leader with competency.

The existing literature has often considered education to be a proxy for the quality of a leader (Atkinson et al., 2016; Besley et al., 2005). However, there are only a few studies that specifically analyze the impact of formal education of the leader on outcomes, and they give conflicting results. Using data on education of national leaders in a cross-country database and random transitions, a few studies have shown that educated leaders tend to increase economic growth, foreign investment and education attainment of citizens (Besley et al., 2011; Diaz-Serrano and Pérez-Reynosa, 2013; Congleton and Zhang, 2013). These studies only analyze national leaders across countries where disparities across nations are difficult to account for and also they do not analyze the impact of state or local leaders' education. But Carnes and Lupu (2016) investigating the impact of education of political leaders at national, state and local levels in different contexts find educated politicians to perform neither better or nor worse than less-educated leaders across a range of outcomes. Impact of education of the leader on development outcomes has not been studied systematically in India, even though various other characteristics of the leader such as gender, religion, caste and criminality have been extensively studied.

The aim of the paper is to test the hypothesis that educated politicians are more competent and deliver better outcomes for their constituents. We investigate whether state legislative representatives, referred to as Members of the Legislative Assembly or MLAs, with higher levels of formal education are better for school education outcomes in the districts from which they are elected. In a patronage democracy like India, the effectiveness of public service delivery depends on the intermediation via local politicians who have significant capacity to influence distribution of resources towards their own constituencies (Bussell, 2019). If leaders with more formal education have greater competency and they utilize it for the benefit of their constituents, then one might expect better education outcomes due to having more educated leaders.

We combine data on various schooling outcomes from multiple sources with information on politicians and election outcomes. We use data on learning and enrollment outcomes of children in rural areas from the Annual Status of Education Report (ASER) from 2006 to 2014. Additionally, we use annual data on school infrastructure and funding from District Information System of Education (DISE) which is a census of all recognized schools from 2006 to 2014. Along with these outcomes, we use data on leaders' education level from Association for Democratic Reforms (ADR) from 2004 to 2014. The merged data-set allows us to examine at the district level the effect of political leaders' education on education outcomes over almost a decade. We specifically compare the performance of leaders who are college-graduate (graduate) with those who are not college-graduate (non-graduate).[3] We use the graduate cut-off for leader's education because approximately 59 percent of leaders are graduate; hence it allows us to exploit maximum variation in leader's education level.[4] Besides, it also helps us to connect to the relevant literature analyzing the effect of graduate leaders (Carnes and Lupu, 2016).

The main identification challenge is that the education level of leader could be correlated with voter preferences and hence endogenous. To identify the causal impact of educated politicians, the share of constituencies in the district won by graduate leaders is instrumented with the share of constituencies in the district having graduate leaders who won in close elections against non-graduate leaders. The validity of the identification strategy relies on the assumption of quasi-randomness of the outcome of a close election (Eggers et al., 2015) – that the preferences of voters who elect a graduate politician in a close election can be assumed to be the same as the preferences of voters who elect a non-graduate leader in a close election. We test these assumptions extensively and show that results of close elections cannot be predicted on any observable characteristics and are quasi-random. We also obviate the concern that the effect of graduate leaders may be due to differences in other characteristics of the leaders, by showing that other characteristics of graduate and non-graduate winners in close elections are similar. This strategy has been used extensively in the literature to study the impact of other characteristics of politicians on various outcomes (Bhalotra and Clots-Figueras, 2014; Clots-Figueras, 2012; Prakash et al., 2019).

[2] In Haryana the education requirements in terms of years of schooling were – 10 years for general candidates, 8 years for women and Scheduled Caste men, and 5 years for Scheduled Caste women. Due to these restrictions, more than 50 percent of women, 68 percent of Scheduled Caste women and 41 percent of Scheduled Caste men were disqualified from contesting elections in Haryana (Bhaskar, 2016). This also led to higher proportion of elections being contested by one or no candidates and lower electoral competition.

[3] In the context of India, a college-graduate individual has at least a Bachelor's degree or a diploma, and is referred to as a 'graduate', a term that we use throughout this paper.

[4] More details on the distribution of education level of leaders are provided in the data section. In the robustness section, we also estimate the effect of alternative levels of education of the leader.

We chose to analyze outcomes in education because of its importance to development, the availability of disaggregated data, and the ability of MLAs to impact education outcomes in their respective constituencies. Comprehensive and reliable data disaggregated at district and lower levels are available for education. MLAs have the power to impact education outcomes through lobbying for funds for schools in their districts, implementing education schemes, monitoring education policy implementation and influencing bureaucracy.[5] This can be through their formal role as ex-officio heads of district education committees and through informal influence on the bureaucracy (Bussell, 2019). It can also be through the role of politicians in hiring and management of teachers. Local politicians play an important role in teacher transfers in most states in India and thus they impact students' learning scores (Fagernäs and Pelkonen, 2018; Ramachandran et al., 2015). Clots-Figueras (2012) has shown that female MLAs are able to improve education outcomes more than male leaders using similar identification techniques. Bhavnani and Jensenius (2015) also study the impact of state level leaders from the ruling party on literacy over the long term.

Indian states display a huge degree of diversity in various aspects. The level of political and legal institutions, norms, voter expectations, awareness and literacy vary across states. Hence we investigate whether the effect of educated leaders differs by states' development level. We find that the impact of educated leaders depends on the initial level of development, proxied by the baseline Human Development Index, of the state. In the most developed states, having more educated leaders results in significantly higher learning levels (reading, maths and English scores) among children in the district. An additional educated leader in the district increases the number of children aged 6–10 years who can read a paragraph in their native language, do division and read an English sentence by 4.4–7.5%Ėducated leaders in the most developed states also lead to a statistically significant but small positive impact (0.1 percentage points) on enrollment rate.

Educated leaders can directly impact investment in schools and monitor the local schooling system better which may explain their impact on learning levels. We explore this channel and find that indeed there is a positive effect of educated leaders on the number of schools, infrastructure in schools and funding for schools in the districts of the most developed states. Other potential channels that we cannot test with the data include impact of leaders through hiring, management and transfer of teachers that have been shown to impact learning outcomes (Fagernäs and Pelkonen, 2018; Ramachandran et al., 2015). But educated leaders do not seem to have any effect in the less developed states. Also in the overall sample of all states, the effects are imprecise and negligible in magnitude.

The robustness of these results holds up to a number of specification tests, alternative measures of key variables and varying definitions of close election. Since education outcomes might take time to change, we also examine the impact of leaders from different lag periods. The positive impact of educated leaders in most developed states, while no significant effect in less developed states, holds for all of these cases.

Our results suggest that pre-existing institutional and economic differences across states influence the effectiveness of political leaders. We postulate that constituents in the most developed states may value education more than in less developed states, and educated leaders – being better leaders – deliver on the needs of their constituents. Having higher levels of human development, citizens from the most developed states may have higher intrinsic preference for education, making it a politically salient issue. Besides, the constituents and the leaders may manifest higher preference for education because the economy in the most developed states is more service sector oriented, therefore education may play a greater role in people's livelihood in these states. For similar reasons, the actual or perceived returns to education could be higher in the most developed states. In a similar setting, Prakash et al., 2019 also find that the impact of politicians varies by the level of development of states. They find that the negative impact of electing criminally accused politicians is concentrated in less developed and the most corrupt states. The literature on the political economy of public education spending also suggests that leaders may invest on education differently based on the income level of the electorate. Bursztyn (2016) finds that investment in public education increases the probability of re-election of leaders only in high-income municipalities of Brazil. The author argues that while the policy of higher public spending on education may be preferred by the rich voters, the poor voters may prefer the government to allocate resources towards redistributive programs that increase their incomes in the short run.

Another reason for educated leaders to perform better in the most developed states could be that a minimum level of development is necessary for results of their efforts to manifest. In the most developed states, per student expenses, basic schooling infrastructure, teacher management regulations and baseline learning levels are better than other states, which might have helped educated leaders in delivering improved education outcomes. Additionally, the most developed states tend to have better-quality educational institutions. The marginal value of a graduate degree is likely to be positively correlated with the quality of education, thus making the effectiveness of graduate leaders, as compared to non-graduate leaders, more salient in the developed states.

Our findings indicate that educated leaders are not necessarily always better. The impact of educated leaders varies by context and a more nuanced understanding is required before taking the education level of politicians as a proxy for their quality. From a policy perspective, our findings suggest that restricting the choice of voters to only those leaders who are formally educated may not always lead to better development outcomes. Restricting choice can have broader implications on right to vote and contesting elections. The evidence of impact of educated leaders is not overwhelming to justify the

[5] An average state in India spends about 16% of its total budgetary expenditure on education, with substantial variation across states from 10% to 23%, as revealed by recent statistics released by the Reserve Bank of India.

restrictions on contesting elections imposed in two states in India. Also beyond India evidence of the impact of educated leaders is not conclusive (Carnes and Lupu, 2016; Gallego and Curto-Grau, 2019). Erikson and Josefsson (2019) show that in Swedish Parliament though higher education helps Members of Parliament in processing information, yet MPs without higher education obtain the same skills through other means.

Our results advance the literature on the quality of leaders by being the first study to systematically analyze the link between politicians education and competency in India. Moreover, it contributes to the broader literature on the political economy of public provision of education in a democracy (Bursztyn, 2016; Hill and Jones, 2017). The rest of the paper is organized as follows. Section 2 provides a background by linking the current context with the existing literature and providing a conceptual framework for analysis. Section 3 describes how different data-sets have been collated for the purpose of our analysis. The empirical model including the method used for identification is illustrated in Section 4. In Section 5, we report the results of our analysis including various robustness tests and heterogeneity exercises. Section 6 discusses the potential reasons why educated leaders have positive impact on education outcomes only in states with higher level of initial development. Section 7 concludes.

2. Background

2.1. Identity of political leader

Educated politicians may have a differential impact on education outcomes if the identity of the political leader matters for policy making. In a world where candidates can fully commit to the implementation of a specific set of policies when elected and care about getting reelected, politicians' decisions would only reflect the preferences of the electorate (Downs, 1957). In this setting, the characteristics of the individual person who wins elections will not matter. Thus, education level, gender, religion, caste, involvement in criminal activities or other aspects of the identity of the politician would not affect development outcomes. But citizen-candidate models (Besley and Coate, 1997; Levitt, 1996; Osborne and Slivinski, 1996) suggest that complete commitment to policy is not possible and the identity of the politician has an influence on the actual policies that are implemented.[6] In this model, voters take into account both policy preferences and other relevant characteristics as competency when casting their votes.

Empirical evidence also shows that identity of the politician matters for policies including government expenditure on education (Hill and Jones, 2017). Jones and Olken (2005) and Besley et al. (2011) use random leadership transitions at the national level to show that individual characteristics of the leader matter for economic growth of the country. Extensive literature on India has shown that gender, religion, caste and other characteristics of the political leader play an important role in determining policy outcomes in the fields of education, health, economic growth and public infrastructure (Asher and Novosad, 2017; Bhalotra et al., 2014, 2017; Bhalotra and Clots-Figueras, 2014; Chattopadhyay and Duflo, 2004; Clots-Figueras, 2011, 2012; Ghani et al., 2013; Halim et al., 2016; Iyer et al., 2012; O'Connell, 2018; Prakash et al., 2019; Burchi).

Besley and Reynal-Querol (2011) argue that good leaders might differ based on competency and prefer broad-based policies and advocate public goods and infrastructure that generate wide benefits. They argue that educated leaders are better citizens, have higher talent and higher concern for social welfare. Elementary education is a basic public good whose widespread provision can lead to improvement in the welfare of citizens. If the arguments made by Besley and Reynal-Querol (2011) or Atkinson et al. (2016) are valid, then educated politicians would prefer to invest their resources in education due to its impact on long term welfare of citizens. Even if educated leaders do not prefer to invest in education, their higher competency by itself should, on average, lead to better education outcomes.

While acknowledging these arguments, Carnes and Lupu (2016) argue that the link between formal education, competence and leadership is not as straightforward. It is possible to gain human capital and skills required for being an effective leader without formal education. Formal education does not just reflect human capital but also the privileges of being able to obtain education. Societal restrictions and economic hardship might hinder a talented person from obtaining formal education while a less talented person might be able to obtain formal education. There still exists widespread discrimination, though declining, in obtaining even elementary education by women and individuals from lower castes in India.

Carnes and Lupu (2016) also argue that human capital obtained through formal education alone does not necessarily improve the quality of leaders. Crucial factors like character, personality, ability to listen and understand people's grievances and other leadership qualities are not the focus of formal education and could be obtained without it. Even basic reading and arithmetic skills could be obtained outside of formal schooling. In instances where specialized skills are required, leaders could rely on qualified bureaucracy to help formulate solutions. Various studies have also shown that the most qualified and those with the highest grades are not necessarily the most successful people in the society (Gottesman and Morey, 2006; Clotfelter et al., 2007). Several studies in the 1960s and 70s and recent followups by Carnes (2012, 2013) which examined the relationship between the education level of leaders and their attitudes, choices and decisions when in office found no difference in behavior between more and less-educated politicians (see Carnes and Lupu (2016) for details).

[6] Also recent research has shown that politicians might not be always aware of citizens preferences (Liaqat, 2019).

The empirical evidence on the impact of education level of the leader on policies is thin and mixed. Dreher et al. (2009) find that professional and highly educated leaders are more likely to implement market-liberalizing reforms. On the other hand, Carnes and Lupu (2016) show that across contexts and the wide range of outcome indicators politicians with a college degree perform the same or worse than non-college graduate politicians. Educated leaders at the national level in a cross-country database, legislative leaders in the US and local municipal leaders in Brazil all perform no better than non-educated leaders. This holds across a range of outcomes including economic growth, inequality, social unrest, interstate conflict, unemployment, inflation, reelection, legislative productivity, and corruption.

Except a few studies such as Martinez-Bravo (2017), most of the studies that find a positive impact of education qualification of the leader analyze data on leaders at the national level; but the impact of education of the leader might be different at lower administrative levels. Leaders at the district or constituency level work more as "fixers" or lobbyists for their constituents and have a smaller role to play in broader policy making (Chopra, 1996). Analyzing the activities of elected state constituency representatives across Indian states, Jensenius and Suryanarayan (2015) find that MLAs spend more time in their constituencies rather than debating legislation in state assemblies. The time spent by leaders debating legislation and making policies has also been declining over time – from 45 days per year in 1967 to about 34 days per year – and most legislation is passed without much debate. Politicians tend to spend most of their time in their constituencies addressing their constituents' complaints, attending social functions, being part of local government bodies, helping individuals in accessing various government schemes, lobbying the district and state administration to implement their favored schemes and use their networks to attract investment to their constituency (Chopra, 1996; Jensenius, 2015). Formal education might be helpful but is not essential to gain the skills required for this set of tasks.

2.2. MLAs and education policy

India is a federal republic with parliamentary system of government at the state and the national level. Each state has a legislative assembly (state government) which plays a substantial role in educational policies and expenditures, especially at the primary and secondary level. For elections, states are divided into single-member constituencies in which candidates are elected in first-past-the-post elections. The term of each elected state representative (MLA) is five years, unless the assembly is dissolved before the end of its term. Constituencies within each state are drawn up so to ensure the same number of people in each of them, though they vary in size across states. District is the administrative unit below the state and consists of multiple constituencies, with a district having an average of nine constituencies. Education is on the concurrent list in the Indian constitution where both the federal and state governments have jurisdiction, but state governments play a major role in education policy at the primary and secondary level.

MLAs can influence state education policy in various ways. First, MLAs can impact investment in school infrastructure by lobbying for government funds for their constituencies and also by allocating own discretionary funding. They have significant influence on the allocation of resources towards their own constituencies (Bussell, 2019). They can lobby the state government for funds to open new schools and help in accessing existing grants or programs for schools from state or federal government. Also, they can direct funds to their districts' educational office (Singh and Cruz, 1997).

Second, MLAs can play a significant role in management of bureaucracy and teachers. MLAs have control over the bureaucracy through role in promotions and job assignments or transfers (Krishnan and Somanathan, 2013; Nath, 2015; Sukhtankar and Vaishnav, 2015; Asher and Novosad, 2017). A study of teachers in nine states shows that teacher transfer in most states are influenced either by official or unofficial role of local politicians (Ramachandran et al., 2015). Fagernäs and Pelkonen (2018) show that teacher hiring and management is influenced by political factors at the state level and it impacts students' test scores.

Third, MLAs can use their influence in impacting constituency and district level policy and monitoring of schemes. MLAs are ex-offico members of constituency education committees and can impact education policy through this role. They can impact state level policy by participating in debates and influencing other legislatures at the state level.

Empirical evidence also links various characteristics of MLAs with differences in policy outcomes in various spheres (Bhalotra et al., 2014, 2017; Bhalotra and Clots-Figueras, 2014; Prakash et al., 2019). Clots-Figueras (2012) shows that districts with higher proportion of women MLAs have higher primary school completion rates than other districts. She argues that women leaders prefer to invest in children's education and are able to influence district policy outcomes. If educated leaders are more competent then they can, if desired, presumably improve education outcomes for their constituents.

In this paper, we focus our analysis on determining whether educated political leaders have an impact on children's enrollment and learning outcomes. In addition, we analyze their impact on supply side factors such as number of schools, schooling infrastructure and allocation of funds to schools. With the rapid expansion of elementary education in the last decade, enrollment rates in primary schools have reached saturation levels (>95% enrollment rate across India), but learning outcomes among children have stayed low and declined in the recent period. According to Annual Status of Education Report (ASER) only 40% of children in grade 3 can read a grade 1 level text and only 26% of children in grade 5 can do subtraction in 2014. These levels have declined from 49% and 43% respectively in 2007. Basic knowledge and skills – rather than enrollment or years of schooling – are key to empower children to realize their potential in life

(Pritchett, 2013). This has been recognized widely by non-government organizations (NGO) and state governments across the country.[7]

Pratham, a large education NGO, which first highlighted these issues has implemented several initiatives to improve learning outcomes since 2007. Pratham working in collaboration with state and local governments has organized short-duration intensive learning camps to improve basic skills for over 430,000 children in 2014–15. Randomized evaluations of learning outcome improvement programs implemented by Pratham in collaboration with local governments in states of Bihar, Uttarakhand, Haryana, Gujarat and Maharashtra have found substantial improvements in reading and math skills among children (Banerjee et al., 2007; Banerji et al., 2013; Banerjee et al., 2010). These programs are simple, low-cost interventions that focus on teaching core competencies which are supposed to be taught in the first and second grades. Several state governments have also implemented their own programs to improve reading and arithmetic skills. If educated political leaders wish to improve learning outcomes or are more competent than other leaders, improving learning outcomes is not a far-fetched goal with the resources they have at their disposal.

2.3. Heterogeneity in Indian states and leader's impact

India is a diverse country and the economic, social and political factors vary substantially across the states and hence we postulate that there might be heterogeneity in impact of leaders across states. The Human Development Index (HDI) for Indian states varies from a high of 0.79 for Kerala to a low of 0.56 for Bihar. The highest HDI state would be ranked 63rd in the world if it was a country and the lowest HDI would be ranked 152nd – indicating the range of development level within the country. The historical development of states and hence the nature of politics differs across states. Southern states like Kerala and Tamil Nadu are among the high HDI states and have a history of active political participation by citizens leading to demands of social provision of services including education. While some of the northern states like Bihar and Uttar Pradesh are low HDI states and issues of caste and religion still dominate the political debate. Administrative capacity and regulations vary substantively across the states in India. One example is that Tamil Nadu (a high HDI state) has a rules-based software-driven teacher transfer process whereas Orissa (a low HDI state) has ad-hoc process (Ramachandran et al., 2015).

There are several reasons one could expect heterogeneity in impact of educated leaders. The first potential reason is that citizens may have higher preference for education in some states than others. This makes education a politically salient item on which graduate leaders – being more competent than non-graduate leaders – may deliver better outcomes in these states. In this context, graduate leaders may yield better education outcomes if: (a) they understand better that citizens have higher demand for education, or (b) although both graduate and non-graduate leaders equally understand citizens' preferences, yet graduate leaders achieve better education outcomes due to having higher competency.

A second possible reason is that a minimum level of development may be required for the efforts of educated leaders to be fruitful. In highly developed states the higher level of development may complement leaders' input and make them effective. On the contrary, due to a lower base it may be easier for leaders to improve outcomes in the less developed states.

Another possibility is that graduate leaders may design policies that target either the high performing or the low performing students. Average learning levels of students in highly developed states tend to be better than those in less developed states. Therefore, policies that target only better learners may be effective in more developed states as they have larger proportion of high-achieving students. On the other hand, if educated leaders design interventions to improve outcomes of low-achievers, then on an average effects are more likely to show up in less developed states.

It is also likely that the quality of a graduate degree varies across states, making graduate leaders better and more effective in some states. Due to these various reasons, we test whether the impact of educated leaders varies depending on the nature of the state. In particular, we use baseline HDI as a proxy for the level of development while exploring heterogeneous effects.[8]

3. Data and summary statistics

We create a data-set that combines information on politicians contesting in state assembly elections in India with various education outcomes.

3.1. Education data

Education outcomes are from different data sources and both at the individual child and school level. The individual child outcomes are learning outcomes for reading, mathematics and English, and enrollment outcomes from Annual Status of Education Report (ASER). School quality outcomes are obtained from the annual census of schools - District Information System for Education (DISE). We use multiple data sources as the range of outcomes are not present in any single data-set and it also checks the robustness of our results to source of data.

[7] The central government in its 2017 budget acknowledging the importance of learning outcomes has decided to make quality assessment a central plank in its elementary education policy.

[8] In Section 4, we explain in more details how we categorize states.

Table 1
Summary statistics from child level data.

	6–10 age-group			11–16 age-group		
	Obs. (1)	Mean (2)	SD (3)	Obs. (4)	Mean (5)	SD (6)
All States						
Reading score	12,19,804	−0.020	1.010	12,31,335	−0.010	1.005
Math score	12,09,304	−0.032	0.979	12,26,732	−0.046	1.001
English score	5,37,602	−0.001	1.007	5,46,275	−0.020	1.002
Enrollment	13,03,387	0.979	0.144	13,90,843	0.920	0.272
Age of child	13,41,118	8.099	1.435	13,92,458	13.338	1.633
Child is female	13,41,118	0.466	0.499	13,92,458	0.472	0.499
Child's mother went to school	13,41,118	0.530	0.499	13,92,458	0.489	0.500
Low HDI States						
Reading score	5,84,281	−0.203	1.046	5,48,831	−0.164	1.147
Math score	5,77,014	−0.220	1.020	5,46,100	−0.197	1.104
English score	2,67,843	−0.254	0.942	2,51,618	−0.275	1.084
Enrollment	6,26,691	0.970	0.171	6,26,912	0.895	0.307
Age of child	6,47,290	8.089	1.444	6,27,875	13.335	1.622
Child is female	6,47,290	0.461	0.498	6,27,875	0.465	0.499
Child's mother went to school	6,47,290	0.399	0.490	6,27,875	0.371	0.483
Medium HDI States						
Reading score	3,31,969	0.048	0.957	3,38,146	0.011	0.947
Math score	3,30,036	0.051	0.915	3,37,098	−0.039	0.945
English score	1,31,955	0.207	1.011	1,38,497	0.099	0.925
Enrollment	3,61,551	0.982	0.134	3,93,731	0.915	0.279
Age of child	3,72,166	8.081	1.429	3,94,086	13.343	1.639
Child is female	3,72,166	0.473	0.499	3,94,086	0.479	0.500
Child's mother went to school	3,72,166	0.577	0.494	3,94,086	0.514	0.500
High HDI States						
Reading score	3,03,554	0.258	0.920	3,44,358	0.216	0.739
Math score	3,02,254	0.236	0.886	3,43,534	0.188	0.822
English score	1,37,804	0.291	0.999	1,56,160	0.287	0.806
Enrollment	3,15,145	0.993	0.082	3,70,200	0.966	0.181
Age of child	3,21,662	8.140	1.422	3,70,497	13.338	1.645
Child is female	3,21,662	0.467	0.499	3,70,497	0.476	0.499
Child's mother went to school	3,21,662	0.738	0.440	3,70,497	0.664	0.472

Source: Author's calculation using ASER data. The unit of observation is children of different age groups.

3.1.1. ASER data

ASER, an annual district representative survey, documents children's schooling status and basic learning levels in all rural districts in India. The survey has been conducted every year from 2005 to 2014 by a group of over 30,000 trained volunteers from over 700 partner organizations under the leadership of Pratham. The survey is conducted from September to November, and covers a random sample of 20 households in 30 villages in each of India's rural districts (approximately 550) totaling about 300,000 households across the country each year and approximately 600,000 children in the age group of 3–16.

ASER tests all children in the household between the ages of 5 and 16 for basic arithmetic and basic reading proficiency in the vernacular language using rigorously developed testing tools.[9] The same test is given to all children across the years. The reading assessment has four levels: letters, words, a short paragraph (a grade 1 level text), and a short story (a grade 2 level text). Similarly, the arithmetic assessment consists of four levels: single-digit number recognition, double-digit number recognition, two-digit subtraction with carry over, and three digit by one digit division (corresponding to what students are expected to know in grade 3 or 4). These levels are converted into a continuous scale of 0–4 in our main analysis. The highest level for which children are comfortable is marked. In the years 2007, 2009, 2012 and 2014, children were also tested for their competency in basic English.

We use data for the years 2006 to 2014 on enrollment and learning outcomes of children belonging to 6–16 years of age. We divide our sample into two groups – children aged 6–10 years which corresponds to primary school age (grade 1–5) in India and children aged 11–16 years corresponding to middle and secondary school age (grade 6 and above) to study the impact of educated politicians on their learning outcomes. Overall our sample includes more than 1.29 million children in each age-group. Table 1 presents summary statistics for our estimation sample.

[9] The tools are available at http://www.asercentre.org/p/141.html.

Table 2
Summary statistics from school level data.

	Mean (1)	SD (2)	Obs. (3)
All States			
Total number of schools	2303	1519	2850
Average school grant (Rs.)	18,187	13,134	2817
Prop. schools with girls toilet	0.88	0.16	2850
Prop. schools with boys toilet	0.76	0.27	2850
Prop. schools with electricity	0.54	0.36	2850
Prop. schools with water	0.96	0.11	2850
Prop. schools with computers	0.27	0.24	2850
Prop. schools with Pupil Teacher Ratio > 30	0.28	0.22	2850
Low HDI States			
Total number of schools	2659	1171	1082
Average school grant (Rs.)	14997	10,752	1081
Prop. schools with girls toilet	0.85	0.16	1082
Prop. schools with boys toilet	0.74	0.28	1082
Prop. schools with electricity	0.26	0.18	1082
Prop. schools with water	0.97	0.06	1082
Prop. schools with computers	0.09	0.06	1082
Prop. schools with Pupil Teacher Ratio > 30	0.43	0.24	1082
Medium HDI States			
Total number of schools	2414	1907	1003
Average school grant (Rs.)	19,065	13,112	996
Prop. schools with girls toilet	0.87	0.16	1003
Prop. schools with boys toilet	0.72	0.28	1003
Prop. schools with electricity	0.57	0.32	1003
Prop. schools with water	0.93	0.13	1003
Prop. schools with computers	0.28	0.20	1003
Prop. schools with Pupil Teacher Ratio > 30	0.21	0.15	1003
High HDI States			
Total number of schools	1653	1127	765
Average school grant (Rs.)	21,664	15,128	740
Prop. schools with girls toilet	0.95	0.12	765
Prop. schools with boys toilet	0.83	0.21	765
Prop. schools with electricity	0.88	0.25	765
Prop. schools with water	1.01	0.10	765
Prop. schools with computers	0.51	0.23	765
Prop. schools with Pupil Teacher Ratio > 30	0.18	0.13	765

Source: Author's calculation using DISE data. The unit of observation is the district.

3.1.2. DISE data

DISE is a database on all recognized schools in India with information on school infrastructure, funding, enrollment, teachers and other aspects of schools maintained by the Government of India. This is updated annually and cross-validated. DISE has data on over 1 million schools across India for each year, and is the most comprehensive source of data on schools in India. We use data from 2006 to 2014 for the number of schools, and from 2010 to 2014 on school infrastructure and funding outcomes. We aggregate this data on various outcomes of interest at the district level. Table 2 presents the summary statistics from DISE data. The first outcome is the total number of schools present in the district. We use Principal component analysis (PCA) to generate an index of school infrastructure and use it as one of the outcome variables. The index is the first component of the PCA generated using data on whether the school has free textbooks, furniture, girl's toilet, electricity connection, access to safe drinking water, library, playground and computers. The index is our second outcome measure. The third outcome variable is the average grants received by schools in the district in each year. There is substantial variation in all outcome variables across the districts.

3.2. Political data

A data-set on politicians contesting state assembly elections in India between 2004 and 2014 was constructed using information obtained from the Election Commission of India (ECI) and the Association for Democratic Reforms (ADR). The ECI provides data on the number of votes, gender and party affiliation of all candidates contesting in every state assembly election in India. Following a 2003 Supreme Court judgment all individuals contesting elections have to file an affidavit with the election commission listing their education level, assets, and criminal cases among other details. The Association for Democratic Reforms (ADR) has scanned all these affidavits and provided the information online for central and state elections from 2004 onwards. We combined this information from ECI and ADR to construct a detailed portrait of all winner

Table 3
Summary statistics of district level variables from elections data.

Variables	Obs. (1)	Mean (2)	SD (3)
Proportion of seats won by graduates	1,127	0.594	0.251
District with at least one graduate leader	1,127	0.953	0.212
Proportion of seats won by graduates in close elections against non-graduates	1,127	0.039	0.098
District with at least one graduate leader who won in close election against non-graduate	1,127	0.201	0.401
Proportion of seats with close election between graduate and non-graduate	1,127	0.0814	0.138
District with at least one close election between graduate and non-graduate	1,127	0.378	0.485
Proportion of seats with election between graduate and non-graduate	1,127	0.407	0.249
District with at least one election between graduate and non-graduate	1,127	0.876	0.330

Notes: The unit of observation is district in an electoral year. The sample corresponds to the full sample used in child level regressions. Close election is the one where the winner beat the runner up by less than 3% of votes. Source: Authors' calculation from ADR and ECI data combined.

and runner-up candidates for state assembly elections from 2004 to 2014. Among winner and runner-up candidates about 39% have not completed college education (Table A1 in the online appendix). Table 3 presents summary statistics from the electoral data. About 38% of districts have at least one close election between graduate and a non-graduate and almost equal number of close elections are won by each type of candidates (49% and 51% respectively).

3.3. Merged data

ASER rounds provide information on residence of a child only at the district level whereas political leaders are elected at the constituency level, which is below the district level. To merge the education and political data-sets we aggregated the election data at the district level. For each child in the sample, politicians who were in power in the year when the child's enrollment and learning levels were recorded and the two years prior to it are identified. Similar merging is also done with the DISE data at the district level. ADR has data on candidate's education level only for state elections conducted after 2004, when the law requiring candidates to publicly report their education level came into force. Since the elections for state assemblies in different states are conducted in different years, the starting year of our data differs for each state – the first election year after 2004 for that state.[10]

4. Empirical strategy

In this section we lay out an econometric model to identify the causal effect of having a graduate versus a non-graduate leader on the educational outcomes of children. As explained in the previous section, the data on leaders' education can be merged with the data on outcome variables only at the district level. Therefore our treatment variable is defined for each district, as the fraction of constituencies with a graduate leader in the district. When the outcome is measured at the child level using ASER data (learning outcomes, enrollment), then our unit of analysis is a child; on the other hand, when we use DISE data on schools, the outcomes are measured at the district level (number of schools, average school infrastructure, average grants etc.) and hence district itself is the unit of analysis. However, in both these cases, the treatment variable is defined at the district level for a given year. The following equation illustrates our basic specification which is estimated by the Ordinary Least Squares (OLS) method:

$$Y_{idst} = \alpha_{ds} + \eta_{st} + \beta G_{dst} + \gamma \mathbf{X}_{idst} + \varepsilon_{idst} \quad (1)$$

The education outcome of child i living in district d of state s in year t is given by Y_{idst}, and G_{dst} is the fraction of assembly constituency seats in the district held by a graduate politician during the last three years.[11] State and district specific time-invariant unobserved heterogeneity is taken into account by including district fixed effects α_{ds}. Since districts are nested within states, therefore the district fixed effects also subsume the state fixed effects. There is a great deal of heterogeneity across Indian state economies which are likely to follow very different trajectories of development. Therefore, we control for all time varying state level factors by including state specific year fixed effects (η_{st}) which also subsumes the overall year fixed effects capturing the impact of growth and various educational policies at the national level. Child level

[10] For example, for Maharashtra which had elections in 2004 we have data on politicians' education level for all years from 2004 to 2014, but for Gujarat our data starts only in 2008 which is the first election year in Gujarat after 2004. Since we are using average value of three years for all political variables in our base specification, the data on outcome variables used in the estimation for a state start two years after the beginning of election data for that state. For example, for all districts in Maharashtra our base specification uses ASER data starting from 2006 whereas for districts in Gujarat estimation data start only in 2010. To elucidate further, our base model assumes that a child living in rural areas of Jalna district of Maharashtra surveyed in 2007 will be impacted by politicians elected in the district from 2005 to 2007.

[11] Following Clots-Figueras (2012), the main specification considers the average fraction of seats held by a graduate politician over the past two years and the current year. In the robustness section, we consider alternative lag periods to calculate this variable, and our results are qualitatively similar in those specifications and are discussed later.

covariates which are included in the vector $\mathbf{X}_{idst}$ are gender and age-cohort specific dummy variables, and an indicator of whether child's mother attended school.

The main challenge of identifying β from Eq. 1 is the possibility that some omitted variables which vary across districts and over time, may be correlated with both G_{dst} and Y_{idst}. While the district fixed effects take care of inherent differences that do not change over time, the presence of time varying unobservable effects at the district level cannot be ruled out. For instance, in regions that have experienced higher growth of educated individuals, voters' preference for education may be manifested through higher propensity to elect graduate politicians in recent elections than in past elections. The fraction of seats held by graduate leaders may be endogenously determined due to the presence of such unobservable factors.

Identification

To tackle the endogeneity problem, we use the fraction of seats won by graduate politicians in *close* elections between a graduate and a non-graduate politician (GC_{dst}) as an instrument for the overall fraction of seats held by graduate leaders (G_{dst}). Close elections are defined as those where the margin of victory is small. For the main specification, we consider an election to be close when the winner beats the runner-up by less than 3% of total votes, and measure the instrument accordingly.[12] Insofar as the vote difference between the top two candidates in an election is arbitrarily small, the winner will be determined by chance; hence the use of close election provides a plausible basis for constructing the instrument in this context. We provide further discussion on the validity of the instrument in a subsequent section.

This empirical strategy has been used in the literature to identify the impact of other personal characteristics of leaders (e.g. gender, religion) on various development outcomes (Bhalotra and Clots-Figueras, 2014; Bhalotra et al., 2014; Clots-Figueras, 2011; 2012). Identification in this method relies on the quasi-randomness of the outcome of a close election. The fraction of constituencies in the district won by a graduate leader in a close election against a non-graduate leader is used as an instrument for the fraction of constituencies won in the district by a graduate leader. The instrument is valid because graduate leaders who win by a small margin do so in constituencies where there is no clear preference for graduate leaders and the non-graduate leader could have also won. The graduate leader winning is almost by chance in these close elections. The constituencies which elect a graduate leader versus those which elect a non-graduate leader are similar in all characteristics except the education level of the leader. The election of the graduate leader in these close elections can be considered essentially random. Given the outcome of each election can be considered random, the average of these electoral outcomes can be considered random as well.

The model is estimated through a two-stage least squares (2SLS) method and is given below:

$$Y_{idst} = \alpha_{ds} + \eta_{st} + \beta G_{dst} + \lambda TC_{dst} + \sum_{j=1}^{N} \pi_j I_{jdst} \times F(M_{jdst}) + \sum_{j=1}^{N} \mu_j I_{jdst} + \mathbf{X}_{idst}\gamma + \epsilon_{idst} \tag{2}$$

$$G_{dst} = \omega_{ds} + \tau_{st} + \theta GC_{dst} + \rho TC_{dst} + \sum_{j=1}^{N} \phi_j I_{jdst} \times F(M_{jdst}) + \sum_{j=1}^{N} \psi_j I_{jdst} + \mathbf{X}_{idst}\xi + e_{idst} \tag{3}$$

Eq. 2 is the second stage and Eq. 3 is the first stage. The main explanatory variable G_{dst} which is potentially endogenous, is instrumented by the proportion of educated leaders who win in close elections against a non-graduate candidate GC_{dst}. Note that unlike the outcome of a close election, the existence of close election may not be random: it may depend on the number of educated candidates or the prevailing political competitiveness in the district. Therefore we control for the fraction of seats that had close elections between graduate and non-graduate candidates in the district (TC_{dst}). This also captures any direct effect of having close elections, such as greater effectiveness of leaders due to higher political competitiveness in the region. The exclusion restriction for the instruments is also satisfied by controlling for the fraction of seats that had close elections.

The Indian electoral system follows the first-past-the-post voting system where the candidate who gets more votes than any other candidate wins the election. Between the top two candidates, the probability that a candidate will win is a function of the margin of votes between the candidate and his/her contestant, and this probability changes discontinuously at the point where the margin of votes is zero. Considering those elections where the contest takes place between a graduate and a non-graduate politician, in an arbitrarily small neighborhood around this point of discontinuity, this discontinuity at zero margin of votes is essentially similar to random assignment of treatment. Since the main explanatory variable is at the district level, we aggregate over the constituency specific discontinuities in treatment assignment within the district; thus we have a research design in the spirit of a fuzzy regression discontinuity design in our empirical set up.[13]

[12] The margin of victory is defined as the difference in the share of votes between the winner and the runner-up, where the total turnout is used as the denominator to calculate the vote shares. In the robustness section, we use various other levels of margin of victory to define close elections between a graduate and a non-graduate candidate.

[13] We also attempted to estimate a sharp RDD model by considering only those districts where there was only one election where a graduate candidate contested against a non-graduate candidate. However, since graduate degree is about the median level of education of leaders, therefore, majority of the districts have more than one election where the contest took place between a graduate and a non-graduate. Thus, we do not have enough number of districts to credibly estimate a sharp RDD model.

Table 4
First stage of the 2SLS estimates of the effect on children's reading score.

	Fraction of seats won by a graduate							
	6–10 age-group				11–16 age-group			
	All States (1)	Low HDI (2)	Medium HDI (3)	High HDI (4)	All States (5)	Low HDI (6)	Medium HDI (7)	High HDI (8)
Fraction of seats won by a graduate in close elections	1.054*** (0.153)	1.062*** (0.188)	0.799*** (0.164)	1.308*** (0.238)	1.041*** (0.141)	1.046*** (0.178)	0.803*** (0.161)	1.243*** (0.230)
Observations	1,219,804	584,281	331,969	303,554	1,231,335	548,831	338,146	344,358
R-squared	0.352	0.395	0.513	0.450	0.355	0.396	0.534	0.436

Notes: Robust standard errors clustered at the district level are in parentheses. Close elections are defined as election between a graduate and a non-graduate in which the difference in vote share between the winner and the runner up is less than 3%ÀIl regressions control for proportion of seats that had close election in district, vote margin (linear), child's age-dummies, gender, mother's education, district fixed effects, year fixed effects, and state specific year fixed effects. *** Significant at the 1% level. ** Significant at the 5 percent level. * Significant at the 10% level.

The specification also controls for a polynomial in the victory margins (linear in the base specification) of every graduate versus non-graduate election (close or non-close) in the district. The margin of victory between a graduate and a non-graduate candidate in election j is M_{jdst}. The polynomials, denoted by $F(M_{jdst})$, are interacted with I_{jdst} which indicates the existence of an election between a graduate versus non-graduate politician j in the district during the period considered. We also test if the results are robust to varying degrees of the polynomial function. Our model is based closely on model used in various other studies, e.g. the impact of women leaders on health and education outcomes by Clots-Figueras (2012) and Bhalotra and Clots-Figueras (2014). The rest of the variables included in the 2SLS analysis are same as in the OLS regression. The standard errors are clustered at the district level to allow for any possible correlation in the error terms among observations from the same district.

To investigate the potential differential impact across Indian states, we split the sample into three groups of states based on their 2004–05 Human Development Index (HDI) scores and run the same model separately for each of them.[14] The high-HDI states also have the highest per-pupil education expenditure and have the best school funding and infrastructure, while the low-HDI states have the least per-pupil education expenditure and the lowest level of school funding and infrastructure. We present the analysis that explores this heterogeneity in the initial condition of the states, and discuss the plausible explanations for our results in a later section. Prakash et al., 2019 also investigate the impact of electing a criminally accused politician by state characteristics. They find the the negative impact varies by state characteristics. The economic costs are concentrated in poor and corrupt states – a category that overlaps substantially with the low-HDI states category we are analyzing.

5. Results

In this section, we present the estimates of the impact of educated politicians on our main outcome variables capturing children's education, and further explore the effect on school outcomes as channels. The dependent variables for learning levels measure children's cognitive outcomes in terms of the standardized reading, mathematics and English scores.[15] The main explanatory variable of interest is the fraction of seats in the district held by the educated leaders.

5.1. Validity of identification strategy

Before discussing the main results, we show the validity of the instrument and of the regression discontinuity design by running various tests.

5.1.1. Validity of instrument

We test whether the instrument is a good predictor of the endogenous variable in the first stage of the 2SLS estimation. Table 4 presents the first stage regressions for 6–10 and 11–16 age-groups for reading scores. The coefficient of the instrumental variable, i.e. fraction of seats won by a graduate leader in close elections, is found to be statistically significant at 1% level in all specifications and for both the age-groups. Result for the sample of 6–10 age-group shows that holding the

[14] Population weights are used to classify the states based on HDI. Low human development states are Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha and Uttar Pradesh. Medium human development states are Arunachal Pradesh, Assam, Andhra Pradesh, Gujarat, Karnataka, Manipur, Meghalaya, Nagaland, Rajasthan,Sikkim,Tripura,West Bengal and Uttarakhand. High human development states are Delhi, Goa, Haryana, Himachal Pradesh, Kerala, Jammu & Kashmir, Maharashtra, Mizoram, Puducherry, Punjab and Tamil Nadu. Alternatively, we also ran our models with groupings based on state level income (State Domestic Product) and obtain qualitatively similar results (available on request).

[15] We use age-wise standardized test scores as a measure of the cognitive outcome. For any given age, between 6–16, we consider children of that age from all the survey years, and calculate the mean and standard deviation of their test scores in a specific subject, and thus calculate the z-score for that subject. The implication of using these standardized test scores (z-scores) as outcomes is that the magnitude of the effect from the regression can be interpreted in terms of standard deviation in test scores.

Table 5
2SLS estimates of the effect on children's education outcomes.

	6–10 age-group				11–16 age-group			
	State HDI category				State HDI category			
	All (1)	Low (2)	Medium (3)	High (4)	All (5)	Low (6)	Medium (7)	High (8)
	Reading score							
Fraction of seats won by a graduate	−0.004 (0.104)	−0.142 (0.152)	0.262 (0.299)	0.324** (0.153)	−0.011 (0.085)	−0.135 (0.125)	0.246 (0.230)	0.208* (0.124)
Observations	1,219,804	584,281	331,969	303,554	1,231,335	548,831	338,146	344,358
First Stage F-stat	48	32	24	30	55	35	25	29
	Mathematics score							
Fraction of seats won by a graduate	−0.073 (0.122)	−0.200 (0.178)	0.099 (0.331)	0.331** (0.162)	−0.063 (0.122)	−0.236 (0.180)	0.179 (0.346)	0.260* (0.154)
Observations	1,209,304	577,014	330,036	302,254	1,226,732	546,100	337,098	343,534
First Stage F-stat	48	32	24	30	55	35	25	29
	English score							
Fraction of seats won by a graduate	0.031 (0.131)	−0.164 (0.155)	-0.010 (0.271)	0.630** (0.293)	0.007 (0.123)	−0.196 (0.177)	−0.304 (0.298)	0.447** (0.190)
Observations	537,602	267,843	131,955	137,804	546,275	251,618	138,497	156,160
First Stage F-stat	56	33	29	31	63	37	28	30
	Enrollment							
Fraction of seats won by a graduate	−0.014 (0.011)	−0.031** (0.015)	−0.015 (0.018)	0.010* (0.006)	−0.016 (0.015)	−0.039* (0.020)	−0.090 (0.065)	0.014 (0.014)
Observations	1,303,387	626,691	361,551	315,145	1,390,843	626,912	393,731	370,200
First Stage F-stat	45	31	23	30	54	34	25	29

Notes: Robust standard errors clustered at the district level are in parentheses. Close elections are defined as election between a graduate and a non-graduate in which the difference in vote share between the winner and the runner up is less than 3%. All regressions control for proportion of seats that had close election in district, vote margin (linear), child's age-dummies, gender, mother's education, district fixed effects, year fixed effects, and state specific year fixed effects. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

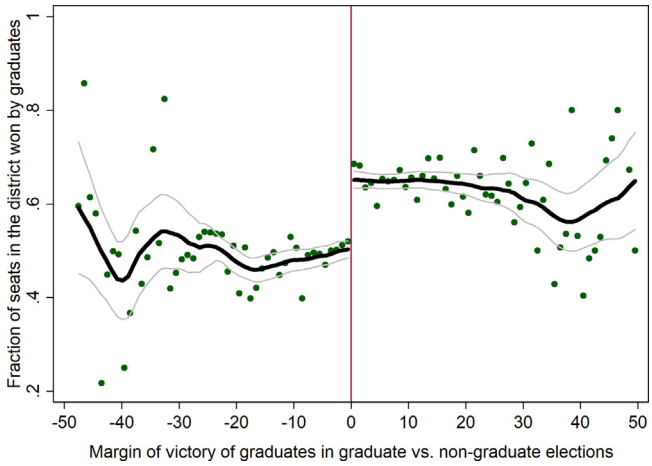

Fig. 1. First stage illustration: Sample consisting of all elections between graduate and non-graduate candidates. Notes: District-level fraction of graduate MLAs is plotted against the vote margin between graduate and non-graduate candidates in each constituency of the district. Data from 2004–2014 are aggregated into 1 percentage point bins. The curves are local polynomial regressions (with 95 percent confidence intervals on each side) fitted separately for positive and negative parts of the margin of victory variable.

fraction of constituencies with close election constant, a 10 percentage point increase in the fraction of constituencies where a graduate leader won against a non-graduate leader in a close election leads to 8 to 13 percentage point increase in the overall fraction of seats held by the graduate leaders in the district, depending on the sample. The results are similar for the first stage analysis using DISE data (Table A2). Although the coefficient of the instrumental variable is not exactly 1, it is not significantly different from 1 in any of the samples. Some graduate politicians win in elections that are not close elections against non-graduate politicians, e.g. they may win by a large margin or against another graduate candidate, affecting the overall proportion of graduate leaders in the district.

We also provide a graphical illustration to explain the first stage relationship. In Fig. 1 we plot the district-level fraction of graduate MLAs against the vote margin between graduate and non-graduate candidates in each constituency of the district.[16] The figure shows that a graduate politician winning a close election leads to a significant and discontinuous rise in the fraction of constituencies in the district won by graduate politicians.

5.1.2. Validity of close election related assumptions

We conduct several checks to show the validity of our assumption that results in close elections are quasi-random. In summary statistics, we see that the probability of winning a close election is same for graduate and non-graduate candidates. But some recent studies have questioned the validity of the close election premise by showing that incumbency status and previous vote share are strongly correlated with winning close elections in the United States House elections, pointing to the possibility of manipulation (Caughey and Sekhon, 2011; Grimmer et al., 2011). However Eggers et al. (2015) find that such sorting in close elections is unique to U.S. House elections in the post-war period and does not hold forth in other countries including India. Along these lines, we test for differences in various constituency and candidate characteristics in close elections. Table A3 shows that these are not significantly different across close elections where graduate or non-graduate candidates win.

We must also obviate the concern that the effect of graduate leaders may be picking up differences in other characteristics between graduate and non-graduate leaders. For example, if graduate leaders are more likely to be younger and male than non-graduate leaders, then the challenge is to identify the effect caused by the difference in their education status, rather than their age and gender. In our RD set up, this threat to identification would be valid if graduate leaders who win in close elections were significantly different from non-graduate leaders along the dimensions other than their education level. From Table A3 we find that there is no significant difference in terms of gender, age, criminal status, and other observable characteristics between graduate winners and non-graduate winners in close elections. We further investigate whether other characteristics are continuous around the cut-off in the vote margin between graduate and non-graduate candidates. Figure 2 provides graphical evidence that indeed other factors such as the leader's age, gender, criminal status, wealth, party affiliation, the proportion of reserved constituencies in the district, the electorate size and turnout in the election do not change significantly around the cut-off. Hence this exercise indicates that only the education status of the politician changes discontinuously at the zero-margin of victory, implying that our analysis identifies the causal effect of graduate versus non-graduate leaders on the outcomes of interest.

Moreover, we test for the possibility that the outcome of a close election is biased in favor of the incumbent or a party that has strategic influence over the election process. In particular, we consider whether the graduate candidate wins in a close election between graduate and non-graduate candidates, and regress this outcome on the party affiliation of the contestants along with other constituency and district level characteristics (Table A4). We find that the outcome of a close election is not significantly predicted by almost any of the variables related to political parties and the predictors are also jointly not significant.

The RD design assumptions might be violated if there is vote manipulation leading to bias in the outcome of a close election. To verify that there is no manipulation involved we check if the distribution of the vote margin is continuous around the neighborhood of zero. We plot the density of the vote margin (Fig. 3) and test if the difference in the densities on either side of the zero point is significant (McCrary, 2008). The estimated difference is −0.099 and is statistically not significant. The election commission of India which conducts elections in India is known to be independent and politically neutral and elections are considered free and fair.

In addition, to satisfy the RD assumptions one must show that districts where more graduates win in close elections are not systematically different than where more non-graduates win. In Table A5 we compare various characteristics in the two types of districts. The districts with more graduate winners do not differ significantly in any of the characteristics from districts with more non-graduate winners in close elections.

We have shown that several of the RD assumptions are valid for our data, but our estimates might still not have external validity. Though we cannot prove this conclusively, we do provide some indications that our results have considerable external validity.

First, we show that the identity of constituencies and districts that have close elections between graduate and non-graduates changes substantially over the elections. The average change in the proportion of a district's constituencies that experience close elections over multiple elections is 71% This indicates that we are not picking up some feature of districts that have close elections and points to external validity. Also the percentage of graduate winners in close elections within a district changes by 61% over election cycles, indicating little correlation between graduates winning close elections and district characteristics.

We repeat the identification validity tests described in this section for each of the three categories of states by development level and get qualitatively similar results. All these results are provided in the appendix.

[16] Data from 2004–2014 are aggregated into 1 percentage point bins. Local polynomial regressions are fitted separately for positive and negative parts of the margin of victory variable.

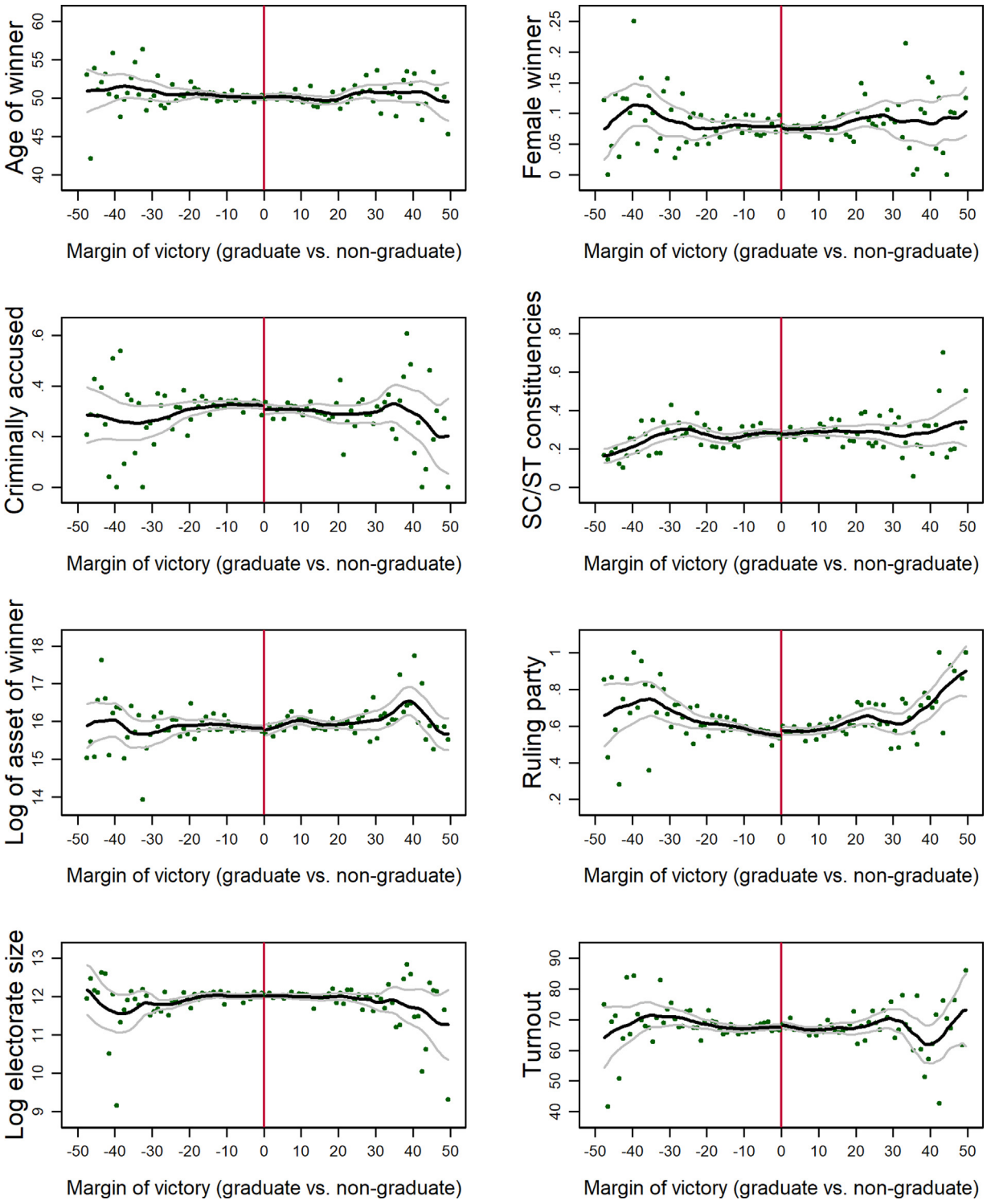

Fig. 2. Continuity checks for other characteristics of candidates and constituencies. Notes: The horizontal axis plots the difference in vote share between graduate and non-graduate candidates in different elections. The vertical axis plots the district level average age of the constituency leaders, the fraction of seats won by female politicians, fraction of seats won by criminally-accused politicians, fraction of constituencies reserved for backward sections (Scheduled Castes and Scheduled Tribes), log of average asset of winner, fraction of seats won by politicians affiliated to state ruling party, log of electorate size, and turnout (poll percentage). Data from 2004–2014 are aggregated into 1 percentage point bins. The curves are local polynomial regressions (with 95 percent confidence intervals on each side) fitted separately for positive and negative parts of the margin of victory variable.

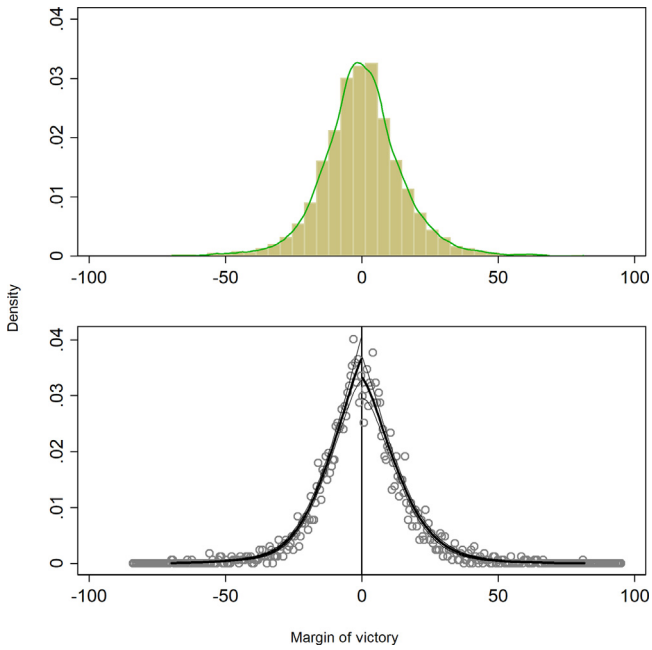

Fig. 3. Continuity of vote margin between graduate and non-graduate candidates (running variable). Notes: The upper panel shows the kernel density of vote margin between graduate and non-graduate candidates. The lower panel shows McCrarys density test.

5.2. Child level outcomes

We find that there is heterogeneous impact of educated leaders on children's learning outcomes. Column 1 and 5 in Table 5 presents results for the entire country, while columns 2–4 and 6–8 present results for grouping of states based on the Human Development Index (HDI).[17] All regressions control for the proportion of seats that had close elections in the district, vote margin (linear), childs age-dummies, gender, mothers education, district fixed effects, year fixed effects, and state-specific year fixed effects. The impact of graduate leaders is positive and significant only in the most developed states. But there is no statistically significant effect of having a higher proportion of graduate leaders in the districts on children's learning scores or enrollment for the entire country or in low and medium developed states. The point estimates in the latter case also suggest that the magnitude of effect is low.[18]

In the most developed states, the magnitude of the coefficient implies that increasing the number of graduate leaders in the district by 10 percentage points, i.e. having an additional leader being graduate in the district, results in an increase of 0.032 standard deviation (SD) in the reading score of children in 6–10 years age-group. This effect is equivalent to an increase of 0.04 points in the raw reading score, or 1.7% of the sample mean of reading score for these children (Table A8). The corresponding impact on math score is similar at 0.033 SD or 1.7% of the mean score. The effect size for English score is higher at 0.063 SD or 4% of the mean score. For children in 11–16 age-group, the effects are statistically significant but slightly lower in magnitude, as they vary from 0.6% to 1.6% of the mean scores across different learning outcomes. To put our results into perspective, we compare these effect sizes with other papers using ASER data. Shah and Steinberg (2017) find that a drought in the district, as compared to normal rainfall, reduces the opportunity cost of education and hence increases math score of children by 0.02 SD or 0.75% of the mean score. Thus, the effect size found in their study is comparable (if not smaller) with the effect of educated leaders we have estimated here. However, the impact of educated leaders seems far smaller when we compare it with the effect of a school feeding program on learning outcomes. Using ASER data, Chakraborty and Jayaraman (2019) find that a child exposed to midday meal throughout primary schooling (five years) has learning scores that are higher by 0.09–0.17 SD (9–18%) than those with less than one year of exposure.

The variables measuring learning outcomes are not continuous, but ordinal with different levels. To better understand at which levels of learning the impacts are higher, we use binary variables indicating the level of learning as an alternative dependent variable.[19] Linear probability models are estimated using 2SLS method following the same specification as the

[17] The OLS estimates are presented in Table A6.

[18] The reduced form estimates of Eqs. 2 and 3 are presented in Table A7. Comparing with the 2SLS estimates, similar conclusions can be drawn from the reduced form results.

[19] For reading, these variables reflect whether a child can read letters, words, short paragraph and short stories. For mathematics, each of them measure one of the categories from single-digit number recognition, double-digit number recognition, two-digit subtraction with carry over, and three digit by one digit division. For English, they measure the ability to recognize capital letter, small letter, word, and sentence.

Table 6
Robustness: binary indicators for different levels of learning as outcome variable (High HDI states).

	Level of reading skill							
	6–10 age-group				11–16 age-group			
	Letter	Word	Paragraph	Story	Letter	Word	Paragraph	Story
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fraction of seats won	0.054*	0.089*	0.123*	0.136**	0.021**	0.035*	0.061	0.092
by a graduate	(0.031)	(0.053)	(0.067)	(0.055)	(0.010)	(0.020)	(0.041)	(0.062)
Observations	303,554	303,554	303,554	303,554	344,358	344,358	344,358	344,358
First Stage F-stat	30.23	30.23	30.23	30.23	29.18	29.18	29.18	29.18
Mean of outcome variable	0.86	0.69	0.47	0.28	0.92	0.90	0.85	0.74
	Level of math skill							
	6–10 age-group				11–16 age-group			
	1 digit	2 digit	Subtraction	Division	1 digit	2 digit	Subtraction	Division
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fraction of seats won	0.048*	0.121*	0.141**	0.062*	0.014	0.037*	0.089	0.134
by a graduate	(0.029)	(0.065)	(0.070)	(0.037)	(0.010)	(0.022)	(0.065)	(0.082)
Observations	302,254	302,254	302,254	302,254	343,534	343,534	343,534	343,534
First Stage F-stat	30.26	30.26	30.26	30.26	29.15	29.15	29.15	29.15
Mean of outcome variable	0.87	0.69	0.38	0.14	0.92	0.89	0.77	0.55
	Level of English skill							
	6–10 age-group				11–16 age-group			
	Capital letter	Small letter	Word	Sentence	Capital letter	Small letter	Word	Sentence
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fraction of seats won	0.180**	0.259**	0.244**	0.142**	0.016	0.116**	0.150**	0.273***
by a graduate	(0.079)	(0.130)	(0.118)	(0.071)	(0.019)	(0.057)	(0.072)	(0.102)
Observations	137,804	137,804	137,804	137,804	156,160	156,160	156,160	156,160
First Stage F-stat	30.58	30.58	30.58	30.58	30.47	30.47	30.47	30.47
Mean of outcome variable	0.81	0.64	0.43	0.19	0.97	0.92	0.83	0.62

Note: The regressions are linear probability models including the full set of controls as reported in Table 5. Robust standard errors clustered at the district level are in parentheses. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

main regressions presented above.[20] The results indicate that the impact of educated leaders increases in magnitude as the level of learning outcomes goes higher (Table 6). The increase in the number of children in 6–10 age-group who are at the highest level of reading (paragraph), mathematics (division) and English (sentence) outcomes is 4.9%, 4.4% and 7.5% respectively due to a 10 percentage points increase in the number of educated leaders in the district. The impact on the lower levels is less and for the lowest level it is less than one percent in most cases. In the 11–16 age-group category, we do not find statistically significant effects at the higher levels of reading and math scores. For lower levels of learning, the effects are statistically significant although the magnitudes are quite small. The number of children who can read an English sentence in the 11–16 age group increases by 4.4% if there is one more educated leader in the district.

For enrollment, the impact is small and statistically significant only in some instances. An additional educated leader has a negative impact in least developed states for both age groups and positive impact in most developed states for the 6–10 age group. But the size of the impact is small. An additional educated leader in the district of a least developed state reduces the probability of enrollment by 0.3–0.4 percentage points, while in the most developed states it increases the probability of enrollment by 0.1 percentage point among children aged 6–10 years. The small size of impact is plausible because enrollment rates are already at saturation levels (98% for 6–10 age group and 92% for the 11–16 age group) across all states.

We also test if the impact of graduate politicians is heterogeneous by gender of the child. We find that the size of the impact is similar for both boys and girls for the 6–10 age group across outcomes. For the 11–16 age group, boys seem to have higher and more significant impact than girls across outcomes (Table A9).[21]

[20] Estimating the regressions using ordered probit or ordered logit would be more appropriate but they limit the estimation models we can use.

[21] In additional heterogeneity analysis, we test whether the effect of graduate leaders varies by the following characteristics of the leader: whether the leader is criminally accused, leaders wealth, whether the leader is affiliated to the state ruling party, and leaders caste. We do not find any conclusive evidence of heterogeneity of impact based on these characteristics. These results are available on request.

Table 7
2SLS estimates of the impact on schools (DISE data).

	All States (1)	Low HDI (2)	Medium HDI (3)	High HDI (4)
	Total number of schools			
Fraction of seats won	−74.31	−268.1	−143.3	336.0**
by a graduate	(94.53)	(168.4)	(198.1)	(143.6)
Observations	3405	1329	1075	1001
First stage F statistics	52	31	19	25
	Index of school facilities			
Fraction of seats won	−0.170	−0.456	−0.109	0.676**
by a graduate	(0.250)	(0.412)	(0.291)	(0.336)
Observations	2687	1010	940	737
First stage F statistics	56	40	25	22
	Log of average school grant			
Fraction of seats won	−0.263	−0.585	−0.718	0.894*
by a graduate	(0.340)	(0.517)	(0.507)	(0.541)
Observations	2646	1012	931	703
First stage F statistics	57	40	23	21

Notes: Robust standard errors clustered at the district level are in parentheses. PCA for school facilities is generated using data on school facilities such as access to girls toilets, safe drinking water, boys toilet, electricity and computers. Log of annual average funds refers to average total funds received by schools in the districts under School Development Grant, School Maintenance Grant, Teachers Grant and other grants. Close elections are defined as election between a graduate and a non-graduate in which the difference in vote share between the winner and the runner up is less than 3 percent. All regressions control for proportion of seats that had close election in district, vote margin (linear), year fixed effects, district fixed effects and state specific year fixed effects. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

5.3. School outcomes

Next we investigate the potential channels of the impact on children's outcomes. One possibility is that educated politicians invest more in schools by directing resources to schools in their constituencies and this results in better learning outcomes. On average, higher spending has been shown to positively impact outcomes (Jackson, 2018). Spending in schooling could be more directly impacted by leaders as they have a more direct role to play in deciding and channeling funding to schools. We analyze the impact of leaders on total number of schools, index of school infrastructure, and grants received by the school.[22] All dependent variables for school outcomes from DISE data are averaged at the district level and the unit of analysis is the district-year.

Similar to child level outcomes, we find that graduate leaders result in more number of schools (increasing access to schooling), better school infrastructure and higher average school grants in their district in highly developed states (column 4 Table 7). An additional graduate leader in the district (i.e. a 10 percentage point increase on average in the number of educated leaders in the district) increases the number of schools by 33.6 and average school grant by 8.9% in high-HDI states. The impact on the number of schools and school grants holds for rural schools and the magnitude is even higher.[23] But there is no statistically significant impact of educated leaders on school outcomes in the less developed states or in the overall sample (column 1–3 of Table 7).[24]

In addition to the evidence of better allocation of resources, some other channels through which political leaders can have an impact are through better monitoring and lobbying of local bureaucracy as they are ex-officio members of various education committees. They may influence teacher attendance rates.[25] Also educated leaders can act as role models for constituents and that in turn can positively impact learning outcomes in highly developed states. O'Connell (2018) finds that a policy mandating quotas for women in local government in India substantially increased school enrollment rates of adolescent girls through a role model effect.[26] Unfortunately, we do not have data to test these additional channels.

[22] All these data are sourced from DISE. Data on number of schools is from 2006 to 2014. The infrastructure index is the first component from principal component analysis (PCA) of school facility indicators such as access to girls toilets, boys toilet, safe drinking water, electricity, and computers for years 2010 to 2014. Data on the amount of school grants is from 2010 to 2014.

[23] We cannot generate PCA only for rural schools as data on school infrastructure in district aggregate files is not disaggregated by region.

[24] The OLS estimates are presented in Table A10 and the reduced form estimates are presented in Table A11 in the appendix.

[25] DISE does not have information on teacher attendance but ASER has some limited data on teacher attendance from a selected list of schools. Using this data we find no significant effect on teacher attendance; however, this may not be a conclusive evidence because the data is not from any representative sample of schools.

[26] On similar lines, Anukriti and Chakravarty (2019) discuss the potential role model effect on citizens' fertility behavior of a policy imposing fertility limits on local politicians in India.

5.4. Robustness analysis

We put our results to robustness checks in this section to investigate if varying the specification or range of political leaders who are supposed to have an impact changes our results. We present the results only for the highly-developed states, for which we find an impact of educated politicians.[27]

5.4.1. Different lag periods

Let us consider that the policies an educated leader implements may take time to show an effect on the outcomes. A priori it is not clear how long it takes for a policy to show effect after its implementation, therefore this remains an empirical issue. The main model discussed above consider the leaders over the last three years (current year and the past two years). This measure is similar to the one used by Clots-Figueras (2012) who finds a significant positive effect of having female versus male politicians on education of citizens. As a robustness exercise, we use different lag periods, in particular the average over the last four years (Lag 3) and two years (Lag 1), to measure the explanatory variable. Irrespective of the lag period used, the effect of graduate leaders, in comparison with non-graduate leaders, remains statistically significant for almost all outcomes (Table A12) including school outcomes (Table A13) in high-HDI states.

5.4.2. Varying degrees of polynomials in vote margins

Given the fuzzy regression discontinuity design of our empirical model, it is important to control for polynomials in the vote margins so that any effect of the vote margin itself is controlled in a flexible way. This ensures that the instrument exploits variation only in the close neighborhood around the discontinuity to justify a quasi-random assignment of treatment. While the main regressions include first order polynomials, our results are robust to using second and third order polynomials as well (Table A14 and Table A15).

5.4.3. Alternative definition of close election

For the main results, we define close elections as those where the margin of victory is less than 3%. We test whether the results are robust to alternative cut-off points of 1%, 2%, 4% and 6%.[28] We find that the results remain qualitatively unchanged for most of the outcomes (Table A16 and Table A17).[29]

5.4.4. Placebo test examining the effect of future leaders

Next we conduct a placebo test where the outcome variable is regressed on the fraction of seats won by graduate leaders from the future. Since the leaders being considered in the analysis are from the future they should not have an impact on current learning outcomes. We estimate the impact of leaders who would be in office after 1 year, 2 years or 3 years from the point when the outcome is measured. Table A18 shows the results for learning outcomes in the highly developed states. The effect is not significant and much smaller in size. This bolsters the credibility of our main results.

5.4.5. Effect of alternative levels of leader's education

Finally, we also compare between educated and less-educated leaders considering alternative threshold levels of education. Specifically, we compare leaders who passed the secondary school (10th grade) with those below that level. Alternatively, we compare between leaders with higher-secondary (12th grade) degree and those without it. We find that the results are qualitatively unchanged (Tables A19 - A22). These additional estimates are not as precise as the main results, possibly because a comparison based on graduate degree provides higher variation for identification.

6. Discussion

Why do graduate politicians have an impact on schooling outcomes only in the highly developed states? We postulated that difference in preferences of constituents, in levels of basic infrastructure, and in quality of students and educated leaders in low and high developed states may be reasons for heterogeneous impact of educated leaders. We present some evidence on these hypotheses below.

Citizens are likely to value education more in the highly developed states than in the less developed states. We do not have data at state constituency level on priorities and preferences of citizens, so we present some indirect evidence on why we think this may hold. First, citizens in developed states, by the virtue of having higher levels of human development, are likely to have higher intrinsic preference for education. Second, the structure of the economy in highly developed states may magnify the role of education in people's livelihood. A basic sectoral analysis of data on state domestic product from 2004–05 reveals that the share of service sector in net state domestic product (NSDP) was significantly higher in high-HDI states (55%) than low-HDI states (42%). In contrast, the share of agricultural sector in NSDP was much higher in low-HDI

[27] We have conducted these robustness checks for the overall sample and all the sub-samples, and our main findings are unchanged.

[28] We also follow the recent literature on optimal bandwidth selection to determine the close-election cut-off in a specification that estimates the effect of graduate leaders on next year's education outcomes. Across different outcomes, the optimal bandwidth varies in a range which is similar to the alternative cut-offs we present in this robustness analysis.

[29] The effects on enrollment and school funds become imprecise in a few cases when alternative cut-off points are considered to define close elections.

states (25%) than high-HDI states (16%). Jobs in the service sector require the workforce to be better educated than in the agricultural sector. Hence, high-HDI states are likely to show greater demand for good quality education than low-HDI states. Therefore, in these states, leaders put greater effort in improving education outcomes and our results show that graduate leaders are more effective in doing so.

Another reason we find significant effect of a graduate leader only in the highly developed states is probably because these states already have that basic level of development to complement leaders' input and make it effective. Indeed, in terms of various education related developmental indicators such as state spending, school grants, infrastructure and pupil-teacher ratio, high-HDI states outperform other states in the baseline data. The average state expenditure on education per enrolled child was more than double in high-HDI states (Rs. 4540) as compared to low-HDI states (Rs. 2107).[30] Also teacher transfer regulations are better defined and implemented in high-HDI states (Ramachandran et al., 2015). Thus, the institutional support system already existing in highly developed states enables graduate leaders to yield better education outcomes in their constituencies. Also, there is no impact in low-HDI states indicating that lower base in these states may not make it easier to have an impact.

We find that educated leaders do not implement policies that target students based on performance level, contrary to our hypothesis. To show this, we consider binary dependent variables that capture learning outcomes at different levels of difficulty (Table 6). We find that the effect of educated leaders is significant for all levels of learning in the high-HDI states. However, none of them is significant in the low-HDI states (results are available on request). In other words, even low achieving students in high-HDI states are benefited from having a graduate leader, while top learners in low-HDI states do not benefit by having a graduate leader. Therefore, we dismiss the hypothesis as a possible explanation for the heterogeneous results.

Quality of graduate leaders is better in high-HDI states and this may lead to graduate leaders in these states having an impact. High-HDI states have better quality education institutions – 54% of the top 100 universities ranked by the University Grants Commission of India are in the high-HDI states and only 16 percent in low-HDI states. Assuming that a vast majority of graduate leaders study in the institutions of their own states, the quality of education of graduate leaders is better in high-HDI states. Better quality education raises the marginal value of a graduate degree. Hence the education and skill differential between graduate and non-graduate leaders is larger in high-HDI states than in low-HDI states, making graduate leaders relatively more effective only in high-HDI states.

7. Conclusion

Formal education of the leader has been used as a proxy for the quality of the leader without much evidence on the efficacy of educated leaders. Recent changes in laws in some states in India have used this notion to bar less-educated citizens from contesting elections. In this paper, we investigate whether having more-educated state representatives results in better learning and schooling outcomes. We find that the impact of more-educated politicians is heterogeneous across Indian states. In the most developed states educated politicians help improve learning outcomes and schooling resources. But in the overall sample and in less developed states educated politicians are no different from less-educated politicians. We find that educated leaders possibly impact learning outcomes through their impact on school access, infrastructure and funding. The impact of educated leaders depends on the context and it is possible that less-educated leaders also acquire relevant skills through means other than formal education. So we interpret our results to be against imposing a blanket ban on less-educated leaders from contesting elections as done in a few states in India. Also, from the perspective of "descriptive representation", leaders who are from similar backgrounds as citizens represent their interest better (Mansbridge, 1999; Aaldering, 2017; Gallego and Curto-Grau, 2019). In the context of India, a candidate restriction policy based on formal education may lead to a loss of representation of the interests of a major part of the population who are less educated.

Our findings advance the literature on the quality of leaders. We are the first, to the best of our knowledge, to analyze the link between politicians education and competency in India. Nonetheless, the results are subject to several important caveats. First, the results are specific to the outcomes in education. Educated leaders might get better, same or worse outcomes than less-educated leaders in other areas such as economic growth, health or environment which are not analyzed in this paper. Second, we only analyze state assembly leaders and the impact of education of leaders might be different at the national or the local level. Third, due to the limitations of data we analyze leader characteristics only at the district level and not at the individual constituency level for which they are elected. Leaders are elected for a constituency and each district has on average nine constituencies. But the lowest unit of identification in the data on outcomes is the district, so we aggregate leader characteristics at the district level before ascertaining the impact. The precision of our estimates might be sensitive to this averaging of leader characteristics at the district level.

Finally, our identification strategy uses close elections to estimate the impact of educated leaders. Even though we control for the proportion of close elections in the district and provide some suggestive evidence of external validity of our results, leaders (educated and less-educated) might behave differently in close elections vis-a-vis non-close elections. If political competition is lower in constituencies with non-close elections, then the leaders there may spend resources differently and this may not be captured in our empirical analysis.

[30] Calculated using data on state expenditure from the Reserve Bank of India.

Declaration of Competing Interest

None.

Acknowledgments

We thank the editor and two anonymous reviewers of this journal for very constructive comments that helped us to improve the paper. We are grateful to Sonia Bhalotra, Olle Folke, Stephan Klasen, Karl Pauw, Abhiroop Mukhopadhyay, Makiko Omura, Vijayendra Rao, Sanjay Reddy, Johanna Rickne, Miri Stryjan, and Steven Wilkinson for helpful discussions and to the ASER Centre for sharing the data with us. This paper also benefited from the comments of the participants at the PEGNet Conference (Kigali), University of Goettingen seminar, GDRI-IDE Conference (Clermont-Ferrand), DSE Winter School (Delhi School of Economics), Growth and Development Conference (ISI Delhi), IGC-ISI-JU West Bengal Growth Conference (Kolkata), NADEL seminar (ETH Zurich), CSAE Conference (University of Oxford), YPED Conference (Yale University), and Development Economics Conference (University of Lincoln). We acknowledge research support from Indian Institute of Management Bangalore through a Research Seed Grant.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2020.03.026.

References

Aaldering, L., 2017. Political representation and educational attainment: evidence from the netherlands (1994–2010). Polit. Stud. 65 (1_suppl), 4–23.
Abdul, T., 2015. Dismantling democracy: how the supreme court deprived the poor of their right to fight elections. http://www.huffingtonpost.in/talha-abdul-rahman-/dismantling-democracy-how_b_9137248.html?m=false.
Anukriti, S., Chakravarty, A., 2019. Democracy and demography: societal effects of fertility limits on local leaders. J. Hum. Res. 54 (1), 79–121.
Asher, S., Novosad, P., 2017. Politics and local economic growth: evidence from India. Am. Econ. J.: Appl. Econ. 9 (1). 229–73
Atkinson, M.M., Rogers, D., Olfert, S., 2016. Better politicians: If we pay, will they come? Legisl. Stud. Q. 41 (2), 361–391. doi:10.1111/lsq.12117.
Banerjee, A.V., Banerji, R., Duflo, E., Glennerster, R., Khemani, S., 2010. Pitfalls of participatory programs: evidence from a randomized evaluation in education in India. Am. Econ. J.: Econ. Policy 2 (1), 1–30.
Banerjee, A.V., Cole, S., Duflo, E., Linden, L., 2007. Remedying education: evidence from two randomized experiments in India. Q. J. Econ. 122 (3), 1235–1264.
Banerji, R., Berry, J., Shotland, M., 2013. The Impact of Mother Literacy and Participation Programs on Child Learning: Evidence from a Randomized Evaluation in India. Cambridge, MA: Abdul Latif Jameel Poverty Action Lab (J-PAL).
Baxi, U., 2015. Supreme error. http://indianexpress.com/article/opinion/columns/supreme-error/.
Besley, T., Coate, S., 1997. An economic model of representative democracy. Q. J. Econ. 112 (1), 85–114.
Besley, T., Montalvo, J.G., Reynal-Querol, M., 2011. Do educated leaders matter? Econ. J. 121 (554), F205–227.
Besley, T., Pande, R., Rao, V., 2005. Political selection and the quality of government: evidence from south India. Yale University Economic Growth Center Discussion Paper No. 921.
Besley, T., Reynal-Querol, M., 2011. Do democracies select more educated leaders? Am. Polit. Sci. Rev. 105 (03), 552–566.
Bhalotra, S., Clots-Figueras, I., 2014. Health and the political agency of women. Am. Econ. J.: Econ. Policy 6 (2), 164–197.
Bhalotra, S., Clots-Figueras, I., Cassan, G., Iyer, L., 2014. Religion, politician identity and development outcomes: evidence from India. J. Econ. Behav. Org. 104, 4–17.
Bhalotra, S., Clots-Figueras, I., Iyer, L., 2017. Pathbreakers? Women's electoral success and future political participation. Econ. J. 128, 1844–1878.
Bhaskar, A., 2016. Damage to democracy. Econ. Polit. Week. 51 (40), 47.
Bhavnani, R. R., Jensenius, F., 2015. Voting for development? Ruling coalitions and literacy in India.
Burchi, F., 2013. Women's Political Role and Poverty in the Educational Dimension: a District-Level Analysis in India. German Development Institute Discussion Paper(23).
Bursztyn, L., 2016. Poverty and the political economy of public education spending: evidence from brazil. J. Eur. Econ. Assoc. 14 (5), 1101–1128.
Bussell, J., 2019. Clients and Constituents: Political Responsiveness in Patronage Democracies. Oxford University Press, New York.
Carnes, N., 2012. Does the numerical underrepresentation of the working class in congress matter? Legisl. Stud. Q. 37 (1), 5–34.
Carnes, N., 2013. White-Collar Government: The Hidden Role of Class in Economic Policy Making. University of Chicago Press.
Carnes, N., Lupu, N., 2016. What good is a college degree? Education and leader quality reconsidered. J. Polit. 78 (1), 35–49.
Caughey, D., Sekhon, J.S., 2011. Elections and the regression discontinuity design: lessons from close US house races, 1942–2008. Polit. Anal. 19 (4), 385–408.
Chakraborty, T., Jayaraman, R., 2019. School feeding and learning achievement: evidence from India's midday meal program. J. Dev. Econ. (forthcoming).
Chattopadhyay, R., Duflo, E., 2004. Women as policy makers: Evidence from a randomized policy experiment in India. Econometrica 72 (5), 1409–1443.
Chopra, V.K., 1996. Marginal Players in Marginal Assemblies: The Indian MLA. Orient Longman.
Clotfelter, C.T., Ladd, H.F., Vigdor, J.L., 2007. Teacher credentials and student achievement: longitudinal analysis with student fixed effects. Econ. Educ. Rev. 26 (6), 673–682.
Clots-Figueras, I., 2011. Women in politics: Evidence from the Indian states. J. Public Econ. 95 (7), 664–690.
Clots-Figueras, I., 2012. Are female leaders good for education? Am. Econ. J.: Appl. Econ. 4 (1), 212–244.
Congleton, R.D., Zhang, Y., 2013. Is it all about competence? The human capital of US presidents and economic performance. Constit. Polit. Econ. 24 (2), 108–124.
Diaz-Serrano, L., Pérez-Reynosa, J., 2013. Do More Educated Leaders Raise Citizens' Education? Discussion Paper 7661. Institute for the Study of Labor (IZA).
Downs, A., 1957. An economic theory of political action in a democracy. J. Polit. Econ. 65 (2), 135–150.
Dreher, A., Lamla, M.J., Lein, S.M., Somogyi, F., 2009. The impact of political leaders' profession and education on reforms. J. Comp. Econ. 37 (1), 169–193.
Eggers, A.C., Fowler, A., Hainmueller, J., Hall, A.B., Snyder, J.M., 2015. On the validity of the regression discontinuity design for estimating electoral effects: New evidence from over 40,000 close races. Am. J. Polit. Sci. 59 (1), 259–274.
Erikson, J., Josefsson, C., 2019. Does higher education matter for mps in their parliamentary work? evidence from the swedish parliament. Representation 55 (1), 65–80.
Fagernäs, S., Pelkonen, P., 2018. Teachers, electoral cycles and learning in india. J. Hum. Res. 0816–8100R.
Gallego, A., Curto-Grau, M., 2019. The education of politicians: effects on performance and fiscal policy. Unpublished.
Ghani, S.E., Mani, A., O'Connell, S.D., 2013. Can political empowerment help economic empowerment? Women leaders and female labor force participation in India. World Bank Policy Research Working Paper (6675).

Gottesman, A.A., Morey, M.R., 2006. Manager education and mutual fund performance. J. Empir. Financ. 13 (2), 145–182.
Grimmer, J., Hersh, E., Feinstein, B., Carpenter, D., 2011. Are close elections random? Unpublished manuscript.
Halim, N., Yount, K.M., Cunningham, S.A., Pande, R.P., 2016. Womens political empowerment and investments in primary schooling in India. Soc. Indicat. Res. 125 (3), 813–851.
Hill, A.J., Jones, D.B., 2017. Does partisan affiliation impact the distribution of spending? evidence from state governments – expenditures on education. J. Econ. Behav. Org. 143, 58–77.
Iyer, L., Mani, A., Mishra, P., Topalova, P., 2012. The power of political voice: Women's political representation and crime in India. Am. Econ. J.: Appl. Econ. 4 (4), 165–193.
Jackson, C.K., 2018. Does School Spending Matter? The New Literature on an Old Question. Working Paper 25368. National Bureau of Economic Research doi:10.3386/w25368.
Jaffrelot, C., 2016. Laws prescribing educational qualifications for contesting elections are undemocratic. http://indianexpress.com/article/opinion/columns/narendra-modi-pm-degree-arvind-kejriwal-delhi-university-ba-degrees-of-exclusion-2792374/.
Jensenius, F.R., 2015. Development from representation? A study of quotas for the scheduled castes in India. Am. Econ. J.: Appl. Econ. 7 (3), 196–220.
Jensenius, F.R., Suryanarayan, P., 2015. Fragmentation and decline in Indias state assemblies. Asian Surv. 55 (5), 862–881.
Jones, B.F., Olken, B.A., 2005. Do leaders matter? National leadership and growth since World War II. Q. J. Econ. 120 (3), 835–864.
Krishnan, K., Somanathan, T., 2013. The civil service in the 21st century. Unpublished manuscript. New Delhi, India.
Levitt, S.D., 1996. How do senators vote? Disentangling the role of voter preferences, party affiliation, and senator ideology. Am. Econ. Rev. 425–441.
Liaqat, A., 2019. No Representation Without Information: Politician Responsiveness to Citizen Preferences. Working Paper, Harvard University.
Mansbridge, J., 1999. Should blacks represent blacks and women represent women? a contingent" yes". J. Polit. 61 (3), 628–657.
Martinez-Bravo, M., 2017. The local political economy effects of school construction in Indonesia. Am. Econ. J.: Appl. Econ. 9 (2). 256–89
McCrary, J., 2008. Manipulation of the running variable in the regression discontinuity design: a density test. J. Econometr. 142 (2), 698–714.
Nath, A., 2015. Bureaucrats and politicians: How does electoral competition affect bureaucratic performance?Unpublished manuscript, Boston University.
NDTV, 2016. Does education make for better politicians?http://www.ndtv.com/video/news/we-the-people/does-education-make-for-better-politicians-411370.
O'Connell, S.D., 2018. Political inclusion and educational investment: Estimates from a national policy experiment in India. J. Dev. Econ. 135, 478–487.
Osborne, M.J., Slivinski, A., 1996. A model of political competition with citizen-candidates. Q. J. Econ. 111 (1), 65–96.
Prakash, N., Rockmore, M., Uppal, Y., 2019. Do criminally accused politicians affect economic outcomes? Evidence from India. J. Dev. Econ. 141.
Pritchett, L., 2013. The Rebirth of Education: Schooling ain't Learning. CGD Books, Center for Global Development.
Ramachandran, V., Chatterjee, P., Ravi, A., Linden, T., Beteille, T., Dey, S., Goyal, S., Mehta, C., 2015. Teachers in the Indian Education System: Synthesis of a Nine-state study. National University of Educational Planning and Administration, NUEPA, New Delhi.
Shah, M., Steinberg, B.M., 2017. Drought of opportunities: contemporaneous and long-term impacts of rainfall shocks on human capital. J. Polit. Econ. 125 (2), 527–561.
Singh, N., Cruz, S., 1997. Issues in Local Government Reform in India. University of California Santa Cruz, Department of Economics Working Paper, November.
Sukhtankar, S., Vaishnav, M., 2015. Corruption in India: Bridging research evidence and policy options. In: India Policy Forum, 11, pp. 193–261.