How does access to education influence political candidacy?
Lessons from school openings in Sweden

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How does access to education influence political candidacy?

Lessons from school openings in Sweden[a]

by

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Abstract

How does availability of education affect who becomes a political representative? Theorists have pointed out access to education as a key to a well-functioning democracy, but few empirical studies have examined how changes in the access to education influence the chances of becoming a politician. In this paper we analyze the effects of a substantial series of school openings during the early 20th century in Sweden which provided adolescents with better access to secondary education. We use unique administrative data pertaining to the entire Swedish population born between 1916 and 1945. According to our empirical results the opening of a new lower secondary school in a municipality increased the baseline probability of running for political office by more than 10 percent and the probability of holding office by more than 20 percent.

Keywords: Education, political representation, elections.
JEL-codes: H7, I2.

Table of contents

1   Introduction

How can democracies ensure that the most suitable persons become political representatives? For classical enlightenment liberals such as Montesquieu, Condorcet, and Mill, the expansion of public education was a key to a well-functioning democracy. In a society without general access to education, those who can afford education gain an advantage in terms of better knowledge, skills and access to influential connections in their social networks. Hence, equal access to education is often seen as a prerequisite for a society in which all potentially competent persons have the ability to stand as a candidate for a political position. However, despite the fact that theorists have made strong assumptions about the positive democratic effects of expanded educational opportunities, few empirical studies have examined how changes in the access to education are related to the distribution of political power. In this paper, we analyze the effects of a substantial series of school openings that provided adolescents with better access to secondary education in order to answer the question: does the availability of education affect who becomes a political representative?

Much of the present discussion on the relationship between education and democracy is closely linked to the liberal theory of representative government that emerged from the French and American revolutions. Most importantly, the division of labor between ordinary citizens and the elected ruling elite that characterizes modern representative democracy is often described as an attempt to combine the principles of democracy and meritocracy (e.g., Brown 2009, chap. 3). This, however, requires both citizens and their political representatives to possess the necessary skills and knowledge to perform their respective duties.

For this reason, many adherents of representative democracy have considered good access to education a keystone of democracy. Thomas Jefferson's much discussed plan for the establishment of public education in his home state of Virginia provides a good example of this line of reasoning. Jefferson proposed the introduction of a large number of school districts five to six square miles in area and containing a publicly financed primary school so that all the children within each district "may daily attend the school to be established therein" (Jefferson 1984, p. 366). On top of that, Jefferson also called for the creation of public grammar schools, at the county level, in which the most gifted students could continue after primary school, and urged that the location of these

schools should "be as central as may be to the inhabitants of the said counties" (Jefferson 1984, p. 369). For Jefferson the provision of good public schools in close *proximity* to the children's homes was the key to securing the survival and prosperity of democracy.

However, in line with the liberal theory of representative government discussed above, the different stages in Jefferson's school system served different purposes in this regard. The education at the primary level was designed to provide the ordinary citizen with the basic civic competence needed to take an active part in political matters and "to choose with discretion the fiduciary of those he delegates; and to notice their conduct with diligence, with candor, and with judgment " (Jefferson 1984, p. 459). The purpose of expanding access to education at the upper levels, on the other hand, was to guarantee that the talented and virtuous rather than the wealthy and wellborn would occupy the most important political positions in society (Holowchak 2013, p. 1). That is, by increasing the availability of post-primary education Jefferson hoped to improve and enlarge the pool of talent from which the ruling elite, *the natural aristocracy*, would be drawn and could be trained (Carpenter 2013, p. 4). Consequently, as Holowchak (2013, p. 1) explains, Jefferson's plan was to provide primary "education for the general citizenry and higher education for those who would govern".

Thus, advocates of representative democracy, such as Jefferson, have envisioned increased availability of schooling as a vehicle to broaden political participation not only at the mass level, but also at the elite level. The first of these assertions—that mass participation is linked to educational attainment—has received much attention from empirically oriented political scientists (e.g., Wolfinger and Rosenstone 1980; Nie et al. 1996; Kam and Palmer 2008; Sondheimer and Green 2010; Persson 2014). However, systematic studies on the causal link between education and *elite* political participation are in short supply (but see Lindgren et al. 2014). The most important reason for the absence of research on this latter issue is without doubt lack of adequate data. Given that political candidates constitute such a small fraction of the overall population, it is not usually possible to study political recruitment using traditional representative surveys. Another factor complicating research in this area is the difficulty of disentangling the effect of education from the effect of all other factors that may have a bearing on both schooling choices and political activity (cf. Kam and Palmer 2008).

In this paper, we seek to overcome these problems by analyzing the expansion of the public education system in Sweden that resembled Jefferson's vision in important respects. More precisely, we study the effects of increased access to education supplied by the expansion of Swedish lower secondary schools during the early 20th century. To study how this expansion in access to education affected recruitment to political positions we use unique administrative data pertaining to the entire Swedish population born between 1916 and 1945.

We use a difference-in-differences approach to analyze how the establishment of lower secondary schools in municipalities that previously only had primary schools affected the chances of the children in these municipalities holding political positions later in life. To the extent that Jefferson was correct in assuming that the provision of public schools in close proximity to the children's homes would enlarge the recruitment pool for political positions, we should expect to observe more politicians among the cohorts that were young enough to enroll in the new schools. This is indeed what we find. According to our empirical results, the opening of a new lower secondary school in a municipality increased the baseline probability of running for political office by more than 10 percent while the probability of holding office increased by more than 20 percent.

We believe that the present study contributes to previous research in the field substantively as well as methodologically. On the substantive side, we add to the knowledge of how education affects political participation by studying elite political participation rather than mass participation. Methodologically, we show that the *timing* of school openings could provide a source of exogenous variation in educational attainment that can be used to gauge the effect of education on various political outcomes. Although this identification strategy has been used in economics (e.g., Card 1995; Currie and Moretti 2003; Frenette 2009) only one study (Dee 2004) has used school proximity to study the effect of education on political participation.

The paper will proceed as follows. The next section presents a literature review and we discuss our expectations of the results. Thereafter we present the case under study; the Swedish school system and the expansion of the lower secondary education. We then turn to our modeling strategy and results while we end with a discussion of the implications of the findings.

2 Education and elite participation

What motivates citizens to run for office? According to Fox and Lawless (2005; 2014), individuals' potential interest in office-seeking can be summarized in the concept of "nascent ambition". Factors such as political socialization early in life, personality traits and ideological motivation influence a person's nascent ambition. However, nascent ambition does not of course determine by itself whether a person runs for office. Whether one's nascent ambition develops into a political candidacy depends on how favorable the context is for becoming a candidate. Schlesinger (1966) famously labeled the context that potential candidates face as the "political opportunity structure". The opportunity structure determines whether a "nascent ambition" develops into an expressive ambition. Factors such as the number of open seats and the partisan composition of the electorate are characteristics of the opportunity structure that influence how hospitable the context is for potential candidates (Lawless 2012).

These two broad approaches highlight the two possible causal mechanisms linking educational attainment and the choice of running for office. First, a 'cognitive pathway' may mediate an effect of education on political activity (Campbell 2009). According to this view, education can increase civic skills and cognitive abilities (cf. Condon 2015; Jackson 1995). These factors may in turn increase political efficacy and the nascent ambition to run for office, and thereby bring the positive consequences that Jefferson and others anticipated. Moreover, being more highly educated may help a potential candidate to appear more competitive (cf. Card 1997). In line with this logic, studies of leader competence routinely use education as a proxy for the skill level of candidates (Kotakorpi and Poutvaara 2011).

However, education may also influence an individual's position within the political opportunity structure. By increasing a person's social status, education can give access to networks that encourage participation and/or increase the likelihood of getting recruited. In previous research on political participation this is referred to as the education effect being mediated through a 'positional pathway' in which social status functions as the causal mechanism (Nie et al. 1996; Tenn 2005). Campbell (2009) argues that the effect of education on forms of participation that are inherently social and competitive is primarily mediated by social network position. For individualistic acts of participation, such as writing letters to politicians, social network centrality does

not seem to be crucial while we can expect a stronger effect of education through a positional pathway on competitive forms of elite participation such as running for office.

According to Nie et al. (1996) the value of education in relation to social network status is relative rather than absolute since what matters is not a person's educational credentials per se but their ranking in the educational hierarchy. Hence, they see elite participation as a competitive zero-sum game in which those with high social status have an advantage. This reasoning goes back to the political economist Fred Hirsch who, in his 1978 book, argued that it is not obvious that educational expansion would benefit everyone, but rather, as educational levels rise "the effect will be to push competition by hitherto qualified applicants down the hierarchy of jobs" (Hirsch 1978, p. 50).

However, the case under study in this paper is different in that not everyone was subject to the educational expansion simultaneously. Therefore, since we study variation in the access to lower secondary schools, it is reasonable to assume that it affected the distribution in the educational hierarchy. Those from advantageous family backgrounds who belonged to the educational elite before the expansion met with more competition at the top of the educational hierarchy after the expansion, while those who still had inferior access to post-primary education found themselves even further from the top of the hierarchy. Hence, the opening of lower secondary schools gave those who happened to grow up close to them an opportunity to get a relatively better position in the educational hierarchy.

A consistent finding of the research on elite political participation and legislative recruitment is that educational attainment is strongly related to the opportunities to run for and hold political office (Aberbach et al. 1981; Matthews 1984; Blondell and Thiébault 1991; Norris 1997; Cotta and Best 2007; Carnes 2013). As two of the pioneers of this literature noted more than forty years ago, "Government officials and other political leaders in most societies come disproportionately from the more prestigious occupations, the better-educated or otherwise privileged members of the community" (Prewitt and Eulau 1971, p. 301). Sweden is no exception in this case (Bäck et al. 2009).

However, studies with a clean identification strategy for estimating the causal effects of education on elite political participation are rare (for an exception see Lindgren et al. 2014). Turning instead to mass political participation, three approaches have mainly been used when trying to gauge whether the relationship to education is causal: field experiments (Sondheimer and Green 2010), matching techniques (Kam and Palmer 2008, 2011; Mayer 2011; Henderson and Chatfield 2011) and instrumental variable analyses (Milligan et al. 2004; Dee 2004; Berinsky and Lenz 2011). Results from these previous studies point in different directions. But again, it should be noted that none of these studies looked at the impact on elite participation and hence little is known about the effects of changes in access to education on this kind of participation. The purpose of this study is to help fill this gap in previous research by studying how the large expansion of secondary education in Sweden, during the first half of the 20th century, affected recruitment to important political positions. In the following sections we will explain in more detail why we believe Sweden to be a good case to study if we want to learn more about the relationship between education and elite political participation.

3   The Expansion of Swedish Education

At the beginning of the 20th century the Swedish educational system was still of a very elitist nature. Education beyond the primary level, which then amounted to six years of mandatory schooling, was mostly a prerogative of the children of the upper echelons of the society. In 1905 an attempt was initiated to broaden access to post-primary education by splitting the existing secondary schools, the grammar schools, into two tiers (the lower and the upper secondary level). The pupils could then earn a lower secondary certificate (realskoleexamen) after nine years of schooling or an upper secondary certificate (studentexamen) after an additional three years. Children were required to start school at the age of seven, and typically, the way to a lower secondary certificate involved three years in primary school and six years in junior secondary school, whereas an upper secondary certificate was reached through three years in primary school, five years in lower secondary school, and four years in upper secondary school.

Secondary education institutions were mainly concentrated in larger towns. In 1905 teaching at either the lower or upper certificate level was on offer only in 61 of

Sweden's then about 2500 municipalities. In an effort to increase the availability of secondary education in less urbanized areas of the country, the Riksdag enacted a bill in 1909 that allowed for a new type of secondary school, the municipal middle school (kommunal mellanskola). These schools were to be run by the municipalities, but would be subject to inspection by central school authorities and receive state grants to cover part of their costs. The pupils could enter the municipal middle schools after six years of primary school, i.e., typically at the age of 13, and qualify for a lower secondary certificate after four years of studies. It thus took one year longer to obtain a lower secondary certificate in the municipal middle schools compared to the state-run grammar schools. The first two municipal middle schools were established in 1910, and a decade later there were 61 schools of this type (Statistics Sweden 1977, p. 24).

In 1918 a government commission, which echoed Jefferson's vision of providing better access to education, proposed that the state-run secondary schools should be re-modeled along similar lines to the municipal middle schools, i.e., all pupils would attend primary school for six years before being offered the opportunity to continue to four years of lower secondary education in the public grammar schools.

This proposal spurred a long and heated debate and it took until 1927 for the politicians to reach a compromise that involved a "double connection" between primary and secondary schools. This meant that pupils could be transferred to the lower certificate level either after four or six years of primary school.[1] Another important aspect of the 1927 reform was that it granted girls access to all state-run grammar schools, which they did not have before. In order to provide better educational opportunities for children in rural areas the Riksdag also decided that a large number of municipal middle schools should be gradually transformed into state-run grammar schools. This latter decision marked the beginning of a new practice in which new state-run lower secondary schools were developed out of pre-existing municipal middle schools.[2]

Although the reform in 1927 did not become as far-reaching as some of its main advocates had hoped, it nevertheless contributed to the democratization of higher

[1] De facto, this opportunity was only offered to pupils in larger towns were both 4 and 5 year courses at the lower secondary level were available. In smaller towns usually only the former type of courses was available, which meant that the pupils could only transfer after grade six in primary school.
[2] To complicate things even further, municipal middle schools were often developed out of 4-year higher primary schools, which had the same curricula as the municipal middle schools but lacked the right to hold the final lower certificate exam.

education in Sweden. Or, as Herrström (1966, p. 356) noted: "The fact that the reform helped to promote the vigorous expansion of secondary education and that it brought with it considerable improvements for girls is beyond dispute".

Figure 1 The expansion of secondary education for cohorts born 1905–1945
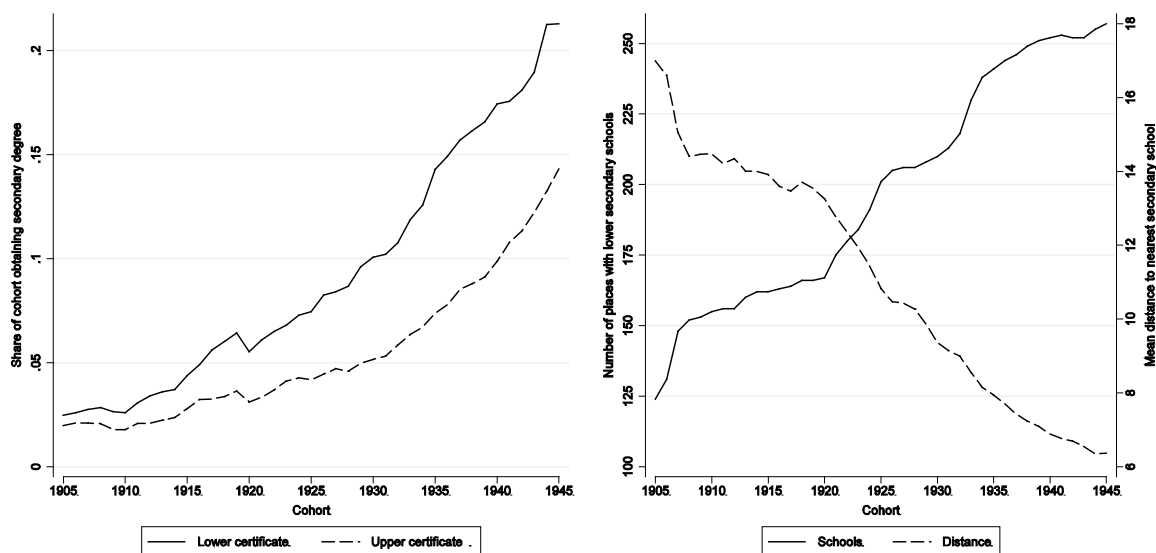
Notes: Data on exams come from Statistics Sweden (1977) whereas the data on the number and the location of the lower secondary schools have been collected by the authors.

The vigorous expansion of secondary education that Herrström refers to is depicted in Figure 1. In the graph to the left we see the large increase in the shares of individuals that obtained a lower or upper secondary certificate among the cohorts born in the first half of the last century. Among those born in 1905 about 2.5 percent earned a lower level certificate and less than 2 percent an upper level certificate. The corresponding figures for those born 40 years later were 21 and 14 percent, respectively. Because the pupils who planned to go on to upper secondary studies usually did not take the exam for the lower level certificate, this means that the share of individuals with secondary education increased by a factor of 8 in only four decades (from 4.5 to 35 percent).

Obviously this huge expansion of secondary education would not have been possible without a corresponding increase in the number of secondary schools. The solid line in the rightmost graph of Figure 1 shows how the number of municipalities with lower secondary schools increased in the period under study. When the cohort born in 1905

was ready to enter secondary education, lower secondary schools were available in 124 municipalities, whereas that number had increased to 257 for the cohort born in 1945.[3]

As can be seen from the figure, the opening of these new schools greatly reduced the average distance to the nearest secondary school. When the children born in 1905 were to start lower secondary school the average distance to the nearest school as the crow flies was about 16 kilometers. Forty years later the corresponding figure was just over 6 kilometers.

The increase in the number of lower secondary schools was partly driven by the increased demand for secondary education, but it also reflected a political will to reduce the inequalities in educational opportunities between more urban and rural areas of the country. Advocates of the 1927 reform often pointed to the concentration of secondary schools in bigger municipalities as an important explanation for the education gap between rural and urban areas. Figures from the mid-1920s had shown that about 70 percent of all pupils studying at the lower secondary level in the public grammar schools came from the municipality in which the school was located. Among the remaining 30 percent twothirds commuted from neighboring municipalities, whereas one-third had moved from their parents in order to study (Proposition 1927/116, p. 102).

The decision, in 1927, to convert a large number of existing municipal middle schools into state-run grammar schools was seen as an important step in reducing these obstacles. In the short term, the decision meant that the provision of secondary education became less dependent on local political support. In the longer term, the improved opportunities to get municipal middle schools converted into state-run grammar schools increased the incentives for municipalities to establish municipal middle schools (by reducing the fiscal responsibilities of the municipalities). This is likely to have contributed to the spread of such schools across the country.

This being said, even after the reform in 1927 the opening of a new lower secondary school in a municipality was often preceded by a long and complicated political process involving actors from different levels of the political system. Among other things the establishment of a new school required the existence of local political entrepreneurs, the availability of suitable school buildings, and the approval of the National Board of

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[3] Here we assume that the starting age of lower secondary school was 13 years, although pupils in the state-run grammar school entered the lower secondary level at the age of 10 before the reform in 1927.

Education. Consequently, whereas both the local demand for education and municipal finances were important factors affecting the decision to open up a lower secondary school in a municipality we believe that *the exact timing* of school openings was subject to considerable random fluctuation.

During the 1930s and 1940s the expansion of the lower secondary school system remained the main instrument for increasing educational equality in Sweden. After years of internal debate the ruling Social Democratic party had settled on what Lindensjö and Lundgren call an "elitistic view of educational equality". That is, the aim of education policy should not be to force all children to attend the same school, but to provide all children with *equal opportunities* to attend different schools. In particular it was considered a big loss for society if academically gifted children from less fortunate circumstances did not continue to secondary education because they lacked the financial means to do so (Lindensjö and Lundgren 2000, p. 41). There is thus a clear resemblance between the educational policies pursued in Sweden in the 1930s and 1940s and Jefferson's plan for public education in Virginia, which we discussed in the introduction. In the next section we explain how we will use the rapid expansion of the number of lower secondary schools to shed light on the link between education and elite political participation.

4   Empirical Strategy

The key difficulty in studying the effects of education is that educational attainment is the result of individual choices. A straightforward comparison of outcomes between individuals with different levels of education may therefore reflect the importance of various factors governing schooling choices, such as innate ability or cognitive skills, rather than education per se.

To overcome this problem researchers typically attempt to identify sources of exogenous variation in education choices. In this paper we follow a literature initiated by Card (1995) that uses geographic differences in the accessibility of educational institutions as a source of exogenous variation (see Öckert (2012) for an overview). The basic idea underlying this approach is that children who have a long way to post-primary schools are less likely to continue to further studies, since commuting (or

moving) is costly in terms of time and money.[4] A bulk of research has shown empirical support for this assumption (Card 1995; Frenette 2004, 2009; Kjellström and Regnér 1999; Holzer 2009; Öckert 2012).[5]

A criticism of the attempts to apply this approach to cross-sectional data is that schools are not allocated in a random manner children growing up close to schools may be systematically different from those brought up in more distant places (Carneiro and Heckman 2002, Cameron and Taber 2004, Frenette 2009). For instance, if well-educated parents are more likely to settle in places where post-primary schools are located an observed correlation between school proximity and educational attainment could potentially be driven by family background. To mitigate this risk more recent studies have instead utilized time-varying data to focus on the impact of school openings (Currie and Moretti 2003, Frenette 2009, Opedisano 2011).

In close correspondence with these latter studies our empirical analysis will rely on the following empirical specification:

$$Y_{icm} = \gamma S_{cm} + \beta' X_{icm} + \Gamma' W_{cm} + \delta_c + \eta_m + \epsilon_{icm}, \qquad (1)$$

where Y is the outcome in question for an individual i from birth cohort c that grew up in municipality m. The variable S denotes our preferred indicator of school availability/proximity. For the main analysis this will be a dichotomous measure indicating whether a lower secondary school was located in the home municipality when an individual finished primary school, but we will also use the distance to the nearest lower secondary school as a robustness check. Because the specification includes both cohort and municipality specific effects (δ and η) we obtain a difference-in-differences set-up where the effect of school availability is identified from the timing of school openings.

The key identifying assumption in the difference-in-differences model is what is known as the common trend assumption, i.e., we have to assume that in the absence of

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[4] As the astute reader may remember this idea echoes the main argument for the need to increase the geographical spread of secondary schools in Sweden in the early 20th century

[5] Furthermore, studies have used distance to educational institutions to test the effects of education on a wide array of different outcomes: Currie and Moretti (2003) use access to colleges in a woman's county in her seventeenth year as an instrument to test the effect of maternal education on the health of newborn children (factors such as birth weight, etc.). Machin, Marie, and Vujic (2012) use the expansion of the UK educational system in the 1980s as an instrument to study the effect of education on crime. And Duflo (2001) exploits school constructions in Indonesia during the 1970s to show that the educational expansion led to an increase in wages.

any school opening the *trends* in education or elite political participation would have followed the same path in the municipalities in which a lower secondary school was established as in those where no such school was opened.[6] This assumption may fail to hold if other factors that affect educational attainment change around the time of the school opening. Assume for instance that particular municipalities, for some reason, experienced a greater shift in the socio-economic composition of different cohorts than others and that this affected the demand for education. To the extent that the location of new lower secondary schools was at least partly determined by the local demand for education, so that new schools were more likely to be located in areas with increasing demand, this could invalidate the common trend assumption.

To mitigate this risk the specification in equation (1) allows for time-varying controls. X captures pre-determined individual characteristics such as gender and immigrant background, whereas W includes controls for various municipal characteristics, e.g., population size, measured at the time an individual was old enough to leave primary school (see the Appendix for more details on these variables). When including these covariates in the model the school-opening effect is identified under the assumption of common trends conditional on observables. In the empirical section we will examine the plausibility of this assumption by various means.

Before moving on to the empirical analysis we will briefly comment on two additional methodological choices. First, our focus will be on the total or reduced form effect, γ in equation 1, which captures the *overall* effect of school openings on the political outcomes of interest. An alternative to this approach would have been to use school proximity as an instrument for educational attainment in order to measure the effect of education on political participation. Distance to schools as an instrument has been used as a strategy in previous research on the effect of education on various social and economic outcomes (Card 1995; Dee 2004). However, we argue that this approach is not appropriate in the present application. Above all, the validity of the instrumental variable approach requires additional assumptions, beyond that of common trends. Most importantly, we have to assume that the effect of school openings on elite political participation is exclusively mediated through years of education, i.e., the so-called exclusion restriction must hold. But if Nie et al. (1996) and others are correct in arguing

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[6] This latter group of municipalities includes both those where no lower secondary school was ever opened and those having a school throughout the period of the study.

that it is the relative rather than absolute levels of education that are of most importance for elite political participation the exclusion restriction is unlikely to be satisfied. The reason is that the opening of a new school will have negative externalities on the cohorts that were too old to go to school because their relative level of education decreases as the younger cohorts enroll in secondary education to a higher extent. If a school opening has an indirect effect on the elite participation of younger cohorts by decreasing the relative competitiveness of older cohorts, the exclusion restriction fails to hold, and the instrumental variable estimate will be biased upwards.[7]

A final methodological choice that needs some discussion is the fact that we will rely on linear regression, rather than logit or probit, to estimate our models even though we are studying binary outcomes such as political candidacy or election. The main reason for this is that the difference-in-differences approach loses much of its attractiveness and simplicity when applied to non-linear models (Blundell and Dias 2009; Lechner 2011). Stated in simple terms, the root of the problem is that the cohort and municipality effects on the probability of elite political participation (δ and η) will not partial out if equation 1 is estimated by a logit or probit model. That is, in non-linear models the inclusion of municipal and cohort fixed effects will not be sufficient to remove the impact of unobserved factors affecting a particular municipality or cohort. Therefore, as Lechner (2011, p. 198) explains:

> Whereas the linear specification requires the group specific differences to be time constant, the nonlinear specification requires them to be absent. Of course, this property of this nonlinear specification removes the attractive feature that DiD allows for some selection on unobservable group and individual specific differences. Thus, we conclude that estimating a DiD model with the standard specification of a nonlinear model would usually lead to an inconsistent estimator if the standard common trend assumption is upheld.

Faced with the choice between having to assume the absence of pre-opening trends in our data or to estimate a linear probability model, whose main problem is usually considered to be the fact that it may give rise to predicted probabilities outside the 0-1

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[7] Another way to state this is that in our case the assumption of Stable Unit Value Treatment (SUTVA) is unlikely to hold and therefore an IV approach will lead to biased estimates. If one persons' schooling affects the political career prospects of those in the community who did not get the same opportunity negatively the IV estimate of the effect of educational attainment will be upwardly biased. But since we instead focus on the total effect the negative externalities on the cohorts that were too old to be affected by the opening of the new school are less problematic.

range, we think the latter is the lesser of the two evils. Therefore we use the linear probability model in the empirical analysis.

5   Data

When studying the effects of school availability on elite political participation we will focus on the school openings occurring between 1935 and 1955. The main reason for starting with the openings in 1935 is data availability, but it also means that we do not have to worry about the fact that women had restricted access to the public grammar schools prior to 1928.

The end date in 1955 is due to the decision to implement a new comprehensive school system in Sweden in the 1950s. The initiation of this school reform signaled the gradual dismantling of the old system with a lower secondary stage, which meant that very few new lower secondary schools were opened after the mid-1950s and it is thus not feasible to continue to study the effects of school openings after this point.[8]

The new lower secondary schools that opened during our study period were all of the four-year type, which meant that pupils could transfer to these schools after six years in primary school. We should thus assume that the pupils were 13 years old when entering these schools. However, since the minimum school-leaving age was typically 14 years in the municipalities in which the new lower secondary schools were established during this time (cf. Fischer et al. 2013) it seems likely that the opening of a new school also affected the schooling decisions of those 14 years old.[9] We will therefore consider an individual as treated by the school opening if he or she was aged 14 or less the year a secondary school opened in the home municipality.[10]

Consequently, the first individuals affected by the openings in 1935 were born in 1921, whereas the first cohort affected by the openings in 1955 was born in 1941. A problem with this is that there can be a difference of more than 20 years between treated and untreated cohorts within a municipality, which raises concern about the compara-

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[9] In Figure A1 in the Appendix we present empirical evidence that indicates that this was indeed the case.

[10] We code home municipality according to the municipal borders in 1960, which means that we have 1029 municipalities in our data.

bility of treatment and control groups. To mitigate this problem we limit our focus to individuals that were between 10 and 19 years old the year the school was opened in the affected municipalities. That is, we use a five-year window around the first affected cohort in these municipalities. For instance, if a new school was opened in 1935 the first cohort included will be born in 1916 (aged 19 in 1935) and the last cohort included will be born in 1925 (aged 10 in 1935). For municipalities in which a new school opened in 1936 we include the cohorts born between 1917 and 1926 and so on. Since our study period is restricted to individuals that were affected by school openings between 1935 and 1955 the youngest cohort included will be born in 1945 (aged 10 in a municipality in which a lower secondary school was established in 1955). Thus, in the affected municipalities our sample consists of individuals born between 1916 and 1945 with the restriction that they should be born within five years from the first affected cohort in the municipality. For all other municipalities – in which a lower secondary school was already established before 1935 or in which no school was opened before 1955 – we instead include all individuals born between 1916 and 1945 in the sample.[11]

To obtain information on our dependent variables, we matched the individuals in our sample with the Register of Nominated and Elected Candidates. The register contains information on all nominated and elected candidates in the ten parliamentary, county council and municipal elections in the period 1982-2014.[12] In the analyses we use indicators for being nominated or getting elected at least once across the ten elections as the main outcomes. We also matched the individuals in the sample with administrative registers with information on demographic characteristics and educational attainment.[13] Moreover, to mitigate the risk that our results are driven by changes in municipality-specific factors we also control for a set of time-varying factors including municipality-level voter turnout, vote shares for the largest parties and size of the electorate the year the individuals turned 13.[14]

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[11] To keep the assignment of treatment and control status as clean as possible the small number of municipalities that opened a lower secondary school between 1930 and 1934 or between 1956 and 1959 were excluded from the analysis.

[12] All three elections – the national and the two regional (county- and municipal-level) elections – are held simultaneously in September every three (until 1994) or four (after 1994) years.

[13] See the Appendix for additional details on these registers and variables.

[14] We use political indicators since year-by-year indicators of socioeconomic development at the municipal level are only available for more recent time-periods. However, previous research has shown that aggregate level turnout and party vote share in Sweden are highly correlated with more direct measures of socioeconomic development (cf. Elinder 2010.) To create the year-by-year indicators we interpolated turnout, vote shares and electorate size between the election years.

In order to classify the persons in our sample as affected by the opening of a lower secondary school in the home municipality, we gathered information on the location of all lower secondary schools in Sweden during the period 1905 to 1966 using several official sources.[15] As mentioned above, an individual is defined as exposed to the school opening if he or she was aged 14 or less the year a secondary school opened in his or her home municipality.[16]

Figure 2 The impact of school openings on the distance to nearest school
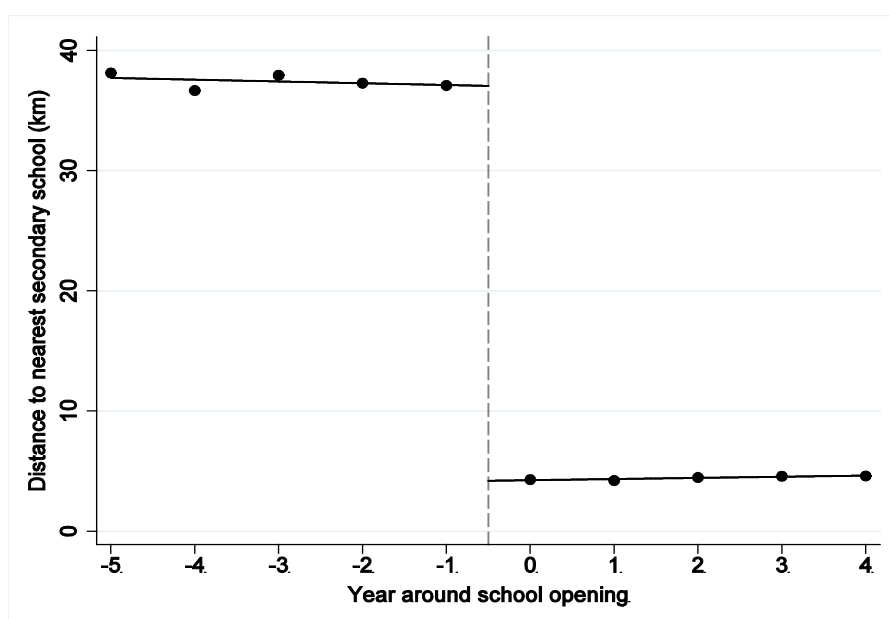
Note: The graph is based on the 77 municipalities in which a lower secondary school was opened between 1935 and 1955.

In the period from 1935 to 1955 the number of municipalities with lower secondary schools increased from 175 to 252, i.e., schools became available in 77 additional municipalities. As can be seen from Figure 2 the opening of these new schools reduced the average school distance for the individuals living in these municipalities by more than 30 kilometres.

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[15] We thank Maya Santimano for helping us obtain this information. In the Appendix we provide further details on the construction of the school indicator.

[16] Unfortunately, information on the individuals' current home municipalities is only available from the censuses from 1960 and onwards. Therefore we need to proxy the home municipality at the time of the school start. For individuals born between 1932 and 1945 and whose parents can be identified via the Multi-Generation Registry, we use information on the parents' home municipality according to the census in 1960 on the assumption that the parents did not move to a new municipality after the child turned 14. For the older individuals we instead use their birth parish and assume that they did not move to a new municipality before they turned 14.

Table 1, finally, reports descriptive statistics separately for the whole sample of individuals included in the main analysis (column 1), the candidates (column 2), and those elected (column 3).

Table 1 Descriptive statistics

	All	Nominated	Elected
Birth year	1930.8	1934.9	1935.1
	(8.9)	(7.7)	(7.55)
Female (%)	49.8	36.6	33.9
	(50.0)	(48.1)	(48.2)
Immigrant background (%)	2.0	3.0	2.9
	(14.1)	(16.9)	(16.7)
Years of schooling	9.7	11.4	11.8
	(3.0)	(3.2)	(3.2)
Post-primary education (%)	45.7	67.3	71.3
	(49.8)	(46.9)	(45.2)
School in municipality (%)	50.0	48.3	49.4
	(50.0)	(50.0)	(50.0)
Nominated (%)	3.15	100.0	100.0
	(17.5)	(0.0)	(0.0)
Elected (%)	0.9	29.1	100.0
	(9.5)	(45.4)	(0.0)
Seats-to-voters ratio (%)	0.2	0.3	0.3
	(0.2)	(0.2)	(0.2)
Municipality level variables measured at age 13			
Voter turnout (%)	74.1	75.8	76.0
	(7.6)	(7.4)	(7.2)
Size of electorate (1000s)	59.5	58.9	56.4
	(136.0)	(139.9)	(136.1)
Vote share - Right party (%)	17.6	16.5	16.2
	(9.1)	(8.1)	(8.0)
Vote share – Liberal party (%)	17.1	19.2	18.8
	(9.7)	(10.1)	(9.8)
Vote share – Center party (%)	13.5	13.9	13.6
	(14.8)	(14.6)	(14.6)
Vote share – Social Democrats (%)	45.3	44.7	45.6
	(13.0)	(12.8)	(12.8)
Vote share – Communist Party (%)	8.1	7.2	7.3
	(9.8)	(9.4)	(9.6)

Notes: N differs from 21,464 to 2,473,915. Entries are means, standard deviations in parentheses.

As can be seen about three percent of our sample ran for office at least once during the period 1982-2014, and just less than one percent were elected. By comparing across columns we can see that the politicians in these generations are better educated, more likely male and more often living in smaller municipalities than the population as a whole. From the lower part of the table we can see that the individuals in the three

groups seem to have been brought up in rather similar municipalities, although there is a slight tendency for politicians to come from somewhat smaller municipalities with slightly higher voter turnout.

6   Results

We start by providing evidence of the strong correlation between education and the two political outcomes in focus. Figure 3 displays the relationship between years of schooling and the probability of standing as a candidate (left graph) and getting elected (right graph) at least once across the elections between 1982 and 2014.

Several important things stand out in these graphs. In line with previous studies on mass political participation we can see that education strongly predicts elite participation (Persson 2015). For instance, adding two more years of schooling from completed primary (7) to completed lower secondary education (9) is expected to double the probability of getting elected from 0.5 percent to 1 percent and increase the chances of standing as a candidate from 2 percent to about 3.5 percent.

Interestingly, the relationship between years of schooling and political representation turns negative at the highest levels in the educational distribution. The probability of running for office and getting elected is lower for people with a PhD degree (19 years of schooling) compared to those with a university degree (16 years of schooling). This may reflect increasing opportunity costs to time spent on mostly unpaid political work among people with higher levels of education. One should also keep in mind that running for office and getting elected are very rare outcomes and that only tiny fractions of the cohorts born between 1916 and 1945 earned university (8.0 percent) or PhD degrees (0.6 percent). Hence, small changes in the composition of candidates and elected could change the relationship between years of schooling and political representation at the far end of the education distribution.

Figure 3 The probability of running for office and getting elected by education
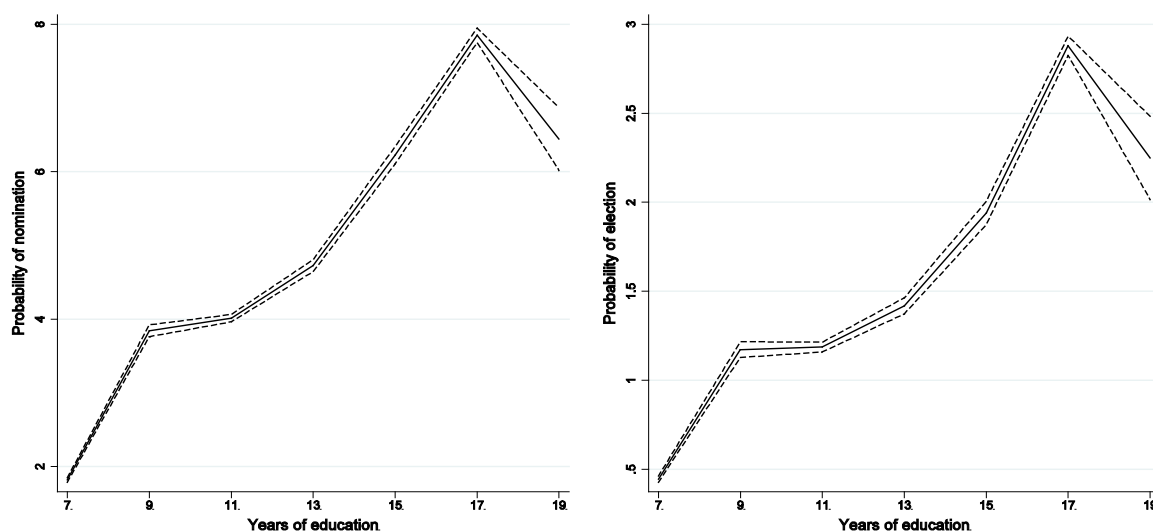
Notes: The lines display the relationship between years of schooling and the probability in percentage points of standing as a candidate (left) and getting elected (right) at least once across the ten elections between 1982 and 2014 for cohorts born between 1916 and 1945. The model specification is that of columns 1 and 4 in Table 2. The dashed lines denote 95 percent confidence intervals.

Another feature worth noticing is that the education gradient is steeper for the probability of getting elected than for candidacy status. Comparing individuals with only primary education (7 years of schooling) with those who have completed a university degree (16 years of schooling) there is a more than fivefold increase in the probability of winning a seat whereas the increase in the likelihood of running for office is less than fourfold.

6.1 The effect of school openings on political participation

To obtain a more credible causal estimate of the effect of education on elite participation we now turn to the impact of the school expansion on the propensity to run for office and getting elected. However, before turning to the study of political outcomes it needs to be established that the availability of new lower secondary schools actually had an impact on educational attainment. With this in view Table 2 presents results from models in which years of schooling and a dummy for post-primary education are regressed on our dummy indicating school availability. All models include controls for gender and immigrant status and the standard errors allow for clustering at the municipality level.

Table 2 The effect of school openings on educational attainment

	Years of schooling			Post-primary education		
	(1)	(2)	(3)	(4)	(5)	(6)
School in municipality	0.132***	0.120***	0.099***	0.025***	0.021***	0.017***
	(0.030)	(0.029)	(0.029)	(0.004)	(0.005)	(0.005)
Municipal controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average outcome	9.692	9.693	9.693	0.457	0.457	0.457
R^2	0.138	0.138	0.139	0.112	0.112	0.112
Observations	2,415,763	2,413,917	2,413,917	2,374,747	2,372,911	2,372,911

Notes: All models include controls for sex, immigrant background, municipality fixed effects, and birth-year fixed effects. Municipality controls include voter turnout, size of the electorate, vote shares for the Communist Party, the Social Democrats, the Center Party, the Liberal Party, and the Right Party, measured at the time the individuals were 13. Standard errors, shown in parentheses, allow for clustering at the municipality level. ***/**/* indicate significance at the 1/5/10% level.

In the baseline models in column 1 and 4 of the table, which reports results from a regression controlling for birth-year and municipality-fixed effects, we find that the opening of a lower secondary school in a municipality increased total schooling by 0.13 years and increased the probability of obtaining at least some type of post-primary education by 2.5 percentage points. However, as discussed in the methods section, the key assumption underlying our identification strategy is that no other important municipal factors affecting the outcomes of interest change around the time of the school opening. To investigate the validity of this assumption, in columns 2 and 5 we control for a set of time-varying factors including municipality- level voter turnout, vote shares for the largest parties and size of the electorate the year the individuals turned 13. It is comforting to note that the effect of school availability decreases only slightly as the municipality-level controls are added to the models.

Nonetheless it could still be the case that trends in other unobserved variables affect our estimates. In columns 3 and 6 we therefore allow the birth-year effects to vary by county (at the time these individuals went to school there were 25 counties in Sweden). As can be seen the estimated effects decrease somewhat when relaxing the assumption that the birth-year effects are constant across the country, but they still remain of substantive importance and statistically significant.

The results presented in Table 2 thus suggest that school openings increased educational attainment among affected individuals. Even more importantly, in Table 3 we can see that the reform also had a long-term impact on elite participation in the elections between 1982 and 2014. In order to simplify interpretation the estimates are

multiplied by 100 and the baseline probabilities (in percentage points) for standing as a candidate and winning office are provided at the bottom of the table. We now also include a linear control for the ratio of municipality assembly council seats to the size of the electorate in the individual's current home municipality among the regressors.[17] The reason for controlling for this variable is that we want to adjust for the strong and mechanically negative effect between the size of the electorate and the probability of running for office and getting elected, which is due to the fact that the size of local assemblies does not increase proportionally to the size of the electorate (Dancygier et al. 2015). Consequently, if obtaining more education makes it more likely that an individual moves to a larger municipality with a smaller seats-to-voters ratio as an adult we do not want this to affect our school opening estimate (but all results excluding the seats-to-voters variable are shown in the Appendix).

Table 3 The effect of school openings on elite participation

	Nomination			Election		
	(1)	(2)	(3)	(4)	(5)	(6)
School in municipality	0.394***	0.331**	0.384**	0.224**	0.195**	0.203**
	(0.151)	(0.149)	(0.154)	(0.085)	(0.086)	(0.087)
Municipal controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
R^2	0.019	0.019	0.019	0.007	0.007	0.007
Observations	2,367,564	2,365,759	2,365,759	2,367,564	2,365,759	2,365,759
Average	3.175	3.176	3.176	0.923	0.924	0.924

Notes: All models include controls for sex, immigrant background, the seats-to-voters ratio, municipality-fixed effects, and birth-year fixed effects. Municipality controls include voter turnout, size of the electorate, vote shares for the Communist Party, the Social Democrats, the Center Party, the Liberal Party, and the Right Party, measured at the time the individuals were 13. Standard errors, shown in parentheses, allow for clustering at the municipality level. ***/**/* indicate significance at the 1/5/10% level.

Looking first at the effect on the probability of standing as candidate we find a positive and statistically significant effect of school availability. The opening of a new secondary school in the municipality is estimated to increase the probability of getting nominated for political office by about 0.4 percentage points, which corresponds to a relative increase of 12.5 percent when compared to the average nomination probability.[18] Although this effect decreases somewhat when adding municipal level

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[17] The seats-to-voter ratio is measured as the average ratio for an individual across the nine local elections between 1982 and 2010.

[18] Alternatively we may relate the size of this effect to the difference in the nomination probability for males and females, which in this sample is about 1.6 percentage points. That is, the school opening effect is about one quarter of the gender effect.

controls to the model (column 2), it increases again when the birth-year effects are allowed to vary between different counties (column 3).

Turning to the effect on getting elected we find even larger effects. To judge from the estimates in columns 4-6 of Table 3 the opening of a new secondary school is estimated to have increased the likelihood of getting elected to political office by as much as 0.2 percentage points, which is more than one-fifth of the baseline probability of getting elected in this sample.[19]

To summarize, several important lessons can be learned from the results. Most importantly, the opening of a lower secondary school in a municipality seems to have increased both education and political participation later in life among the cohorts that were young enough to enroll in the new school. The size of the effect on political participation may seem small at first glance but given how rare it is for someone to become a political candidate the effect is in fact of some magnitude. Indeed, a considerable number of persons are likely to have become political representatives who would not have chosen that path in a counterfactual scenario where no school openings had occurred, Hence, the results provide rare evidence for the widespread, but seldom empirically tested, idea that educational availability matters for the functioning of representative democracy.

6.2   Checking the robustness of the results

The results presented above support the idea that education is conducive to elite political participation. However, before drawing any firm conclusions, we need to examine how sensitive the results are to the most important modeling choices that we have made.

Although the type of difference-in-differences estimator employed here rests on considerably less stringent modeling assumptions than those invoked in previous research on the topic, the chosen research design is not assumption-free. Most importantly, the identifying assumption underlying our empirical analysis is that the trend in elite political participation would have been similar in all municipalities in the absence of any school openings. Since the common trend assumption concerns a counterfactual scenario, it is not directly testable.

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[19] This is about one third of the gender difference in election probabilities, which in this sample is about 0.6 percentage points.

However, in the methodological literature it is frequently suggested that the tenability of various common trend assumptions should be investigated by testing for different trends in the pre-reform period. Tests of this type usually build on the fact that if a particular reform is (conditionally) exogenous, it should not have any effect on cohorts that were too old to be affected by the reform. One way to check this assumption is to perform placebo regressions of the type conducted by Hjalmarsson et al. (2015), in which individuals that were t years too old to be affected by the reform (school opening) are defined as treated. To the extent that we find reform effects for the placebo groups that are of similar sign and magnitude to those for the cohorts actually affected by the school opening, it would signal that the timing of the opening is correlated with some unobserved factors not captured by the difference-in-differences model.

In line with this logic, we re-estimated our preferred model specification also including a placebo reform indicator. We coded this indicator as if the reform had affected individuals who were between one and five years older than the first affected cohort. The results of this test are presented in Table 4.[20]

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[20] More formally, we estimate an equation of the following type $\hat{y}_{icm} = \gamma S_{cm} + \theta P_{cm}^k + \beta' X_{icm} + \Gamma' W_{cm} + \delta_c + \eta_m$, where P_{cm}^k takes on the value of 1 for individuals born exactly k years prior to the first affected cohort. That is θ is the effect of opening a school in the municipality for the individuals that were $14 + k$ years old when the school opened.

Table 4 Placebo regressions

	(1)	(2)	(3)	(4)	(5)
Panel A. Post-primary education					
School in municipality	0.018***	0.019***	0.018***	0.017***	0.016***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Placebo opening	0.001	0.006	0.002	-0.004	-0.005
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Observations	2,372,911	2,372,911	2,372,911	2,372,911	2,372,911
Panel B. Years of education					
School in municipality	0.102***	0.102***	0.100***	0.095***	0.093***
	(0.030)	(0.029)	(0.029)	(0.030)	(0.032)
Placebo opening	0.019	0.019	0.007	-0.018	-0.028
	(0.031)	(0.035)	(0.033)	(0.035)	(0.040)
Observations	2,413,917	2,413,917	2,413,917	2,413,917	2,413,917
Panel C. Nomination					
School in municipality	0.427***	0.398**	0.364**	0.353**	0.375**
	(0.163)	(0.158)	(0.158)	(0.171)	(0.157)
Placebo opening	0.227	0.071	-0.100	-0.154	-0.039
	(0.205)	(0.253)	(0.236)	(0.249)	(0.278)
Observations	2,365,759	2,365,759	2,365,759	2,365,759	2,365,759
Panel D. Election					
School in municipality	0.241***	0.173*	0.194**	0.215**	0.192**
	(0.087)	(0.091)	(0.133)	(0.092)	(0.090)
Placebo opening	0.194	-0.149	-0.047	0.058	-0.053
	(0.131)	(0.120)	(0.133)	(0.149)	(0.130)
Observations	2,365,759	2,365,759	2,365,759	2,365,759	2,365,759
Placebo year	t-5	t-4	t-3	t-2	t-1
Municipality controls	Yes	Yes	Yes	Yes	Yes
County x Cohort FE	Yes	Yes	Yes	Yes	Yes

Reassuringly, the placebo regressions show little sign of any important pre-opening trends in the data. None of the coefficients of the placebo indicators reach conventional levels of statistical significance, and the signs of these coefficients vary across pre-reform cohorts. Although the outcome of this test does not prove that our key identifying assumption is correct, it considerably strengthens the credibility of this assumption.

An alternative, often used, robustness check when estimating difference-in-differences models is to include controls for municipality-specific trends in the specification. However, as explained by Wolfers (2000), to the extent that the introduction of a particular reform or policy implies both a level and a trend shift, the municipality-specific trends may partly control for the policy response that we want to estimate. This problem, which can cause bias in the estimates, is aggravated when the analysis is based on few time points. To circumvent the problem highlighted by Wolfers, but still allowing for municipality-specific trends, Holmlund (2008, p. 20) suggested that one can use pre-reform data to predict municipality-specific trends in the

outcome of interest. Because these trends are estimated on the data from the pre-reform period they will not capture trend shifts induced by the policy in question.

In Table 5, we therefore present school-opening effects on educational attainment and political activity, including municipality-specific predicted pre-opening trends as controls.[21] As can be seen the results are stable against the inclusion of these municipality-specific trends. The point estimates from our preferred specification are very close to those reported in Table 2 and Table 3.

Table 5. Results with predicted municipality-specific trends

	Years of schooling	Post-primary education	Nomination	Election
School in municipality	0.110***	0.019***	0.361**	0.214**
	(0.034)	(0.005)	(0.176)	(0.094)
Time Trends	Yes	Yes	Yes	Yes
Municipality controls	Yes	Yes	Yes	Yes
County x Cohort FE	Yes	Yes	Yes	Yes
R^2	0.14	0.11	0.02	0.01
Observations	2,413,917	2,372,911	2,365,759	2,365,759

Notes: All models include controls for sex, immigrant background, municipality-fixed effects, and birth-year-fixed effects. The two models on nomination and election also include a control for the seats-to-voters ratio. Standard errors, shown in parentheses, allow for clustering at the municipality level. ***/**/* indicate significance at the 1/5/10% level.

Another potentially important modeling choice is that of restricting the analysis to a five-year window around the time the school opened. Figure 4 displays how the coefficient of the school-opening indicator, from our preferred model specification, varies with the size of the observation window.

Overall, our main findings do not appear to be very sensitive to the choice of window size. For all four outcomes the school-opening coefficient remains positive regardless of the size of the observation window. That being said, it is also clear that the estimates, in particular for the political outcomes, become much noisier and imprecisely estimated as the window is shrunk. In addition, it can be noted that the magnitude of all coefficients decreases somewhat when we restrict attention to cohorts born very close to the first affected cohort. However, if it takes a few years for the introduction of a new school to

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[21] More precisely, we predict pre-opening trends in the four outcomes of interest using cohorts born in 1911-1945. In a first stage, the outcome is regressed on a full set of municipality and county by cohort fixed effects as well as a linear municipality-specific effect, restricting the analysis to cohorts that were above 14 years old when the school opened. To increase precision when estimating the time trends we do also include individuals that were more than 5 years too old to be affected by the school opening.

reach its full effect, we will tend to underestimate the long-run effect if using a very narrow window.

Figure 4 School-opening effects for different observation windows
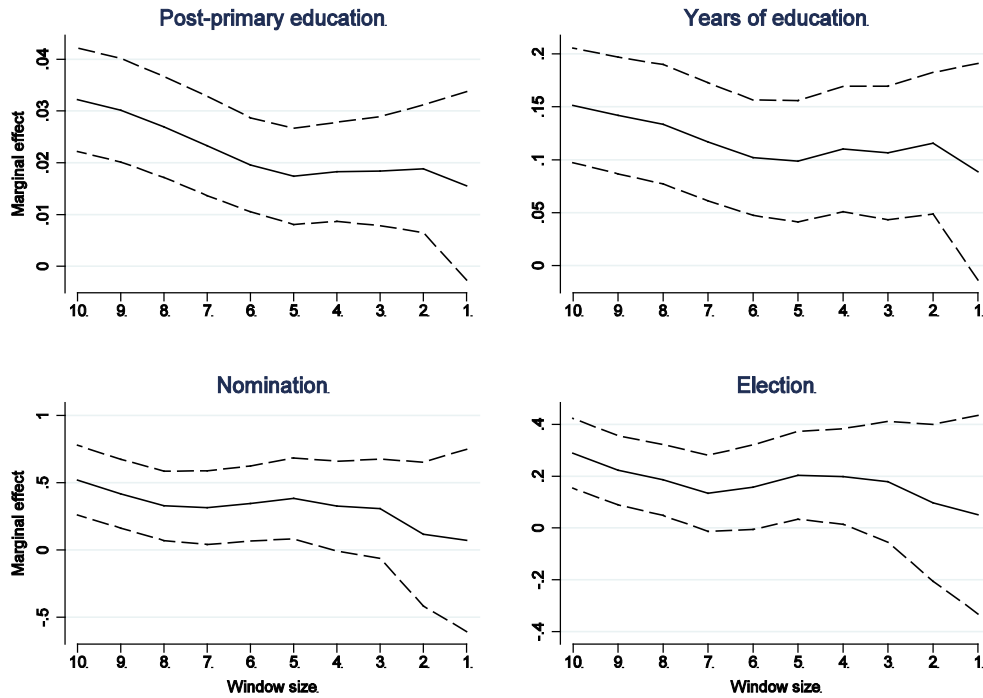
Notes: The solid lines denote the effect of school availability on the outcome of interest. The dashed lines represent 95 percent confidence intervals for these effects.

We have also examined how sensitive our results are to the choice of defining individuals aged 14 to be treated by the school opening; this has been done by re-estimating all models excluding this particular cohort from the sample. This does not affect any of the main results. If anything the effect of school availability on both educational attainment and elite political participation is strengthened somewhat when excluding the individuals that were 14 years old from the analysis (see the Appendix for the full results).

To account for the fact that the probability of being nominated or elected is mechanically related to the size of the municipality we have included a linear control for the seats-to-voters ratio when analyzing the political outcomes. In the Appendix we show that we obtain very similar results if we allow the effect of the seats-to-voters variable to have a non-linear effect or if we include a full set of dummy variables for municipality of residence in 1980 in the model.

Finally, we re-estimated all models using the (log) distance to the nearest lower secondary school as the main independent variable. The results from these analyses, which we present in the Appendix, are well in line with those presented here. Both educational attainment and elite political participation decrease with the distance to nearest lower secondary school.

7   Possible causal mechanisms

Thus far we have presented results demonstrating that school availability in adolescence positively predicts elite political participation later in life. The next question we turn to is the potential mechanisms that may explain these results. As discussed in the literature review previous research has emphasized two mechanisms by which education may lead to increased political activity. First, the causal influence of education on political participation could be mediated by a cognitive pathway by enhancing civic skills and cognitive abilities in general and political knowledge and political interest in particular (Lewis-Beck et al. 2008). In contrast, adherents of the relative education model argue that education has a more indirect effect on political engagement via a positional pathway. Relatively better educated individuals typically enjoy higher social and economic status and are more closely connected and exposed to political networks that spur political participation (Nie et al. 1996, Campbell 2009).

The administrative data we have employed so far do not include any information on potential mechanisms mediating the relationship between education and political participation. Instead we will use data from the Swedish National Election Study (SNES) for the period 1982-2010 and the Society, Opinion and Media (SOM) survey from 2001 to shed some light on this issue. The SNES and SOM data contain several items that measure political skills and abilities as well as network connections. However, both surveys lack information on place of birth. Therefore we cannot employ the difference-in-differences approach used in the main analysis to identify the causal effect of school openings on these mechanisms. Instead the aim of the following analyses is more modest: to provide descriptive evidence on the differences in levels of political interest, political knowledge, and degree of connection to political networks between individuals who only attended seven years of compulsory schooling and those whose highest attained education corresponds to a lower secondary degree.

In Table 6 we report estimates from models in which we regress different measures related to the cognitive and positional pathways on a trichotomous education variable distinguishing between (a) primary education (baseline category), (b) completed lower secondary degree and (c) completed upper secondary degree or higher. The outcome variables are rescaled to the 0-1 range and higher values denote more of the characteristic in question. Following the main analyses we restrict the sample to individuals born between 1916 and 1945. For further information on item wordings and codings see the Appendix.

The results in the first three columns suggest that attaining a lower secondary degree is positively related to different aspects of the cognitive pathway. When asked directly about their general interest in politics respondents with a lower secondary degree are more interested than those who only attended primary school (column 1). The pattern of results for news consumption in column 2 – how often the respondents read newspaper articles with political content – is very similar. Column 3 reports estimates for an index based on the ability to answer correctly a number of political knowledge questions. Once again we find a statistically significant positive relationship between educational attainment and political knowledge. To get a sense of the substantive importance of attaining the lower secondary degree the mean and standard deviation for each outcome are reported at the bottom of Table 6. In all three cases the coefficient estimates amount to about a third of the size of one standard deviation of the outcome in focus.

Recent research on the effect of schooling on cognitive ability and the impact of cognitive ability on political participation further substantiate the potential importance of the cognitive pathway for understanding our results. Exploiting the random variation in the exact date Swedish males complete cognitive tests as part of the mandatory conscription Carlsson et al. (2015) showed that additional school instruction has a positive effect on cognitive skill formation. Moreover, using the same test scores Dawes et al. (2014) reported that in a sample of Swedish twins cognitive ability is positively related to a number of political acts such as voter turnout, contacting politicians and attending protest meetings.

Turning to the three rightmost columns, we focus on outcomes related to the positional pathway. The first item measures how often persons close to the respondent – family, friends and colleagues – discuss political issues. In the last two columns we

report results from two indicators intended to tap into the strength of the respondent's political networks. The measures are based on a set of items asking the respondent whether he/she knows a local politician or a member of the national parliament and, if so, whether the relationship is superficial or close. In line with the argument of the relative education model, we find that respondents who have completed lower secondary school have more politically engaged social networks (column 4) and are more often acquainted with (column 5) and personally know (column 6) politicians at the local and national levels. As was the case for the first three models in Table 6 the substantive impact of attaining a lower secondary degree is to increase the level in all three measures of the positional pathway by approximately a third of one standard deviation.

Table 6 Analysis of potential mechanisms

	Cognitive pathway			Positional pathway		
	Political Interest	Pol. news consumption	Political Knowledge	Discuss politics	Weak pol. network ties	Strong pol. network ties
Lower secondary school	0.083***	0.163***	0.091***	0.144***	0.086*	0.074*
	(0.009)	(0.018)	(0.008)	(0.023)	(0.047)	(0.040)
Upper secondary/tertiary	0.153***	0.273***	0.135***	0.202***	0.046	0.093***
	(0.006)	(0.012)	(0.005)	(0.015)	(0.030)	(0.027)
Mean outcome	0.544	0.544	0.629	0.411	0.158	0.112
S.d. outcome	0.258	0.498	0.224	0.492	0.287	0.245
Cohorts	1916-1945	1916-1945	1916-1945	1916-1945	1916-1945	1916-1945
Survey	SNES	SNES	SNES	SNES	SOM	SOM
Observations	7,911	7,565	6,297	5,291	546	546

Note: The models on political interest, news consumption, discussing politics and political knowledge are based on the Swedish National Election Surveys (SNES) from the parliamentary elections held between 1982 and 2010. All these variables have 4 categories but they have been rescaled to the 0–1 range. The models on social network ties are based on the Swedish Society, Opinion and Media (SOM) survey in 2001. Both of the two indicators of network ties have 3 categories and have been rescaled to the 0–1 range. Higher values denote more political interest, greater political news consumption, more frequent discussions about politics with family and friends, greater political knowledge and a larger number of social network connections. The models based on SNES include controls for sex, election-year fixed effects and birth-year fixed effects while the models based on SOM include controls for sex and birth-year fixed effects. Robust standard errors are shown in parentheses. ***/**/* indicate significance at the 1/5/10% level.

The overall impression of the estimates reported in Table 6 is one of consistency. Irrespective of the measure used the average score for those who completed lower secondary school is higher compared to those who only attended primary school. Also, with the exception of weak political network ties in column 5 respondents in the top educational category score highest on all indicators. Hence, bearing in mind that this is correlational evidence, the estimates reported in Table 6 suggest that the positive effect

of acquiring a lower secondary degree on political candidacy may have been mediated both through a positional and a cognitive pathway.

However, it is important to stress the obvious limitation with this mechanism probe. Since the evidence is strictly correlational we cannot rule out the possibility that a host of factors may confound the relationship between educational attainment and the different indicators of the cognitive and positional pathways used in Table 6. Moreover, the assumed causal link between, on the one hand, the cognitive and positional mechanisms and, on the other, political participation may very well go in the opposite direction. For instance, it is highly likely that political activity could lead to stronger political networks and connections. Thus, the results presented in Table 6 should be considered as suggestive but only tentative.

8   Discussion

Political theorists have discussed for a long time the importance of education for a well-functioning democracy that succeeds in electing the most competent persons as political leaders. Jefferson even went as far as considering "an educated public as a bastion against the encroachment of an overzealous government" (cf. Carpenter 2013, p. 1). However, little is known about the actual consequences of rolling out an educational system that resembles Jefferson's vision of better access to education for political representation. Empirical studies have rarely focused on the causal impact of education on elite political participation.

Ours is therefore a rare study which tries to estimate the causal effects of educational availability on elite participation in the form of candidacy for representation. The unique Swedish register data provides us with an exceptional opportunity to perform these analyses, but the case under study is also relevant outside the Swedish context since most industrialized countries experienced a strong educational expansion during the 20th century and are likely to have had a somewhat similar development. In a comparative perspective the Swedish case is no outlier in this regard. As we explained earlier it is a very suitable case for testing the ideas on how education matters for democracy put forward by Jefferson and others, since Swedish educational policies clearly echoed these ideas.

By exploiting the exogenous variation related to the timing of opening of Swedish lower secondary schools from 1935 to 1955 and using data on the full Swedish population we show that being subject to the educational expansion increases individuals' probability of running for office later in life by 0.4 percentage points and their chances of winning a seat by 0.2 percentage points. Given that the baseline probabilities for candidacy status and winning office are about 3 and 1 percent, respectively, the effects should be considered substantial.

While our approach to estimating the effects of education has important advantages it is not without its own shortcomings. As mentioned earlier, the effect of school openings can be mediated by both skills and abilities that affect a person's nascent ambition to run for office or social network connections that will later be of importance for a potential political candidacy. Our probe into the causal mechanisms, indicating that both causal pathways can be at work, is merely tentative and cannot verify the exact causal flows. But despite the inability to follow the exact causal paths the overall effects of the reform on educational attainment and political candidacy can still be estimated – and we believe that the evidence of the effects we show is hard to ignore.

How can it be explained that this study does show significant and considerable effects of education while a number of studies on mass political participation (e.g. Kam and Palmer 2008; Berinsky and Lenz 2010) have failed to do so? One reason might be that we study elite participation, and that education effects are stronger in this area than for easier forms of participation. Nie et al. (1996) suggest that the influence of education on participation in difficult and competitive acts is primarily mediated by the positional pathway, i.e. social network status. For competitive forms of political participation recruitment and contacts are important in a way that is not the case for easier individualistic acts of participation such as boycotting, signing petitions or voting. Then, if the education effect runs through a positional pathway it should be reasonable to expect stronger effects on political candidacy than on, for example, voting.

Another feature of this study is that we study variation in a part of the educational distribution that is most often *not* studied. While most previous studies have focused on the effects of college we study lower secondary education. Although this is a form of education at a lower level than is usually examined, it should be remembered that this was an exclusive form of education during the period studied. But most importantly, it

was an elite education that was acquired at a relatively early age and it might be possible that students are more impressionable during these years (cf. Sears and Funk 1999). At the time when individuals acquire higher education political attitudes might already have crystallized and important network connections might already have been formed, leaving little room for an additional boost in participation because of college graduation.

What are the wider implications of our results? One could perhaps question the current relevance of changes in the Swedish educational system that took place more than 60 years ago. However, we suggest that the results not only have historical interest but also important implications for the functioning of existing democracies. In particular, the results are relevant to those countries that have not yet supplied sufficient opportunities for their citizens to acquire education at the lower secondary level. In these countries, giving better access to education might help expand the pool of potential political leaders and give proper training to the potentially most competent persons.

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Appendix

Details on data and measures

Nominated—Equal to 1 each time the individual ran for office at the national, county or municipal level in the ten general elections held 1982, 1985, 1988, 1991, 1994, 1998, 2002, 2006, 2010, and 2014 (for the elections between 1982-1988 we only have information for the municipal level). Information is retrieved from the Register of Nominated and Elected Candidates.

Elected—Equal to 1 each time the individual was elected to office at the national, county or municipal level in the ten general elections held 1982, 1985, 1988, 1991, 1994, 1998, 2002, 2006, 2010, and 2014. Information is retrieved from the Register of Nominated and Elected Candidates.

School in municipality—Equal to 1 if there was a lower secondary school in an individual's home municipality when he or she was 14 years old. During the period we study a majority of lower secondary schools began as 4-year higher primary schools. These schools had the same curricula as the lower secondary schools but lacked the right to hold the final lower certificate exam (but the pupils from the higher primary schools could take the exam at the nearest lower secondary school). Since almost all 4-year higher primary schools turned into lower secondary schools within 5 to 6 years after they were established, a lower secondary school is assumed to have been in existence by the time a 4-year higher primary school was opened in a municipality. All school data have been obtained from official statistics, most often from the yearly publication *Statsliggaren*, which contain detailed information on governmental public expenditures.

Distance to school—Measures the logarithmic distance in kilometers to the nearest lower secondary school. To construct this measure we have gathered information on the location of all lower secondary schools that existed during the study period. If we failed to find an exact address we assumed that the school was located in the center of the municipality (which it usually was). To locate the individuals we have used information on home parish (see the description on home municipality below) and calculated the distance from the parish church (which usually had a central location in the parish) and the nearest lower secondary school.

Home municipality—Information on the individuals' home municipalities is only available from the censuses from 1960 and onwards. Therefore we need to proxy the home municipality at the time of the school start. For individuals born between 1932 and 1945 and whose parents can be identified via the Multi-Generation Registry, we use information on the parents' home municipality according to the census in 1960 under the assumption that the parents did not move to a new municipality after the child turned 14. For the older individuals we instead use their birth parish and assume that they did not move to a new municipality before they turned 14.

Sex—Equal to 1 if female. Information is retrieved from the Swedish Population Register.

Birth-year—Information is retrieved from the Swedish Population Register.

Municipality of residence—Municipality of residence in 1960. Information is retrieved from the 1960 census.

Immigrant background—Equal to 1 if the individual or at least one parent was born abroad. Information is retrieved from the Swedish Population Register.

Years of schooling—The measure is based on information concerning the highest completed degree from the 1970 census. We assigned the following years of schooling to each category: primary school shorter than 9 years (7); pre-secondary education 9-10 years (9) ; upper secondary education less than 3 years (11); upper secondary education 3 years (12); post-secondary education shorter than 3 years (14); post-secondary education 3 years or more (15.5), postgraduate education (19).

Post-primary education—Equal to 1 if the individual's highest completed degree is above the primary level. The data are from the 1970 census.

Political interest—Based on the following survey item from the Swedish National Election Studies between 1982 and 2010: "In general, how interested in politics are you? Which of the answers on this card describes you most accurately? Are you very interested, fairly interested, not very interested or not at all interested in politics?"

Political news consumption—Based on the following survey item from the Swedish National Election Studies between 1982 and 2010: "How often do you read news and articles about politics in the daily press?" Response alternatives: "Never reads news and articles about politics "; "Occasionally reads news and articles about politics"; "Often reads news and articles about politics"; "Reads what there is in the newspaper of news and articles about politics every day".

Political discussion—Based on the following survey item from the Swedish National Election Studies between 1982 and 2010: "How often is there discussion about politics in your nearest surroundings – in your family, among your friends at work and among other friends? Does it happen very often, fairly often, not very often or not at all?"

*Political network ties*—Based on the following survey item from the Society, Opinion and Media survey in 2001: "Among your friends and acquaintances, are there some belonging to the following occupations? Member of local parliament; Member of national parliament"; Response alternatives: "No there is no one with that occupation in my acquaintanceship"; "Yes, remotely"; "Yes, closely"; "I have this occupation myself".

Additional and alternative analyses

School starting aging

In the main text we assume that the 14-year-olds were affected by the school openings although the standard age for starting lower secondary school was 13. To check this assumption we were able to obtain complete school enrollment records for four lower secondary schools that begun operations between 1920 and 1947. As can be seen from Figure A 1, a substantial share of the pupils starting the first grade were indeed 14 years old. The first year the schools were in operation (the leftmost graph) the 14-year-olds were actually in the majority, whereas they constitute just under one third of all first graders during the next three years of operation (the rightmost graph).

Figure A 1. Age distribution among first graders in four lower secondary schools
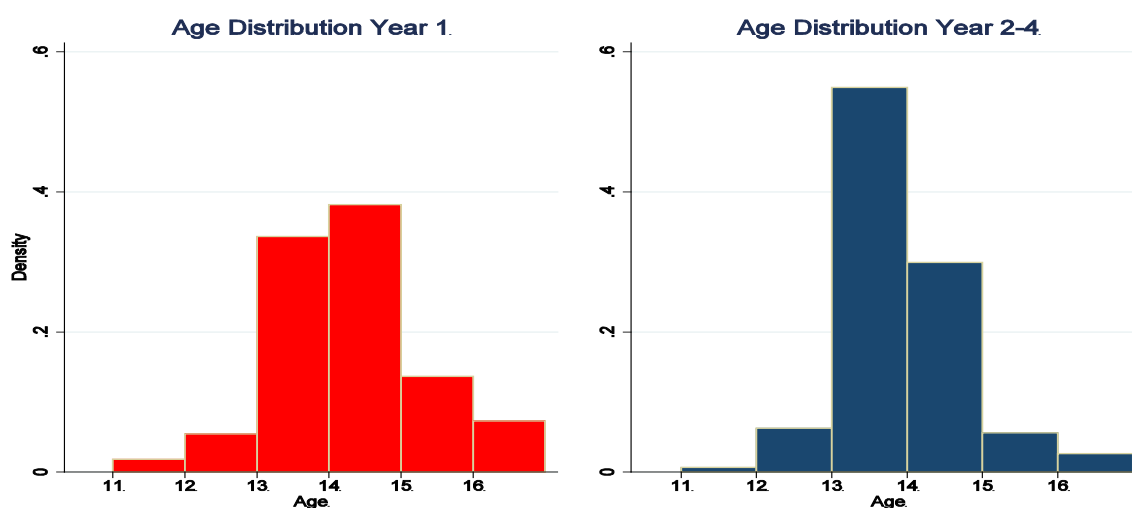
Even though Figure A 1 seems to support the assumption that also the 14year-olds were affected by the openings, we cannot tell whether the enrollment pattern found in these four schools was representative of all other lower secondary schools that opened during the study period. In Table A 1 and Table A 2 we therefore present models corresponding to the ones displayed in Table 2 and Table 3 in the main text but in which we have excluded the individuals that were 14 years old when the schools opened from the analysis.

Table A 1. Results for education when excluding the 14 year-olds

	Years of schooling			Post-primary education		
	(1)	(2)	(3)	(4)	(5)	(6)
School in municipality	0.139***	0.125***	0.103***	0.027***	0.022***	0.019***
	(0.032)	(0.031)	(0.030)	(0.005)	(0.005)	(0.005)
Municipal controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average outcome	9.694	9.694	9.694	0.457	0.457	0.457
R^2	0.138	0.138	0.139	0.112	0.112	0.113
Observations	2,409,667	2,407,894	2,407,894	2,368,724	2,366,960	2,366,960

Notes: All models include controls for sex, immigrant background, municipality fixed effects, and birth-year fixed effects. Standard errors, shown in parentheses, allow for clustering at the parish level. ***/**/* indicate significance at the 1/5/10% level.

Table A 2. Results for elite participation when excluding the 14-year-olds

	Nomination			Election		
	(1)	(2)	(3)	(4)	(5)	(6)
School in municipality	0.474***	0.401***	0.466***	0.271***	0.242***	0.250***
	(0.157)	(0.156)	(0.161)	(0.088)	(0.088)	(0.092)
Municipality controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average	3.174	3.174	3.174	0.923	0.923	0.923
R^2	0.019	0.019	0.019	0.007	0.007	0.007
Observations	2,361,586	2,359,852	2,359,852	2,361,586	2,359,852	2,359,852

Notes: All models include controls for sex, immigrant background, the seats-to-voters ratio, municipality fixed effects, and birth-year fixed effects. Standard errors, shown in parentheses, allow for clustering at the municipality level. ***/**/* indicate significance at the 1/5/10% level.

Comparing these results to those presented in Table 2 and Table 3 in the main text, it is evident that excluding the 14–year-olds from the analysis does not affect the main findings. If anything, the point estimates of the school opening indicator are somewhat larger when the problematic cohort is left out of the analysis.

Distance to school
In the main text we have measured school availability by a dummy indicating whether there was a lower secondary school in a particular municipality. In Table A 3 and Table A 4 we instead use the distance to the nearest lower secondary school, measured in log kilometers, as our main independent variable. Given that distance varies by parish in our data, we here use parish-fixed effects rather than municipality-fixed effects. All substantive findings from the main text remain intact.

Table A 3. The effects of school proximity on educational attainment

	Years of schooling			Post-primary education		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to school	-0.032***	-0.037***	-0.025***	0.008***	-0.008***	-0.006***
	(0.009)	(0.009)	(0.009)	(0.002)	(0.002)	(0.002)
Municipal controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average outcome	9.692	9.693	9.693	0.457	0.457	0.457
R^2	0.145	0.146	0.146	0.117	0.117	0.118
Observations	2,415,763	2,413,917	2,413,917	2,374,747	2,372,911	2,372,911

Notes: All models include controls for sex, immigrant background, parish fixed effects, and birth-year fixed effects. Standard errors, shown in parentheses, allow for clustering at the parish level. ***/**/* indicate significance at the 1/5/10% level.

Table A 4. The effects of school proximity on elite participation

	Nomination			Election		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to school	-0.116***	-0.111***	-0.110***	-0.061***	-0.056***	-0.057***
	(0.038)	(0.037)	(0.037)	(0.020)	(0.021)	(0.021)
Municipality controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average	3.175	3.176	3.176	0.923	0.924	0.924
R^2	0.020	0.020	0.020	0.007	0.007	0.007
Observations	2,367,564	2,365,759	2,365,759	2,367,564	2,365,759	2,365,759

Notes: All models include controls for sex, immigrant background, the seats-to-voters ratio, parish-fixed effects, and birth-year-fixed effects. Standard errors, shown in parentheses, allow for clustering at the municipal level. ***/**/* indicate significance at the 1/5/10% level.

Alternative ways of dealing with municipality size

In order to net out the influence on municipal size on the likelihood of standing as a candidate or becoming elected we include a linear control for the seats-to-voters ratio in the models presented in Table 3 in the main text.

In Table A 5 we examine how sensitive the results are to the assumption that the seats-to-voters variable enters linearly in the model. In columns 1 and 3 of the table we do this by adding seats-to-voters squared to the model, whereas in columns 2 and 4 we instead include a full set of dummies for municipality of residence in 1980. By comparing the results of Table A 5 to those of Table 3 we see that the main results appear to be very robust to alternative ways of controlling for municipality size.

Table A 5. The effects of openings on elite participation with alternative controls for seats-to-voters

	Nomination		Election	
	(1)	(2)	(3)	4)
School in municipality	0.366**	0.373**	0.200**	0.193**
	(0.149)	(0.149)	(0.082)	(0.082)
Squared seats-to-voters	Yes	No	Yes	No
Municipality-1980 FE	No	Yes	No	Yes
Municipality controls	Yes	Yes	No	Yes
County x Cohort FE	Yes	Yes	Yes	Yes
R^2	0.020	0.020	0.007	0.007
Observations	2,365,759	2,357,486	2,365,759	2,357,486

Notes: All models include controls for sex, immigrant background, the seats-to-voters ratio, municipality-fixed effects, and birth-year-fixed effects. Standard errors, shown in parentheses, allow for clustering at the municipal level. ***/**/* indicate significance at the 1/5/10% level.

Nonetheless, if school availability affects geographic mobility the total effect of school openings will differ from the effects reported in Table 3 and Table A 5. In Table A 6 we therefore show what the results look like when excluding the seats-to-voters control altogether.

Table A 6. The effects of openings on elite participation without control for seats-to-voters

	Nomination			Election		
	(1)	(2)	(3)	(4)	(5)	(6)
School in municipality	0.263*	0.227	0.310**	0.174**	0.156*	0.174**
	(0.151)	(0.151)	(0.155)	(0.084)	(0.085)	(0.085)
Municipality controls	No	Yes	Yes	No	Yes	Yes
County x Cohort FE	No	No	Yes	No	No	Yes
Average	3.155	3.156	3.174	0.917	0.917	0.918
R^2	0.011	0.011	0.019	0.004	0.004	0.004
Observations	2,383,329	2,381,524	2,381,524	2,383,329	2,381,524	2,381,524

Notes: All models include controls for sex, immigrant background, municipality-fixed effects, and birth-year-fixed effects. Standard errors, shown in parentheses, allow for clustering at the municipality level. ***/**/* indicate significance at the 1/5/10% level.

As should be expected the coefficient of the school availability indicator decreases somewhat when not controlling for the seats-to-voters ratio. With that said the overall pattern of the results remains very similar to those presented in the main text.

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