

Ben Salah, Mhamed; Chambru, Cédric; Fourati, Maleke

**Working Paper**

## The colonial legacy of education: Evidence from of Tunisia

Working Paper, No. 411

**Provided in Cooperation with:**

Department of Economics, University of Zurich

*Suggested Citation:* Ben Salah, Mhamed; Chambru, Cédric; Fourati, Maleke (2024) : The colonial legacy of education: Evidence from of Tunisia, Working Paper, No. 411, University of Zurich, Department of Economics, Zurich, <https://doi.org/10.5167/uzh-218541>

This Version is available at:

<https://hdl.handle.net/10419/303071>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



**University of  
Zurich** <sup>UZH</sup>

University of Zurich  
Department of Economics

Working Paper Series

ISSN 1664-7041 (print)  
ISSN 1664-705X (online)

---

Working Paper No. 411

# **The Colonial Legacy of Education: Evidence from of Tunisia**

Mhamed Ben Salah, Cédric Chambru and Maleke Fourati

Revised version, September 2024

---

# The Colonial Legacy of Education: Evidence from Tunisia\*

MHAMED BEN SALAH<sup>†</sup>  CÉDRIC CHAMBRU<sup>‡</sup>   
MALEKE FOURATI<sup>§</sup> 

September 2024

## Abstract

This paper uses spatial variations in the enrolment rate of Tunisian pupils in 1931 to estimate the weight of colonial history on medium- and long-run educational attainment. We assemble a new dataset on the location of public primary schools and the number of pupils and teachers, together with population data for 1931. We match these data with information on education at the district level, derived from two population censuses conducted in 1984 and 2014. We find that a one per cent increase in the enrolment rate in 1931 is associated with a 2.37 percentage points increase in the literacy rate in 1984, and a 1.89 percentage points increase in 2014. We further investigate the exposure to colonial public primary education across different age cohorts. We find that our results are mainly driven by older generations, and tend to fade for younger cohorts. While we provide qualitative evidence that a cultural transmission of education may have contributed to this persistence, we also argue that the continuous effort and investment made by Tunisian governments to achieve universal primary enrolment best explain the decline in spatial disparities in educational attainment.

**JEL classifications:** D10, H52, I25, I28, N37, N47, Z10.

**Keywords:** Colonial investment; Colonial settlers; Primary education; Literacy; Tunisia.

\*We thank Denis Cogneau, Rasha Shakra, Lore Vandewalle, and Rémi Viné as well as seminar audiences at the Geneva Graduate Institute, University of Geneva, MASE-ESSAI Carthage, South Mediterranean University, and Stellenbosch University for many helpful comments and suggestions. We thank Bob Rijkers for kindly sharing with us valuable data for this project, and Sabrine Aloui for granting us access to the 1984 census held at the National Institute of Statistics. We also would like to thank Hatem Ben Salem for kindly sharing insights about the elements of the 1989–91 education reform. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. All errors are our own.

<sup>†</sup>Mhamed Ben Salah, South Mediterranean University, Mediterranean School of Business. Email: [mhamed.bensalah@medtech.tn](mailto:mhamed.bensalah@medtech.tn).

<sup>‡</sup>Corresponding author: Cédric Chambru, Center for Economic Research on Governance, Inequality and Conflict, École normale supérieure de Lyon, CNRS. Email: [cedric.chambru@ens-lyon.fr](mailto:cedric.chambru@ens-lyon.fr).

<sup>§</sup>University of French Polynesia and the South Mediterranean University, Mediterranean School of Business. L.R. MASE (LR21ES21), ESSAI, Université de Carthage. Economic Research Forum. Emails: [maleke.fourati@msb.tn](mailto:maleke.fourati@msb.tn) or [maleke.fourati@upf.pf](mailto:maleke.fourati@upf.pf).

# 1 Introduction

“For us, education is a social function, i.e. a fundamental factor in our collective entity, and a responsibility that must be fulfilled equally by the state, the teacher and the learner.” (Habib Bourguiba, 29 June 1968 [authors’ translation])

In 2000, the United Nations set universal primary education as the second Millennium Development Goal. Education, and more generally the diffusion of knowledge and human capital, are key components of economic growth and break the vicious circle of the poverty trap (Gennaioli et al. 2014; Glaeser et al. 2004; Jones and Romer 2010). Tunisia is among the top ten countries in terms of public spending on education, either as a percentage of the national budget or as a percentage of GDP.<sup>1</sup> Many studies document that part of the regional disparity in education is a legacy of the colonial past, whereby countries inherited the education models implemented by European settlers. In fact, whatever the settlers brought to their colonies—extractive institutions, civil vs. common laws, etc.—it proved to have had a lasting imprint on contemporary economic development (Acemoglu, Gallego et al. 2014; Nunn 2009).

Along this line, we study the influence of local population exposure to colonial public primary education in Tunisia and medium- and long-term educational outcomes. From 1881 to 1956, Tunisia was a French protectorate. During this period, French settlers were engaged in building primary schools and increasing enrolment rates for both Europeans and Tunisian pupils (Sraieb 1993). We exploit spatial variations in the enrolment rate of Tunisian Muslim pupils in 1931 to estimate the weight of colonial history on education. For this purpose, we assemble a unique dataset on the location of colonial public primary schools, and the number of pupils and teachers by origin, together with population data in 1931. We match these data with information on education at the district (*délégation*) level, derived from two population censuses conducted in 1984 and 2014. Our results provide novel insights on the dynamics of persistence of the colonial past.

On the one hand, we observe a strong relationship between the exposure of the local population to colonial public primary education and the level of human capital in the medium- and long-run. A one per cent increase in the enrolment rate of Tunisian Muslim pupils in 1931 is associated with a 2.37 percentage points increase in literacy rate in 1984.<sup>2</sup> Interestingly we observe that the relationship is weaker three decades

<sup>1</sup> Over the past fifteen years, public expenditures in education have amounted to approximately 6–7 per cent of Tunisian GDP, while the global average is 3.7 per cent. This represents about 20–5 of the government budget, compared to 13.8 per cent globally (UNICEF 2022: 11, 61).

<sup>2</sup> Throughout the paper, we focus on Tunisian Muslim population because the Tunisian Jewish

later (1.89 percentage points in 2014). On the other hand, we take advantage from the structure of our data to study this relationship by 5-year age cohort between the 1930s and the late 1990s. We show that this relation peaked for the cohort born in the late 1940s before continuously declining until the end of the twentieth century. In 2014, the relationship between the exposure to colonial public primary education and literacy rate is three times weaker for the age group 15-29 than for the rest of the Tunisian population. This suggests that, in Tunisia, the path dependence of colonial education has begun to fade away in the recent decades. We discuss four plausible channels to explain this set of results.<sup>3</sup>

First, while there is no consensus in the literature on whether colonial investment is the main driver of colonial persistence (Calvi and Mantovanelli 2018; Huillery 2009), we find weak evidence for this channel. Second, we find some evidence in support of transmission through the effect of colonial education on the occupational sector (Valencia Caicedo 2019). The results show that the exposure of Tunisian Muslim pupils to colonial public primary education is positively and significantly associated with the propensity to work in industry and manufacturing, but not in the agricultural sector. However, we cannot confirm this channel because we are unable to disentangle skilled from unskilled occupations within these sectors. Third, we use qualitative accounts to rule out the competition channels with Islamic schools and private schools. The former have always had a different objective from public schools, be it to transmit religious knowledge rather than to develop literacy and human capital. Private primary education, unlike Islamic education, is a recent phenomenon, and was negligible more than two decades ago.<sup>4</sup> As a result, we posit that none of these alternative types of schooling can explain the colonial persistence of education. Fourth, we consider that the most plausible channel is the transmission of an educational culture. We find a strong correlation between the share of Tunisian males with primary education in the younger generation and those in the older generation, which may provide suggestive evidence of vertical transmission. However, this pattern portrays an unconditional relationship and must be considered with caution. Finally, our qualitative evidence on the decline in past dependency is best explained by the continuous efforts of successive Tunisian governments to achieve universal primary enrolment—a goal that was finally

population (*Israélites*) made up 2.5 per cent of the total population in 1931. The majority of which subsequently emigrated from Tunisia after 1956 (see Section 2).

<sup>3</sup> It should be noted that we provide only tentative evidence for each channel, because data limitations do not allow us to investigate them thoroughly.

<sup>4</sup> In 1931, there were 32 private schools, mainly in Tunis. They represented 6 per cent of the total number of schools. If anything, Chaudhary and Rubin (2011) show that, in historical India, districts with stronger Muslim religious authorities tended to have lower levels of Muslim literacy. The authors suggest that this may be due to the more religious nature of the school curriculum in these districts, which may have been less focused on developing literacy skills.

achieved in the 2000s.

We show that our results are robust to controlling for the spatial distribution of the European population and the level of investment in education during the colonial period. One concern is that the location of the primary schools was endogenous. Tunisia's colonial history provides a unique setting to confirm that our results are robust. In 1926, Italians accounted for 51.5 per cent of the European population in Tunisia, and it was not until in 1931 that French settlers outnumbered them. However, most of Europeans, including Italians, left the country after the independence. Therefore, one should not expect to find any association between European (Italian) exposure to colonial public primary education and medium- and long-run educational outcomes. Placebo exercises show that neither French nor Italian enrolment rates have any predictive power for literacy rates and the likelihood of completing primary school. Moreover, permutation tests show that our treatment outperforms randomly assigned enrolment rates. Taken together, these exercises reinforce the credibility of our results.

**Related literature.** This paper relates to the broader literature on colonial persistence in socio-economic outcomes (Guardado 2022). Colonial institutions have been considered as the workhorse of such persistence (Acemoglu, Johnson et al. 2001; Acemoglu and Robinson 2006; Dell 2010; La Porta et al. 1999). Banerjee and Iyer (2005)'s seminal work on India finds that differences in historical property rights led to different contemporary economic outcomes. Focusing on Brazil, Rocha et al. (2017) show that a settlement policy that attracted more educated immigrants in some municipalities at the turn of the twentieth century led to higher levels of schooling and per capita income a century later. Our study contributes to the literature by adding a case study for a country located in a region often neglected in development and historical persistence studies, the Maghreb. In contrast to Brazil, where the European settlement itself was long-lasting, the vast majority of European settlers left Tunisia after independence. This means that, in the Tunisian context, the persistence is entirely indigenous, rather than a mixture of indigenous and European settlers. In addition, unlike India or Brazil, Tunisia has a highly homogeneous population, in terms of religion and ethnicity, which limits the threat of potential confounders.<sup>5</sup>

The paper also contributes to scholarship focusing more specifically on colonial investment. Huillery (2009) documents the long-term impact of colonial investment in education, health, and infrastructure in French West Africa. She highlights the

<sup>5</sup> Tunisia is 98 per cent Arab, and Sunni Muslims make up 99 per cent of the population according to the CIA's World Factbook (<https://www.cia.gov/the-world-factbook/countries/tunisia>) [last access on 10 March 2024].

persistence of investment as the main mechanism, meaning that current public investment predominates in areas where colonial investment already prevailed. Dupraz (2019) uses the partition of Cameroon to study long-term educational outcomes. He finds that, in 2005, individuals born after 1970 were more likely to have completed high school and to have a high-skilled occupation if they were born in the formerly British part of the country.<sup>6</sup> In this paper, we rely on a more refined measure of exposure to colonial education by estimating the enrolment rate of Tunisian Muslim pupils and controlling for colonial investment. In this way, we estimate the direct exposure to colonial public primary education, rather than just colonial investment in education, which may have benefited settlers only. Even though there was no universal primary education during the colonial period, we show that the stronger the exposure to colonial primary education in a given district, the stronger the association with educational outcomes for the age cohort born from the late 1940s onwards. This result is consistent with findings from Wantchekon et al. (2014) for Benin. They show that individuals who attended colonial schools had higher educational attainment and earnings than their counterparts. This effect persists in the second generation. Interestingly, the descendants of uneducated people living in villages with a colonial school also had higher educational attainment than their counterparts from villages without a school.

Rather than institutions, Glaeser et al. (2004) view human capital as the main driver of persistence. In particular, there is a large literature on the impact of Christian missions on education (Cagé and Rueda 2016; Calvi, Hoehn-Velasco et al. 2020; Waldinger 2017). However, Jedwab et al. (2022) show that Christian missions tended to be located in already more developed areas, leading to an overestimation of the effect of missions on human capital. Álvarez-Araón et al. (2023) address this criticism and find that distance from Catholic missions had a persistent effect on the contemporary number of primary schools per capita as well as female educational outcomes in the Democratic Republic of the Congo. While data from Cagé and Rueda (2016) show that missions were very sparse in Tunisia around 1900, French settlers may also have settled in more developed areas. We draw from this literature and systematically control for predetermined geographic and economic characteristics. We also run placebo exercises to show that the medium- and long-term influence of the indigenous enrolment is not driven by unobservable factors. In particular, we find that there is no significant relationship between the enrolment rate of European pupils in 1931 and medium- and long-run educational outcomes. This suggests that it is truly the exposure of Tunisian Muslim pupils that really matters.

<sup>6</sup> For a discussion of the factors behind the difference in the persistence of colonial investment between the former British and French colonies, see Ricart-Huguet (2021).



Our work also complements that of Chaudhary and Garg (2015), who find that educational reforms in post-colonial India have successfully outweighed the long-lasting effects of colonial education. Similarly, our results suggest that persistence fades over generations. While we cannot causally document the influence of post-colonial policies implemented to achieve universal primary education, we provide qualitative evidence to document the centrality of educational reforms in this process.

The remainder of the paper is organised as follows. Section 2 provides colonial and contemporaneous institutional backgrounds in Tunisia. Section 3 describes the data and methodology used to assemble the dataset. Section 4 introduces the empirical strategy, quantifies both the static and dynamic influence of exposure to colonial public primary education and contemporary educational outcomes. Section 5 considers a wide range of sensitivity checks. Section 6 discusses possible channels, and Section 7 concludes.

## 2 Historical background

France's interest in Tunisia intensified after the conquest of Algeria (1830–57). At the time, Tunisia, which had been under Ottoman rule since 1574, was facing domestic challenges. The reign of Ahmed Bey (1837–55) was marked by rising public expenditure and, increasingly financial difficulties. In 1863 and 1865, Bey Mohammed es-Sadok (1859–82) contracted Tunisia's first foreign debt, the burden of which triggered a severe financial crisis in the late 1860s. These economic vulnerabilities, coupled with the decline of the Ottoman Empire, made Tunisia an attractive target for French expansionism.

At the Congress of Berlin in 1878, Germany and Great Britain gave their consent for France to invade Tunisia. In February 1881, a conflict between a Tunisian tribe, the *Kroumirs*, and an Algerian tribe, the *Ouled Nahd*, prompted French military intervention. Within a few months, the Bey signed the Treaty of Bardo (12 May 1881), which made Tunisia a French protectorate. The treaty gave France responsibility for the country's defence and foreign policy decisions. The subsequent Conventions of La Marsa, signed on 8 June 1883, transferred administrative, judicial and financial powers from the Bey to the French government.

The arrival of the Maltese in 1816 marked the beginning of a substantial European presence in Tunisia, followed by a wave of Italian immigrants, primarily Sicilians, in the 1820s. The French population arrived mainly after the conquest of Algeria, completed in 1857 (Planel 2015). By 1881, there were an estimated 19,000 Europeans living in Tunisia, the majority of whom were Italians. French colonisation efforts began



soon after the establishment of the protectorate. Initially, large financial firms acquired vast tracts of land to develop agriculture and mining. However, in the mid-1890s, the protectorate shifted its focus to a colonisation policy targeting small landowners. Unlike in Algeria, Tunisian land was not freely granted to settlers, which slowed the pace of colonisation.<sup>7</sup> During the first decades of the protectorate, around 2,000 French settlers arrived in Tunisia each year. Until 1931, the Italian population remained the most significant European community in Tunisia (63 per cent in 1906, online Appendix Table A.1).<sup>8</sup>

The post-independence period saw a significant demographic shift in Tunisia. The European population, which had grown steadily during the colonial period, began to decline rapidly. By 1958, just two years after independence, more than half of the French settlers had departed and by the mid 1960s that number had risen to over 90 per cent (Wolkowitsch 1959). While the departure of Italians occurred at a slower pace, with 20 per cent leaving by 1958, their numbers eventually dropped as well. By 1969, 90 per cent of the Italian community had emigrated. In the late 1990s, only 800 Italians in Tunisia belonged to the pre-independence community (Davi 2000). Tunisian Jews (*Israelites*) also experienced a similar exodus, with their numbers falling from 105,000 in 1940 to approximately 7,000 by the late 1960s (Ben Achour 2015).

## 2.1 Pre-colonial education

For centuries, religious spaces were the sole providers of education in Tunisia. The *Medersa* of the Al Zaytouna mosque, founded in 737, served as a central institution. While traditional education persisted, the emergence of modern educational institutions began with the military *École Polytechnique du Bardo* in 1838. This marked a departure from religious-centred education. The Sadiki College, founded in 1875 on the principles of the French school system, was the next major step towards a western-inspired education system. In 1893, however, traditional elementary education given in Koranic schools (*kuttebs*) was still prevalent with 961 schools serving 17,000 children in 1893 (Bourdand 1893: 294).<sup>9</sup>

The growing European community in the first half of the nineteenth century led to the establishment of several European educational institutions, which preceded the

<sup>7</sup> Centre des archives diplomatiques de Nantes, Tunisie, protectorat, 1er versement (hereafter CADN–Tun., 1er vers.), 1361 et 1362.

<sup>8</sup> The presence of Italians was a constant source of concern for the administration, which continuously sought for ways to increase the presence of French settlers and/or to ensure that the interests of the Italian population were aligned with those of France. CADN–Tun., 1er vers., 916 A et 2130 à 2134.

<sup>9</sup> For an overview of the education system before the protectorate, see Arnoulet (1994), and Foncin (1882). Degorge (2002) provides a discussion of the progression of public education during the protectorate. On the evolution of non-public schools during this period, see Damis (1974).

colonial administration's efforts to create a unified system. The British established a Protestant school for the Maltese in 1830, followed by the London Jews Society's Israelite school. The first French school, a free girls' school, was founded by Mother Émilie de Vialar in 1840, three years before the Italians established their own. A dozen French and a few other European schools were founded between then and 1883. These private and congregational schools primarily served European communities in Tunis, Sousse, and Sfax (Bannour 2001).

## 2.2 Colonial education

Before the creation of the *Direction Générale de l'Instruction Publique* in 1883, Tunisia had no unified education system. The French protectorate sought to extend its cultural influence through education. Historical records indicate that, from the beginning of colonisation until the 1930s, French schools targeted European children to counter Italian influence.<sup>10</sup> French education policy in Tunisia was shaped by its experience in Algeria. Jules Ferry's recommendations to Louis Machuel, then head of the *Direction Générale de l'Instruction Publique*, stressed the importance of teaching Arabic alongside French, providing religious education for both Catholics and Muslims, and employing Tunisian (or Algerian) teachers to teach Arabic and Islamic studies (Sraieb 1993). These recommendations were born out of France's failure to bring local children into schools in Algeria. This approach aimed to alleviate local concerns about cultural displacement and to encourage school attendance. The catechism was also promoted specifically for the European population in order to teach French to the large and highly religious Italian population.

Online appendix Table A.2 depicts the evolution of colonial investment in public primary education. French investment increased substantially between 1891 and 1931. The number of schools and pupils increased from 76 to 468 and from 8,208 to 67,089, respectively. From 1931 onwards, more Tunisian pupils were enrolled in primary schools than European pupils, although the enrolment rate remained much higher for the latter (Bousnina 1991: 45–6).<sup>11</sup> The geographical spread of colonial investment in education is also evident: French schools were present in 165 out of 264 districts in 1931, compared with only 43 in 1891. French education in Tunisia was also somewhat inclusive. The share of Tunisian Muslim pupils rose from 32 per cent in 1891 to 52 per

<sup>10</sup> On the diffusion of Italian schools during the colonial period, see Montalbano (2020). The widespread presence of Italian-speaking schools was a concern for the colonial administration that feared the diffusion of Italian influence and the risk of being overthrown. CADN–Tun., 1er vers., 1356 à 1358.

<sup>11</sup> By comparison, in 1930 there were 3,497 boys and 3,837 girls were enrolled in 33 private schools, of which 8.5 per cent were Tunisian Muslim. BnF, NUMM-9105654, Statistique générale de la Tunisie, 1936, pp. 63–6.

cent of the total in 1931. This paper focuses only on public primary education, which accounted for 94 per cent of the schools and 90 per cent of the pupils in 1931.<sup>12</sup>

## 2.3 Education after independence

Following independence in 1956, the Tunisian government made the expansion of primary education a priority. The ambitious goal of achieving universal primary enrolment by 1966 was met with significant challenges, particularly a severe shortage of teachers. Achieving universal primary education meant that 980,000 children had to be enrolled each year, whereas in 1956-7 about 270,631 children attended primary school. One of the major constraints was the low number of teachers: in 1957, there were only 6,159 teachers, whereas about 20,000 were needed in order to keep a reasonable ratio of 40 pupils per teacher.

The first major education reform in 1958 attempted to address these challenges by opening new teacher training schools, lowering the duration of primary school from 7 years to 6 years, and reducing the number of hours of schooling per day. The new curriculum was designed so that the first two years of primary education consisted of 15 hours of school per week and, in the last four years, 25 hours per week. This allowed teachers to teach several classes of pupils without decreasing their weekly working hours (30 hours). As a result, the number of teachers fell from 6,159 for 6,066 classes in 1957 to 5,358 for 7,474 classes in 1958, and the number of pupils increased by 52,554 in only one year (Debiesse 1958).<sup>13</sup>

To overcome these difficulties, the government substantially increased spending on education, from 18 per cent of the national budget in 1958-9 to 32 per cent in 1967 (Eibl 2020; Tarifa 1971). Nevertheless, the challenges were high: in 1958, the primary school enrolment rate ranged from as low as 13 per cent in the governorates of Béja and Kairouan to around 30 per cent in Bizerte and Gabès, and up to 42 per cent in Tunis.<sup>14</sup> In 1957, UNESCO reported that Tunisia was suffering from ‘a very grave shortage of teaching staff’ and that it ‘will continue to experience great difficulties

<sup>12</sup> Half of the 32 private schools in Tunisia were located in the capital Tunis. It should be noted that the number of primary schools continued to increase after 1931, but we were unable to identify disaggregated data. Before independence, there were about 700 primary schools located in 418 municipalities, enrolling about 140,000 pupils. The enrolment rate reached 30 per cent for males and 10 per cent for females.

<sup>13</sup> The number of teachers decreased between 1957 and 1958 because many of the 1,500 French teachers decided to resign from their positions and emigrate. See also *Nouvelle conception de l'enseignement en Tunisie*. Tunis: Secrétariat à l'Éducation nationale, 1958, p. 149. <https://catalogue.bnf.fr/ark:/12148/cb331975106>.

<sup>14</sup> The unequal access to primary education translated into significant differences in literacy rates across Tunisia. See Bousnina (1991: 57–8, 68–78) for a detailed discussion of regional disparities at independence.

for several years to come' before sufficient numbers of primary schools teachers were trained in higher teacher training school.<sup>15</sup> Three years later, UNESCO noticed that 'the rate of opening new classes considerably exceeds that of the supply of teachers by the training schools'. In 1959, 56 trainees graduated from the training schools, while the number of pupils enrolled in primary schools increased by 43,929 in the same year.<sup>16</sup> Ten years after the reform, the shortage of teaching staff was still stark: 14,148 teachers were teaching 777,686 pupils in 1966-7. Despite the construction of a staggering 1,000 classrooms per year, the pupils-teacher ratio was still 55.<sup>17</sup> As a result, and despite government efforts, many Tunisian pupils were unable to attend primary school in the 1960s and 1970s. As evidenced by Figure 2, primary school enrolment was capped at around 60 per cent, which slowed the spread of literacy among the population.<sup>18</sup> However, the Tunisia government pursued its investments in education which continued to make significant progress throughout the 1980s and the 1990s. By 1994, the primary school enrolment rate had reach 86.2 per cent (Figure 2).

The second major reform, implemented between 1989 and 1991, aimed to promote the universalisation of primary education throughout the country, emphasising human rights and citizenship, raising students' awareness as social actors in a modern state, and countering the influence of religion.<sup>19</sup> It also aimed to combat racial and sexual discrimination, improve the quality of education, and ensure a better match between training and employment (Bouttemont 2002; Mahjoubi 2010). The reform made schooling compulsory for nine years instead of six for children aged between 6 and 16, and reorganised the training of primary school teachers by creating a new training school modelled on the French system. It also strengthened the separation between religion and schools by prohibiting religious veils and making mixed-sex classes compulsory (Lucenti 2017).<sup>20</sup> The reform was accompanied by continuous investment to support the spread of education. Between 1975 and 2000, the government built an additional 2,000 primary schools across the country and continued to train and recruit more teachers (Bouttemont 2002). From an average

<sup>15</sup> *International Yearbook of Education*, v. 19, 1957, pp 379–83. <https://unesdoc.unesco.org/ark:/48223/pf0000132931> [last access on 10 March 2024].

<sup>16</sup> *International Yearbook of Education*, v. 22, 1960, pp. 394–9. <https://unesdoc.unesco.org/ark:/48223/pf0000132937> [last access on 10 March 2024].

<sup>17</sup> *International Yearbook of Education*, v. 29, 1967, pp. 416–20. <https://unesdoc.unesco.org/ark:/48223/pf0000132955> [last access on 10 March 2024].

<sup>18</sup> In 1975, the average years of schooling was 2.9 for males and 1.6 for females (Zoughlami and Skik 1977: 52).

<sup>19</sup> Hatem Ben Salem (former Minister of Education in Tunisia in 2008–11 and 2017–20), personal communication, 23 July 2024.

<sup>20</sup> For a detailed discussion of the state of primary education in at the turn of the 1990s, see *Développement de l'éducation en Tunisie, 1990–1992. Rapport présenté à la 43e session de la conférence internationale de l'éducation*. Tunisia, Ministère de l'Éducation et des sciences, 1992, p. 104.

of 0.9 teachers per class in the early 1980s, the ratio rose to 1.03 in 1990, 1.27 in 2000 and 1.40 in 2016 (UNICEF 2022: 69). By 2004, the enrolment rate for children aged 6–14 had reached 95 per cent, compared with 55 per cent in former French colonies in sub-Saharan Africa (Garnier and Schafer 2006). Ten years later, the enrolment rate for children aged 6–11 reached 99 per cent.<sup>21</sup> Overall, while the 1989–91 reform contributed to the eventual achievement of universal primary education, it is in fact the continued investment by successive Tunisian governments that enabled the progressive elimination of the striking spatial disparities in public primary education inherited from the colonial era.

### 3 Data

#### 3.1 Unit of analysis

Our unit of analysis is the district (*délégation*). These administrative boundaries are the result of various reforms since independence in 1956 and only partially correspond to the pre-existing administrative boundaries of the French (*contrôle civil*) and the Tunisian (*cheikhat* and *caïdat*) administrations, which coexisted between 1881 and 1956. In several modern-day large urban areas, such as Gabes, Sfax, Sousse, or Tunis, the number of districts had increased as the population had grown in recent decades. Between 1984 and 2014, 66 additional districts were created, bringing the total number of districts to 264, grouped into 24 governorates (*gouvernorats*), themselves grouped into six geographical regions. However, historical sources rarely contain information on the exact postal addresses of schools or the spatial distribution of the population within the city. This means that we are unable to allocate historical data across districts within the same city. Moreover, in small urban districts, pupils could easily have shuttled from one district to another within the same large city to attend school (Bousnina 1991: 176–8).

In total, our dataset includes 198 districts in 1984, and 217 districts in 2014, after merging urban districts to obtain consistent administrative boundaries (online Appendix Figure A.1).<sup>22</sup> We also choose to exclude the governorate of Tunis from our baseline samples. As the capital of Tunisia, Tunis concentrated an unusually high

<sup>21</sup> Ministère de l'Éducation, Tunisie, Statistiques scolaires, Données et indicateurs du secteur 2013–2014, [http://www.education.gov.tn/article\\_education/statistiques/stat2013\\_2014/Livre\\_Stat.pdf](http://www.education.gov.tn/article_education/statistiques/stat2013_2014/Livre_Stat.pdf) [Last accessed on 10 March 2024].

<sup>22</sup> Our baseline vector data come from the United Nations' Second Administrative Level Boundaries (SALB) programme (<https://salb.un.org/en>). No vector data are available for 1984. We reconstruct district boundaries by merging districts based on information contained in three sources: the 1984 population census; the decrees published in the *Journal officiel de la République tunisienne*; the 1975 Tunisian administrative map (Bousnina 1991: 19).

number of European settlers during the protectorate, and continued to attract the bulk of economic activity after independence (Belhedi 1999).<sup>23</sup> In fine, our baseline samples include a total of 184 districts in 1984, and 211 districts in 2014.

### 3.2 Educational outcomes

We use two main dependent variables to capture medium- and long-run educational outcomes at the district level. First, *literacy rate* captures the share of Tunisians who can read. Data for 1984 and 2014 were obtained from the Tunisian National Institute of Statistics (INS) population censuses (*Recensement Général de la Population et de l'Habitat*). While 2014 data are publicly available,<sup>24</sup> the INS gave us access to the aggregated data by district from the 1984 census. In 1984, the average literacy rate across districts was 48 per cent, with a minimum of 13 per cent and a maximum of 76 per cent. Three decades later, the average literacy rate had increased to 76 per cent, with a minimum of 44 per cent and a maximum of 94 per cent (Tables 1 and 2).

Second, the variable *primary education* indicates the share of males who completed primary education. The INS granted us access to the aggregated data by age cohort and by district in 1984, whereas the information is not publicly available from the 2014 census. We derive it from Do et al. (2023) who use education level as a control variable in their study of the relationship between radicalisation to violent extremism and internet access in Tunisia. In the two samples, we consider both all males of 10 years and older (15 years and older in 2014), and 5-year age cohorts in order to investigate the dynamics of the relationship between exposure to colonial public primary education and medium- and long-run educational outcomes.<sup>25</sup> Overall, there are 9 age groups in 1984, starting with 15–19 years old and ending with 55 years old and over, and 10 age groups in 2014, starting with 15–19 years old and ending with 60 years old and over. The percentage of males who completed primary education at the district level was 59 percent in 1984 and 82 per cent in 2014. Summary statistics by age cohort are reported in Tables 1 and 2.

<sup>23</sup> In the late twentieth century, Tunis attracted three-fourth of the Tunisian students, accounted for 45 per cent of the car fleet, and concentrated about 40 per cent of the tertiary employment in the public sector and 57 per cent of industrial employment. Tunis was also the main destination for Tunisian internal migrants after independence.

<sup>24</sup> <http://www.ins.tn/enquetes/recensement-general-de-la-population-et-de-lhabitat-2014> [Last accessed on 17 March 2022].

<sup>25</sup> While the information on literacy rates by age cohort is also available from the 1984 census (see online Appendix Table A.7), we were unable to retrieve the information for 2014.



### 3.3 Historical data

Our analysis is based on a novel city-level dataset constructed from the 1931 colonial population census.<sup>26</sup> We complement this information with disaggregated data on the location of public primary schools and the number of pupils by gender and nationality in 1931, obtained from the *Statistique générale de la Tunisie*.<sup>27</sup> These annual reports contain a large number of statistics on various topics, including weather, health, education, trade, agricultural and industrial production. However, the content and/or the level of detail varies from year to year, and detailed statistics on education were no longer reported after 1931.<sup>28</sup>

To the best of our knowledge, there are no resources available to accurately geo-code and match Tunisia's historical places with contemporary administrative units.<sup>29</sup> Therefore, we created a dedicated database, which includes all places mentioned in the various population censuses and statistical reports on education. We identify about 1,300 distinct places for which we provide the geographical coordinates. We use this database to match historical data with modern districts based on the geographic location. In total, we are able to geo-locate 98 per cent of the population for our variables (online Appendix Table A.3).<sup>30</sup>

We measure the level of exposure to colonial public primary education by the share of the non-adult population (individuals aged 0–18) enrolled in public primary schools in 1931. We compute separate enrolment rates for French, Italian, Tunisian Muslim, and Tunisian Israelite pupils.<sup>31</sup> To calculate the school-age population, we rely on the information on the age structure of the population provided by the 1931 census.<sup>32</sup> We

<sup>26</sup> Bibliothèque nationale de France (hereafter BnF), NUMM-994559, Dénombrement de la population civile indigène au 22 mars 1931. BnF, 8-SG-14304, Dénombrement de la population civile européenne et tunisienne en Tunisie au 12 mars 1936. We chose the latest available point in time, 1931, in order to estimate the maximal exposure.

<sup>27</sup> BnF, NUMP-7491, Statistique générale de la Tunisie, 1931.

<sup>28</sup> We were unable to identify any relevant official publication providing disaggregated information on education after the early 1930s. We searched in the collections of the French National Library, the *Centre des Archives diplomatiques de Nantes* (CADN), which gathers the collections of documents produced by the French Protectorate in Tunisia, and the Tunisian National Archives.

<sup>29</sup> Online tools, such as GeoNames ([www.geonames.org](http://www.geonames.org)), return an extremely high number of false positives due to (i) errors and approximations made by French colonial administrators in the transliteration of Tunisian places; (ii) the numerous changes in place names after 1956.

<sup>30</sup> For an overview of the geographical distribution of these variables, see online Appendix Figure A.2.

<sup>31</sup> The reports only provide information on Muslim and Israelite pupils, regardless of whether they are actually Tunisian or from neighbouring countries, namely Algeria and Libya. For the sake of simplicity, we consider Muslims to be Tunisian Muslims, as non-Tunisian Muslims represented only 3.3 per cent of the total number of Muslims in 1931.

<sup>32</sup> The demographic data on the Tunisian age structure is available at the *caïdat* level ( $n = 33$ ) in Table V, *Répartition de la population musulmane et israélite d'après le sexe et l'âge* (pp. 102–5). The demographic data on the European age structure is available at the *circonscription* level ( $n = 20$ ) in the Annex 9, *Répartition par circonscriptions administratives de la population civile européenne, selon*



also calculate the number of teachers and the number of schools per 1,000 Tunisian Muslim inhabitants in 1931 by district.<sup>33</sup>

We add 1 to our variables before their log transformation to retain zero-value observations. We rely on the log because the distribution is highly skewed with extreme values. There are many districts with no colonial public primary education in contrast to others with high exposure to colonial education. Tables A.6, A.8, and A.9 report the results for a number of alternative measures to the log transformation, including the inverse hyperbolic sine transformation and the square root transformation. All results are qualitatively unchanged. Summary statistics are reported in Tables 1 and 2.

### 3.4 Geographic and socioeconomic controls

We combine a set of geographic and historical variables at the district level to control for potential covariates that could affect both exposure to colonial public primary education and educational outcomes. This set of variables includes the distance to the coast, the average slope, and the soil suitability for wheat and olives cultivation (Fischer et al. 2021), the average rainfall per year between 1901 and 1911 (Harris et al. 2020), the number of mines in 1905, the number of railway stations in 1926, and pre-colonial urban centres (Nouschi 1981).<sup>34</sup>

[Table 1 about here]

[Table 2 about here]

### 3.5 Prima facie evidence

In Figure 1, we document the unconditional relationship between the exposure of the local population to colonial public primary education and literacy rate by district in 1984 and 2014. The figure depicts a positive and significant correlation between the

*l'âge* (p. 94). We assume that there are no significant variations in the age structure within each *caïdat* and *circonscription*, and match each place to its respective administrative unit to derive the school-age population before aggregating the data at the district level.

<sup>33</sup> It should be noted that these variables may be subject to measurement error for two reasons. First, to estimate the number of children per district, we rely on statistics aggregated at a higher level than the district. This may remove heterogeneity within *caïdat* and *circonscription*, and misallocate some of the child population across districts. Second, while we do our best to adequately identify and geocode all historical locations, missing values and incorrect attribution of latitude and longitude may introduce measurement error into the distribution of the population.

<sup>34</sup> *L'Écho des Mines et de la Métallurgie*, Lundi 9 janvier 1905, 32e année, numéro 1648, pp. 18–20. BnF, IFN-53081141, Tunisie physique et administrative, dressée par la Compagnie Française des Chemins de fer Tunisiens, 1926.

enrolment rate of Tunisian Muslim pupils in 1931 and the literacy rate in 1984 and 2014– the pairwise correlation is 0.63 and 0.56, respectively.<sup>35</sup>

[Figure 1 about here]

## 4 Empirical strategy and results

### 4.1 Empirical framework

Our empirical strategy consists of comparing districts with low exposure to colonial public primary education with districts where a larger share of the Tunisian Muslim population was directly exposed to colonial public primary education. We estimate in the following equation:

$$\begin{aligned} \text{Educational outcome}_{ijk} = & \alpha + \beta_1 \log(\text{Enrolment rate}_{ijk 1931}) \\ & + \beta_2 X_{ijk} + \eta_k + \epsilon_{ijk} \end{aligned} \quad (1)$$

where our dependent variable is: (i) the literacy rate of the Tunisian population in 1984 and 2014 in district  $i$  in governorate  $j$  in region  $k$ ; (ii) the share of the Tunisian males who had completed primary education in 1984 and 2014 in district  $i$  in governorate  $j$  in region  $k$ . Unless otherwise specified, the independent variable is the log of Tunisian Muslim enrolment rate in 1931 in district  $i$  in governorate  $j$ .<sup>36</sup> The vector  $X_{ijk}$  captures the set of control variables in district  $i$  in governorate  $j$ . We control for the log of European settlers living in district  $i$  in 1931 (*European population 1931*), to account for French settlements location that may be correlated with schools' location choice and long-term economic development. We further control for the log of the number of teachers per 1,000 Tunisian Muslim inhabitants in 1931 (*Teachers' ratio 1931*) to account for the possible role of investment in education by the French colonial government. We also add a set of geographical and economic controls, which includes a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives, the average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy that equals one for pre-colonial major urban centres.<sup>37</sup>  $\eta_k$  are region fixed effects that account for

<sup>35</sup> The figure displays a large number of zeros indicating that, in many districts, there were no schools in 1931. In online Appendix Table A.2, we show that the number of districts with at least one school increased significantly between 1891 and 1931, but only reached 163 even after merging small districts. In Table A.11, we provide evidence that our results are not driven by fuzzy zeros.

<sup>36</sup> We add 1 to our variables prior to their log transformation to retain zero-valued observations. In Section 5, we check that our results are robust to taking the inverse hyperbolic sine transformation, the ratio, and the squared roots.

<sup>37</sup> Mines and railways are calculated within a 10 km radius from the district.

time-invariant regional characteristics ( $k = 6$ ). In our baseline estimate, we use robust standard errors clustered at the governorate level ( $j = 23$ ).<sup>38</sup>

Our coefficient of interest is  $\beta_1$ . In our preferred estimation, we control for observable geographic and economic characteristics, as well as the location of schools and the European population in order to purge for differences in observables across districts. However, we acknowledge that districts may differ in terms of their unobservables. To address the latter issue, we perform placebo and permutation tests. Taken altogether, these strategies allow us to estimate the influence of exposure to colonial public primary education on medium- and long-run educational outcomes.

## 4.2 Baseline results

Panels A and B in Table 3 report the OLS results from the estimation of Equation 1. The coefficients in column 1 indicate that a one per cent increase in the enrolment rate of Tunisian Muslim pupils in 1931 is associated with a 4.8 and 3.2 percentage points increase in the literacy rate in 1984 and 2014, respectively. Columns 2 and 3 control for the location of French settlements and the choice of primary school location. In column 4 we capture geographic and economic differences across the country by adding our set of geographic and historical controls. Our preferred baseline specification is column 5, which includes region fixed effects to account for region-specific factors. We find that a one per cent increase in the enrolment rate of Tunisian Muslim pupils in 1931 is associated with a 2.37 percentage points increase in the literacy rate in 1984– that is an additional 564 individuals per district being literate.<sup>39</sup> Three decades later, the relationship remains tangible with an increase of 1.89 percentage points in the literacy rate of the Tunisian population– that is an additional 889 individuals per district being literate in 2014.<sup>40</sup> The results are similar whether we consider only Tunisian Muslim pupils in 1931 or Tunisian Muslim and Israelite pupils together (online Appendix A.4). In line with previous empirical studies (e.g. Cogneau and Moradi 2014; Huillery 2009; Wantchekon et al. 2014), these results indicate a persistence of exposure to colonial education on medium- and long-run educational outcomes.

[Table 3 about here]

<sup>38</sup> In Section 5, we show that our results are robust to using a Bartlett spatial weights correction to compute standard errors.

<sup>39</sup> In 1984, the average population of a district– excluding the governorate of Tunis– was 23,806 inhabitants and the average literacy rate was 48 per cent. Thus, an increase of 2.37 percentage points is the equivalent of  $23,806 \times 0.0237 = 564$  individuals.

<sup>40</sup> In 2014, the average population of a district– excluding the governorate of Tunis– was 47,045 inhabitants and the average literacy rate was 76 per cent.

**Placebo test.** Even though we account for the presence of European settlers, colonial investment in primary education, and a number of controls, differences in Tunisian literacy rates may still be explained by omitted variables that affect both enrolment rates during the colonial period and literacy rates after independence. To address this concern, we run a placebo test using the exposure of Italian pupils to colonial public primary education. Until 1931, the Italian population outnumbered the French in Tunisia (online Appendix Table A.1), but most of them left the country shortly after 1956, just as the French did (see Section 2). Therefore, the enrolment rate of European pupils, whether Italian or French, should have no predictive power for medium- and long-run educational outcomes, unless the relationship is driven by omitted variables.

Table 4 reports the results of estimating Equation 1 with the log of the Italian and French enrolment rates in 1931 as the main explanatory variables. Columns 1 and 2, and columns 4 and 5 show that the coefficients are both much smaller than those of the Tunisian Muslim enrolment rate and not statistically significant at the conventional levels. In columns 3 and 6, we investigate the relationship between the enrolment of Tunisian Israelite pupils in 1931, who also left Tunisia after independence (see Section 2). We find a positive but weak correlation. The magnitude and the significance are smaller than for Tunisian Muslim pupils.

[Table 4 about here]

**Permutation Tests.** As an additional robustness check, we use permutation tests to rule out plausible spurious correlated effects. We replace the log of the Tunisian Muslim enrolment rate in a given district with the value of the enrolment rate from another district within the same region ( $n = 6$ ). We then re-estimate Equation 1 10,000 times and compare the estimated placebo result with the baseline treatment result. Figure 5 displays the distribution of coefficients and t-statistics obtained from the permutation exercises for literacy rates in 1984– panel (a) and 2014 panel (b), respectively. In both cases, less than one per cent of the t-statistics from the permuted treatment are as positive as the estimated baseline effects. In online Appendix Figure A.3, we repeat the exercise with the log of the Italian enrolment rate. In both 1984 and 2014, the placebo treatment is as predictive of medium- and long-run literacy rates as the random permutations. We interpret these two sets of results as indicating that the exposure of the Tunisian Muslim population to colonial public primary education is the main factor explaining our baseline results.

[Figure 5 about here]

### 4.3 Dynamic results

In the previous section, we analyse the imprint of exposure to colonial public primary education at two points in time and show that the relationship with the literacy rate of the Tunisian population is not as strong in 2014 as it was in 1984. However, this set of results does not allow us to study the dynamics of persistence between the end of the colonial period and the present.

We now re-estimate Equation 1 using 5-year age cohorts, starting with 15–19 years old. Due to data limitations, we cannot focus on the literacy rate of the Tunisian population, but instead we study the share of the male population who completed primary school. The combination of the two population censuses allows us to follow age cohorts born between the 1930s and the late 1990s. Figure 3 plots the regression coefficients obtained from estimating Equation 1 by age cohort, which we also report in Panel A of Tables 5 (1984) and 6 (2014). The relation with the exposure to colonial public primary education and the likelihood of completing primary education peaks for the age cohort born in 1945–49 who started to attend primary school in the last years of the colonial period. It then slowly declines for all age cohorts born thereafter, reaching a 0.33 percentage point increase in the share of males completing primary school for the age cohort born in 1995–99 (Table 6 column 11). While this result may seem to contradict the discussion presented in Section 4.2, it is hardly surprising given that Tunisia had achieved near-universal primary education by the end of the twentieth century– 96.4 per cent for the age cohort born in 1995–99. It is also consistent with additional evidence presented in online Appendix Table A.5. In 2014, the relationship between exposure to colonial public primary education and the literacy rate is about three times smaller for the younger generation (column 3) than for the population as a whole (column 1).

In online Appendix Table A.7 we report results from the estimation of Equation 1 with the male literacy rate in 1984 as the main dependent variable. Both the magnitude and significance of the estimates are very close to those reported in Table 5. The average literacy rate by district also closely follows the average share of males who completed primary education, suggesting that the latter is a good complementary measure of the former. In Panel B of Tables 5 and 6, we report our results taking the enrolment rate of Tunisian Muslim and Israelite pupils in 1931. Results remain unchanged.

**Placebo test.** In Panel C of Tables 5 and 6, we repeat the same placebo test as in our static results by replacing the log of the enrolment rate of Tunisian Muslim pupils in 1931 with that of Italian pupils. The results indicate coefficients that are close to zero and not statistically significant at conventional levels for any age cohort

between the 1930s and the late 1990s. In line with our previous findings, this set of results suggests that it was not the presence of colonial public primary schools that mattered for the (subsequent) development of human capital, but the actual enrolment of Tunisian pupils in these schools.

[Table 5 about here]

[Table 6 about here]

## 5 Robustness checks

### 5.1 Alternative measures of the main variables

**Alternative educational outcomes.** We replicate Equation 1 using alternative contemporary educational outcomes and report the results in online Appendix Table A.5. Column 1 replicates our baseline estimates. Columns 2 and 3 report respectively the association between the exposure to primary education in 1931 and literacy in 2004 and in the 15–29 age-group in 2014. We find a positive and significant association between exposure to colonial public primary education in 1931 and contemporary educational outcomes in all specifications. It is noteworthy that the magnitude is much smaller for the literacy rate of the younger generation (column 3). This suggests that the long-lasting influence of colonial public primary education in Tunisia has begun to fade in recent decades.

**Ratio as a dependent variable.** Another concern arises from the fact that the dependent variable is a ratio. Linear regressions can lead to misspecification and uncertain statistical validity. To circumvent this caveat, we use a beta regression to estimate our baseline model (Ferrari and Cribari-Neto 2004; Smithson and Verkuilen 2006). In other words, we compute a maximum likelihood estimator based on a beta distribution using a logit as the link function. The logit function will take us from our bounded space to real numbers, which allows us to perform a regression, assuming our data is beta distributed, by maximising its likelihood. This will allow us to better specify our estimators so that they do not lead to predictions with negative or greater than 100 per cent literacy rates. Static results using the 1984 census and the 2014 census are reported in Panels A and B of online Appendix Table A.10, respectively. Our coefficient of interest remains positive and statistically significant in all specifications. The magnitude of the exposure to colonial public primary education is also in the same range as our baseline estimate. On average, a one percentage point increase in the enrolment rate of Tunisian Muslim pupils in public primary school in 1931 is associated with a 1.76 percentage point increase in the literacy rate in 2014 (column 5, Panel B).

**Alternative educational input measures.** In our baseline specification, we rely on the log transformation of our independent variables. As discussed in Section 3, this measure has the attractive property of dealing with skewed distributions. We further show that our results are robust to considering the inverse hyperbolic sine transformation (IHS), which is often used for right-skewed variables including zeros (online Appendix Table A.6, and Panel A of online Appendix Tables A.8 and A.9). However, Chen and Roth (2024) highlight the problem associated with log-like transformations. They suggest that the treatment effect is highly sensitive to both the extensive and intensive margin, leading to unstable coefficients. We perform several tests to assess the sensitivity of both the log transformation and the IHS transformation. First, we plot the distribution of four different estimates: the log transformation, the IHS transformation, the ratio, and the square root of the ratio (online Appendix Figures A.4 and A.5). The distributions are skewed to the right, especially for the ratio (panel (a)). Second, online Appendix Table A.6 reports the baseline regression results with the log transformation (columns 1 and 5), the IHS transformation (columns 2 and 6), the ratio (columns 3 and 7), and the square root (columns 4 and 8). The coefficients remain positive and statistically significant at the one per cent level in all specifications.

## 5.2 Alternative geographical divisions

To ensure the robustness of our results, we conduct a series of sensitivity analyses. First, we examine alternative geographical divisions by including the governorate of Tunis and adjusting district boundaries based on school location. The results are reported in online Appendix Table A.11. Columns 1 and 3 report the baseline results from column 5 in Panels A and B of Table 3. Columns 2 and 4 report the result of estimating Equation 1 by including districts in the governorate of Tunis.<sup>41</sup>

Another concern is potential measurement error in our treatment variable, as children living close to a district boundary may have attended a school in a neighbouring district, particularly in urban areas where districts are small. To address this issue, we identify each school within 5 km of a district boundary and redistribute its pupils across these districts. We first compute a 5 km radius around colonial schools and calculate the share of that area in each neighbouring district. We use this share to redistribute each school's pupils across districts before re-estimating Equation 1 (column 4). In column 6, we report our estimate using the full sample of 264

<sup>41</sup> We omit Tunis from our baseline estimation because it is likely to be an outlier (see Section 3).



contemporary districts, without merging small districts and including Tunis.<sup>42</sup> The coefficient of interest remains positive and statistically significant in all specifications. The fact that it is smaller and less significant in column 6 is not surprising since, as we argue, using the full sample of districts is likely to introduce some measurement error in the explanatory variable.

### 5.3 Spatial autocorrelation

This paper relies on several spatial regressions to study the relationship between exposure to colonial public primary education in a given district and medium- and long-run educational outcomes in the same district. The first law of geography states that ‘everything is related to everything else, but near things are more related than distant things’ (Tobler 1970). This can be translated into the fact that spatial data tends to show a significant autocorrelation based on the distance between points. Kelly (2019, 2020) argues that this could lead to both a spatial trend, resulting in spurious correlation, and an underestimation of standard errors, resulting in inflated t-statistics. However, there is no consensus among researchers on the importance of spatial autocorrelation in the historical persistence literature (Voth 2021).

We are confident about the fact that our geographical control variables (latitude, distance to the coast), along with the region fixed effects, substantially reduce the impact of the spatial trend. Our results are also robust to the inclusion of longitude, squared latitude or longitude and an interaction of latitude and longitude to control for non-linearities (online Appendix Table A.12). On the other hand, our residuals are likely to be spatially correlated. In our baseline specification, we control for the spatial correlation by clustering standard errors at the governorate level, which is one administrative level above our unit of observation. However, for clustered standard errors to be consistent, residuals must be uncorrelated across clusters, a condition that is not necessarily met when we consider, for example, neighbouring districts on the other side of governorate boundaries.

Following Kelly (2019), we first test for the spatial autocorrelation of the residuals of our baseline estimates (column 5 of Table 3), by computing their Moran’s I statistic. We find positive and significant I statistics with a *z-score* of 9.9 and 2.6 in 1984 and 2014, respectively. This suggests that our residuals are indeed spatially correlated (online Appendix Figure A.6).<sup>43</sup> Therefore, we adjust our standard errors to account for

<sup>42</sup> We do not report this result for the 1984 census, as it is equivalent to the result reported in column 2. We do not merge any urban districts in 1984, so 198 represents the totality of Tunisian districts.

<sup>43</sup> The probability of spatial noise outperforming the original independent variable is low for regressions with residuals whose *z-score* of their Moran’s I statistic is less than 4.

spatial correlation (Conley 1999). As the classical Conley adjustment is very sensitive to the choice of distance cut-offs, we use a modified Bartlett matrix to allow for a linear decay of spatial weights with distance. We report results using three different distance cut-offs (25 km, 50 km, and 75 km) in online Appendix Table A.13. Our baseline estimate remains significant in all specifications.

## 6 Discussion of the possible channels

Our main findings highlight a robust association between the exposure of the local population to colonial public primary education and medium- and long-run educational outcomes. We document that persistence stems from the extent to which Tunisian Muslim pupils were enrolled in colonial public primary schools. We find that the persistence is particularly driven by Tunisian Muslim pupils and not by French or Italian pupils, and to a lesser extent by Tunisian Israelite pupils. Our dynamic results show that while we observe persistence over time, it tends to fade over generations. This implies that the younger the cohort, the lower the influence of colonial public primary education on their educational outcomes. In this section, we discuss the possible channels at work to explain these findings. Unfortunately, our data do not allow us to test all channels directly. Instead, we provide suggestive evidence wherever possible.

**Persistence of investment.** The literature has pointed to the persistence of colonial investment as a key driver of colonial persistence in the sense that past colonial investment strongly influences the level of contemporary investment (Huillery 2009; Wietzke 2015). A contrario, Calvi and Mantovanelli (2018) find that the long-run effect of access to health care on contemporary health outcomes in India is not driven by the persistence of health infrastructure. Thus, there is no clear consensus on this matter. In order to test for this channel, we rely on the official statistics from the Tunisian Ministry of Education, which provide the number of teachers and pupils by district in 2014–15.<sup>44</sup>

We regress the number of schools (teachers) per 1,000 Tunisian Muslim inhabitants in 1931 on the literacy rate in 2014, and the number of schools (teachers) per 1,000 Tunisian Muslim inhabitants in 2014. The results are presented in Table 7. The results in columns 1 and 2 show that colonial investment in schooling is positively associated with the current literacy rate. However, we also find that colonial investment is not associated with the current number of schools per 1,000 inhabitants (column 3)

<sup>44</sup> Ministère de l'Éducation, Tunisie, Statistiques scolaires, Données et indicateurs du secteur 2014–2015, <http://www.education.gov.tn/?p=688&&lang=en> [Last accessed on 10 August 2024].

and is negatively and significantly associated with the current number of teachers per 1,000 inhabitants in 2014 (column 4). Persistence does not seem to be explained by colonial investment, i.e. the number of schools (or teachers) built by the French during the protectorate. In fact, it turns out that, if anything, the results show the opposite, i.e. districts that benefited more from colonial investment experience less contemporaneous investment in education. It should be noted that this result may be specific to the Tunisian case. As we discussed in Section 2.3, it took the Tunisian government almost five decades and massive investment to achieve universal access to primary education throughout the country.

[Table 7 about here]

**Education for better economic outcome.** Valencia Caicedo (2019) documents that inequalities in human capital can persist over time because of their dynamic interaction with occupational structure. He finds that individuals exposed to Jesuit missions in the Guaraní area tended to move away from the agricultural sector and work more frequently in manufacturing and trade, leading to further investment in human capital. To explore this channel, we replace the educational outcomes in Equation 1 with the share of the labour force working in various economic sectors in 2014—namely agriculture and fishing, industry and manufacturing, and trade.

We also include the mining sector, because it is similar to the agricultural sector, and is more likely to employ non-skilled labour. However, the geological characteristics mean that it is less spread out across the country than agriculture, as mining is mainly concentrated in the south-west of Tunisia. Table 8 displays the results. Unlike Valencia Caicedo (2019), we do not find a negative association between the exposure of Tunisian Muslim pupils to colonial public primary education and the propensity to work in agriculture (column 1). Looking at the mining sector, the coefficient is also negative but insignificant (column 2). Columns 3 and 4 show that the exposure of Tunisian Muslim pupils to colonial public primary education is positively and significantly associated with the propensity to work in industry and manufacturing, and to a lesser extent in the trade sector. While these results are in line with the evidence from Valencia Caicedo (2019), we view them with caution. Within a sector, one position may require skills and human capital, while another may not. The available data do not allow us to disentangle the specificity of human capital within sectors.

[Table 8 about here]

**Competition with Islamic and private schooling.** As discussed in Section 2.2, religious, mostly Islamic, schools existed before the French Protectorate (1881–1956). However, their purpose was to provide religious education rather than human capital. Nowadays, *kuttebs* are considered religious institutions and are under the Ministry of

Religious Affairs rather than the Ministry of Education. They are mainly responsible for children between the ages of 3 and 5, before they enter primary school. To the best of our knowledge, private schools were negligible during the protectorate. Private education is rather a relatively recent phenomenon in Tunisia, having increased in the last few decades. Between the years 2010 and 2020, the number of private schools rose from 102 to 600, and the number of pupils enrolled in these schools reached 97,843 in 2020, compared to 21,509 in 2010 (Hussain 2021: 26).

Private schooling is currently becoming an alternative to public schooling, but our results point toward a long-run persistence, starting with age cohorts born in the late 1940s. We are therefore not concerned about competition from private primary schools, unless the first of these private schools deliberately located near a former colonial public primary school. We think this is unlikely to be the case: 40.8 per cent of private primary schools and 50 per cent of the pupils are located in Tunis.<sup>45</sup> In all our baseline results, we exclude the governorate of Tunis, where most of these schools are located.

**Local culture of education.** In many countries, colonial settlers aimed to some extent to develop human capital and culture among other objectives, namely for instance the extraction of local resources (Glaeser et al. 2004). Our results show that persistence is driven by the exposure of Tunisian Muslim pupils rather than that of European pupils, and not by colonial investment in education. In Section 2.2, we discuss how the French education system in Tunisia aimed to promote human capital and French values. These considerations suggest that persistence could occur through the transmission of education within the local population. Bisin et al. (2016) remind us that cultural transmission can occur at two non-exclusive levels: vertically (through parents) and/or horizontally (through peers).

Ideally, to test for vertical transmission, we would have had information on parents' education to see how it correlates with children's education. Our data only allow us to test for the correlation between male primary education of different age cohorts that are one generation apart. Figure 4 shows a strong correlation in both 1984 and 2014 between the share of males who completed primary education those aged 20–24 and the older generation– 50–54 years old in 1984 and 55–59 years old in 2014. While this strong unconditional correlation may suggest local transmission, it must be treated with caution, as it assumes that there has been no in-out district migration between these two age groups.

<sup>45</sup> On the contrary, there is only one private school in the governorate of Tatouine, four in those of El Kef and Tozeur, and five in Béja (Hussain 2021: 26).

## 7 Conclusion

We document a positive and significant relationship between the exposure of the local population to colonial public primary education and medium- and long-run education outcomes. We show that a one per cent increase in the enrolment of Tunisian Muslim pupils in French schools in 1931 is associated with a 2.37 percentage points increase in the literacy rate in 1984, and a 1.89 percentage points increase in the literacy rate in 2014. We also provide evidence that this persistence tends to fade over generations. Spatial variation in exposure to colonial public primary education matters more for older generations than for younger ones. Based on qualitative evidence, we suggest that the transmission of the culture of education may explain this persistence. We also posit that the successive educational reforms that took place after independence may have reduced the weight of this persistence, explaining why younger generations are less influenced by exposure to colonial public primary education. The results presented in this study are in line with those of Chaudhary and Garg (2015) who show how effective policies overturned the effects of colonial investment in primary education in India. In the Tunisian case, the efforts of post-colonial governments to provide universal primary education across the country took about 50 years and required massive investment to reduce the spatial disparities inherited from the colonial schooling system for new generations.

## References

- Acemoglu, Daron, Francisco A. Gallego and James A. Robinson (2014). 'Institutions, Human Capital, and Development'. *Annual Review of Economics* 6.1, pp. 875–912. DOI: [10.1146/annurev-economics-080213-041119](https://doi.org/10.1146/annurev-economics-080213-041119).
- Acemoglu, Daron, Simon Johnson and James A. Robinson (2001). 'The Colonial Origins of Comparative Development: An Empirical Investigation'. *American Economic Review* 91.5, pp. 1369–1401. DOI: [10.1257/aer.91.5.1369](https://doi.org/10.1257/aer.91.5.1369).
- Acemoglu, Daron and James A. Robinson (2006). *Economic Origins of Dictatorship and Democracy*. New York: Cambridge University Press, p. 434.
- Álvarez-Araón, Pablo, Catherien Guirkinge and Paola Villar (2023). *Legacy of Colonial Education: Unveiling Persistence Mechanisms in the D.R. Congo*. Working Paper No 5. DeFiPP.
- Arnoulet, François (1994). 'L'enseignement congréganiste en Tunisie aux XIX<sup>e</sup> et XX<sup>e</sup> siècles'. *Revue des mondes musulmans et de la Méditerranée* 72, pp. 26–36. DOI: [10.3406/remmm.1994.1650](https://doi.org/10.3406/remmm.1994.1650).
- Banerjee, Abhijit and Lakshmi Iyer (2005). 'History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India'. *American Economic Review* 95.4, pp. 1190–1213. DOI: [10.1257/0002828054825574](https://doi.org/10.1257/0002828054825574).
- Bannour, Abderrazak (2001). 'Aperçu sur l'enseignement du français en Tunisie de 1830 à 1883'. *Documents pour l'histoire du français langue étrangère ou seconde* 27, pp. 1–13. DOI: [10.4000/dhfles.2604](https://doi.org/10.4000/dhfles.2604).
- Belhedi, Amor (1999). 'Les disparités spatiales en Tunisie, état des lieux et enjeux'. *Méditerranée* 91, pp. 63–91. DOI: [10.3406/medit.1999.3088](https://doi.org/10.3406/medit.1999.3088).
- Ben Achour, Olfa (2015). 'De la velléité à la volonté : l'émigration des Juifs de Tunisie de 1943 à 1967, un phénomène complexe'. Thèse de doctorat. Université Toulouse 2, p. 443.
- Bisin, Alberto, Eleonora Patacchini, Thierry Verdier and Yves Zenou (2016). 'Bend it like Beckham: Ethnic Identity and Integration'. *European Economic Review* 90, pp. 146–164. DOI: [10.1016/j.euroecorev.2016.01.006](https://doi.org/10.1016/j.euroecorev.2016.01.006).
- Bourdand, François (1893). *Tunisie et Tunisiens*. Paris: J. Lefort, p. 368.
- Bousnina, Mongi, ed. (1991). *Développement scolaire et disparités régionales en Tunisie historiques et scientifiques*. Tunis: Publications de l'Université de Tunis, p. 471.
- Bouttemont, Cécile de (2002). 'Le système éducatif tunisien'. *Revue internationale d'éducation de Sèvres* 29, pp. 129–136. DOI: [10.4000/ries.1928](https://doi.org/10.4000/ries.1928).
- Cagé, Julia and Valeria Rueda (2016). 'The Long-Term Effects of the Printing Press in Sub-Saharan Africa'. *American Economic Journal: Applied Economics* 8.3, pp. 69–99. DOI: [10.1257/app.20140379](https://doi.org/10.1257/app.20140379).



- Calvi, Rossella, Lauren Hoehn-Velasco and Federico G. Mantovanelli (2020). 'The Protestant Legacy: Missions, Gender, and Human Capital in India'. *The Journal of Human Resources* 55.4, 0919–10437R2. DOI: [10.3368/jhr.58.2.0919-10437R2](https://doi.org/10.3368/jhr.58.2.0919-10437R2).
- Calvi, Rossella and Federico G. Mantovanelli (2018). 'Long-Term Effects of Access to Health Care: Medical Missions in Colonial India'. *Journal of Development Economics* 135.4, pp. 285–303. DOI: [10.1016/j.jdeveco.2018.07.009](https://doi.org/10.1016/j.jdeveco.2018.07.009).
- Chaudhary, Latika and Manuj Garg (2015). 'Does History Matter? Colonial Education Investments in India'. *The Economic History Review* 68.3, pp. 937–961. DOI: [10.1111/ehr.12078](https://doi.org/10.1111/ehr.12078).
- Chaudhary, Latika and Jared Rubin (2011). 'Reading, Writing, and Religion: Institutions and Human Capital Formation'. *Journal of Comparative Economics* 39.1, pp. 17–33. DOI: [10.1016/j.jce.2010.06.001](https://doi.org/10.1016/j.jce.2010.06.001).
- Chen, Jiafeng and Jonathan Roth (2024). 'Logs with Zeros? Some Problems and Solutions'. *The Quarterly Journal of Economics* 139, pp. 891–936. DOI: [10.1093/qje/qjad054](https://doi.org/10.1093/qje/qjad054).
- Cogneau, Denis and Alexander Moradi (2014). 'Borders That Divide: Education and Religion in Ghana and Togo Since Colonial Times'. *The Journal of Economic History* 74.3, pp. 694–729. DOI: [10.1017/S0022050714000576](https://doi.org/10.1017/S0022050714000576).
- Conley, Timothy G. (1999). 'GMM Estimation with Cross Sectional Dependence'. *Journal of Econometrics* 92.1, pp. 1–45. DOI: [10.1016/S0304-4076\(98\)00084-0](https://doi.org/10.1016/S0304-4076(98)00084-0).
- Damis, John (1974). 'The Free-School Phenomenon: The Cases of Tunisia and Algeria'. *International Journal of Middle East Studies* 5.4, pp. 434–449. DOI: [10.1017/S0020743800025526](https://doi.org/10.1017/S0020743800025526).
- Davi, Laura (2000). 'Entre colonisateurs et colonisés : les italiens de Tunisie (XIX<sup>e</sup>–XX<sup>e</sup> siècle)'. In: *La Tunisie mosaïque*. Ed. by Patrick Cabanel and Jacques Alexandropoulos. Toulouse: Presses Universitaires du Midi, pp. 99–113. DOI: [10.4000/books.pumi.4859](https://doi.org/10.4000/books.pumi.4859).
- Debiesse, Jean (1958). *Projet de réforme de l'enseignement en Tunisie*. s. l.: s. n., p. 112.
- Degorge, Barbara (2002). 'The Modernization of Education: A Case Study of Tunisia and Morocco'. *The European Legacy* 7.5, pp. 579–596. DOI: [10.1080/1084877022000006780](https://doi.org/10.1080/1084877022000006780).
- Dell, Melissa (2010). 'The Persistent Effects of Peru's Mining Mita'. *Econometrica* 78.6, pp. 1863–1903. DOI: [10.3982/ECTA8121](https://doi.org/10.3982/ECTA8121).
- Do, Quy-Toan, Nicolas Gomez-Parra and Bob Rijkers (2023). 'Transnational Terrorism and the Internet'. *Journal of Development Economics* 164, p. 103118. DOI: [10.1016/j.jdeveco.2023.103118](https://doi.org/10.1016/j.jdeveco.2023.103118).
- Dupraz, Yannick (2019). 'French and British Colonial Legacies in Education: Evidence from the Partition of Cameroon'. *The Journal of Economic History* 79.3, pp. 628–688. DOI: [10.1017/S0022050719000299](https://doi.org/10.1017/S0022050719000299).

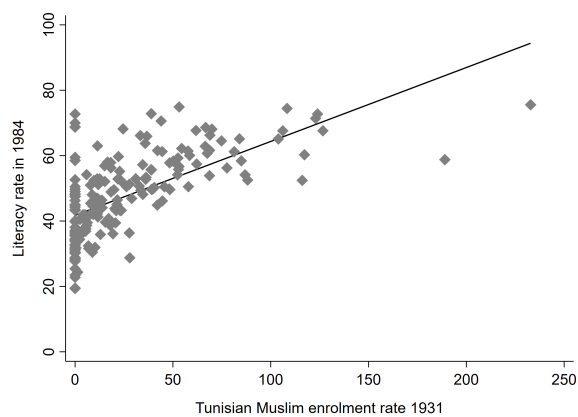


- Eibl, Ferdinand (2020). *Social Dictatorships: The Political Economy of the Welfare State in the Middle East and North Africa*. Oxford: Oxford University Press, p. 380. DOI: [10.1093/oso/9780198834274.001.0001](https://doi.org/10.1093/oso/9780198834274.001.0001).
- Ferrari, Silvia and Francisco Cribari-Neto (2004). 'Beta Regression for Modelling Rates and Proportions'. *Journal of Applied Statistics* 31.7, pp. 799–815. DOI: [10.1080/0266476042000214501](https://doi.org/10.1080/0266476042000214501).
- Fischer, Günther, Freddy O. Nachtergaele, H. van Velthuisen, F. Chiozza, G. Francheschini, M. Henry, D. Muchoney and S. Tramberend (2021). *Global Agro-Ecological Zones v4 - Model documentation*. FAO & IIASA 286. Rome. DOI: [10.4060/cb4744en](https://doi.org/10.4060/cb4744en).
- Foncin, Pierre (1882). 'L'enseignement en Tunisie'. *Revue internationale de l'enseignement* 4, pp. 401–418.
- Garnier, Maurice and Mark Schafer (2006). 'Educational Model and Expansion of Enrollments in Sub-Saharan Africa'. *Sociology of Education* 79.2, pp. 153–175. DOI: [10.1177/003804070607900204](https://doi.org/10.1177/003804070607900204).
- Gennaioli, Nicola, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2014). 'Human Capital and Regional Development'. *The Quarterly Journal of Economics* 128.1, pp. 105–164. DOI: [10.1093/qje/qjs050](https://doi.org/10.1093/qje/qjs050).
- Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2004). 'Do Institutions Cause Growth?' *Journal of Economic Growth* 9.5, pp. 271–303. DOI: [10.1023/B:JOEG.0000038933.16398.ed](https://doi.org/10.1023/B:JOEG.0000038933.16398.ed).
- Guardado, Jenny (2022). 'The Historical Political Economy of Colonialism'. In: *The Oxford Handbook of Historical Political Economy*. Ed. by Jeffrey A. Jenkins and Jared Rubin. Oxford: Oxford University Press, pp. 559–580. DOI: [10.1093/oxfordhb/9780197618608.001.0001](https://doi.org/10.1093/oxfordhb/9780197618608.001.0001).
- Harris, Ian, Timothy J. Osborn, Phil Jones and David Lister (2020). 'Version 4 of the CRU TS Monthly High-Resolution Gridded Multivariate Climate Dataset'. *Scientific Data* 7.109, pp. 1–18. DOI: [10.1038/s41597-020-0453-3](https://doi.org/10.1038/s41597-020-0453-3).
- Huillery, Élise (2009). 'History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa'. *American Economic Journal: Applied Economics* 1.2, pp. 176–215. DOI: [10.1257/app.1.2.176](https://doi.org/10.1257/app.1.2.176).
- Hussain, Munir (2021). *Le système éducatif et de formation : entre les répercussions du processus de développement et les besoins de réforme*. Rapport. Forum Tunisien pour les Droits Économiques et Sociaux.
- Jedwab, Remi, Felix Meier zu Selhausen and Alexander Moradi (2022). 'The Economics of Missionary Expansion: Evidence from Africa and Implications for Development'. *Journal of Economic Growth* 27, pp. 149–192. DOI: [10.1007/s10887-022-09202-8](https://doi.org/10.1007/s10887-022-09202-8).

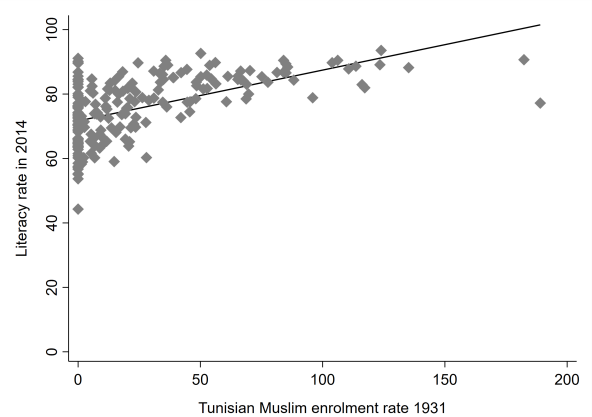
- Jones, Charles I. and Paul M. Romer (2010). 'The New Kaldor Facts: Ideas, Institutions, Population, and Human Capital'. *American Economic Journal: Macroeconomics* 2.1, pp. 224–245. DOI: [10.1257/mac.2.1.224](https://doi.org/10.1257/mac.2.1.224).
- Kelly, Morgan (2019). *The Standard Errors of Persistence*. CEPR Discussion Paper No DP13783. Centre for Economic Policy Research.
- Kelly, Morgan (2020). *Understanding Persistence*. CEPR Discussion Paper No DP15246. Centre for Economic Policy Research.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1999). 'The Quality of Government'. *The Journal of Law, Economics, and Organization* 15.1, pp. 222–279. DOI: [10.1093/jleo/15.1.222](https://doi.org/10.1093/jleo/15.1.222).
- Lucenti, Maria (2017). 'La nouvelle réforme scolaire en Tunisie : le défi démocratique entre analyse des manuels et didactique'. *Foro de Educación* 15.23, pp. 219–242. DOI: [10.14516/fde.481](https://doi.org/10.14516/fde.481).
- Mahjoubi, Ali (2010). 'La réforme de l'enseignement en Tunisie, 1989–1994'. *Revue d'histoire maghrébine* 37.139, pp. 67–78.
- Montalbano, Gabriele (2020). 'Le scuole italiane in Tunisia: tra rivalità imperiali e costruzione comunitaria (1861–1910)'. *Altretalia* 61, pp. 53–70.
- Nouschi, André (1981). 'Observations sur les villes dans le Maghreb précolonial'. *Cahiers de la Méditerranée* 23.1, pp. 3–21. DOI: [10.3406/camed.1981.927](https://doi.org/10.3406/camed.1981.927).
- Nunn, Nathan (2009). 'The Importance of History for Economic Development'. *Annual Review of Economics* 1, pp. 65–92. DOI: [10.1146/annurev.economics.050708.143336](https://doi.org/10.1146/annurev.economics.050708.143336).
- Planel, Anne-Marie (2015). *Du comptoir à la colonie. Histoire de la communauté française de Tunisie, 1814–1883*. Paris: Riveneuve éditions, p. 521.
- Ricart-Huguet, Joan (2021). 'Why Do Colonial Investments Persist Less in Anglophone than in Francophone Africa?' *Journal of Historical Political Economy* 1.4, pp. 477–498. DOI: [10.1561/115.000000017](https://doi.org/10.1561/115.000000017).
- Rocha, Rudi, Claudio Ferraz and Rodrigo R. Soares (2017). 'Human Capital Persistence and Development'. *American Economic Journal: Applied Economics* 9.4, pp. 105–136. DOI: [10.1257/app.20150532](https://doi.org/10.1257/app.20150532).
- Smithson, Michael and Jay Verkuilen (2006). 'A Better Lemon Squeezer? Maximum-Likelihood Regression with Beta-Distributed Dependent Variables'. *Psychological Methods* 11.1, pp. 54–71. DOI: [10.1037/1082-989X.11.1.54](https://doi.org/10.1037/1082-989X.11.1.54).
- Sraieb, Nouredine (1993). 'L'idéologie de l'école en Tunisie coloniale (1881–1945)'. *Revue des mondes musulmans et de la Méditerranée* 68.1, pp. 239–254. DOI: [10.3406/remmm.1993.2570](https://doi.org/10.3406/remmm.1993.2570).
- Tarifa, Chadli (1971). 'L'enseignement du premier et du second degré en Tunisie'. *Population* 26.1, pp. 149–180.
- Tobler, Waldo R. (1970). 'A Computer Movie Simulating Urban Growth in the Detroit Region'. *Economic Geography* 46.supl. Pp. 234–240. DOI: [10.2307/143141](https://doi.org/10.2307/143141).

- UNICEF (2022). *Mission d'appui au Ministère de l'Éducation pour l'approfondissement de l'analyse sectorielle et l'élaboration du plan stratégique*, p. 114.
- Valencia Caicedo, Felipe (2019). 'The Mission: Human Capital Transmission, Economic Persistence, and Culture in South America'. *The Quarterly Journal of Economics* 134.1, pp. 507–556. DOI: [10.1093/qje/qjy024](https://doi.org/10.1093/qje/qjy024).
- Voth, Hans-Joachim (2021). 'Persistence-Myth and Mystery'. In: *The Handbook of Historical Economics*. Ed. by Alberto Bisin and Giovanni Federico. London: Academic Press, pp. 243–267. DOI: [10.1016/C2017-0-04055-7](https://doi.org/10.1016/C2017-0-04055-7).
- Waldinger, Maria (2017). 'The Long-Run Effects of Missionary Orders in Mexico'. *Journal of Development Economics* 127, pp. 355–378. DOI: [10.1016/j.jdeveco.2016.12.010](https://doi.org/10.1016/j.jdeveco.2016.12.010).
- Wantchekon, Leonard, Klašnja Marko and Natalija Novta (2014). 'Education and Human Capital Externalities: Evidence from Colonial Benin'. *The Quarterly Journal of Economics* 130.2, pp. 703–757. DOI: [10.1093/qje/qjv004](https://doi.org/10.1093/qje/qjv004).
- Wietzke, Frank-Borge (2015). 'Long-Term Consequences of Colonial Institutions and Human Capital Investments: Sub-National Evidence from Madagascar'. *World Development* 66.3, pp. 293–307. DOI: [10.1016/j.worlddev.2014.08.010](https://doi.org/10.1016/j.worlddev.2014.08.010).
- Wolkowitsch, Maurice (1959). 'L'émigration des français de Tunisie'. *Annales de Géographie* 68.367, pp. 253–257.
- Zoughlami, Younès and Hichem Skik (1977). 'L'enseignement en Tunisie vingt ans après la Réforme de 1958'. *Monde Arabe* 78.4, pp. 43–69. DOI: [10.3917 / machr1.078.0043](https://doi.org/10.3917/machr1.078.0043).

## Figures



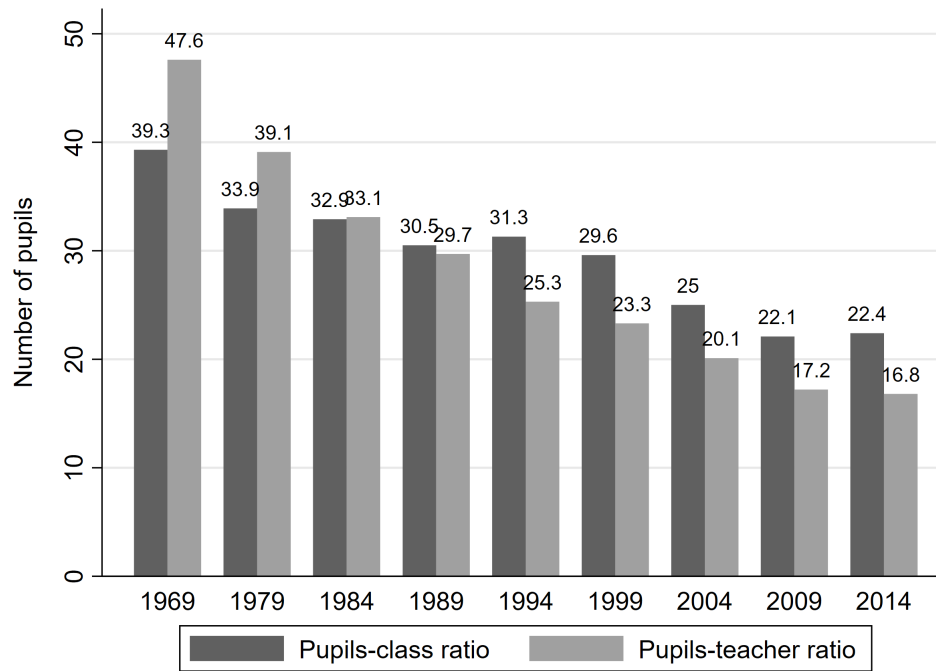
(a) 1984 population census



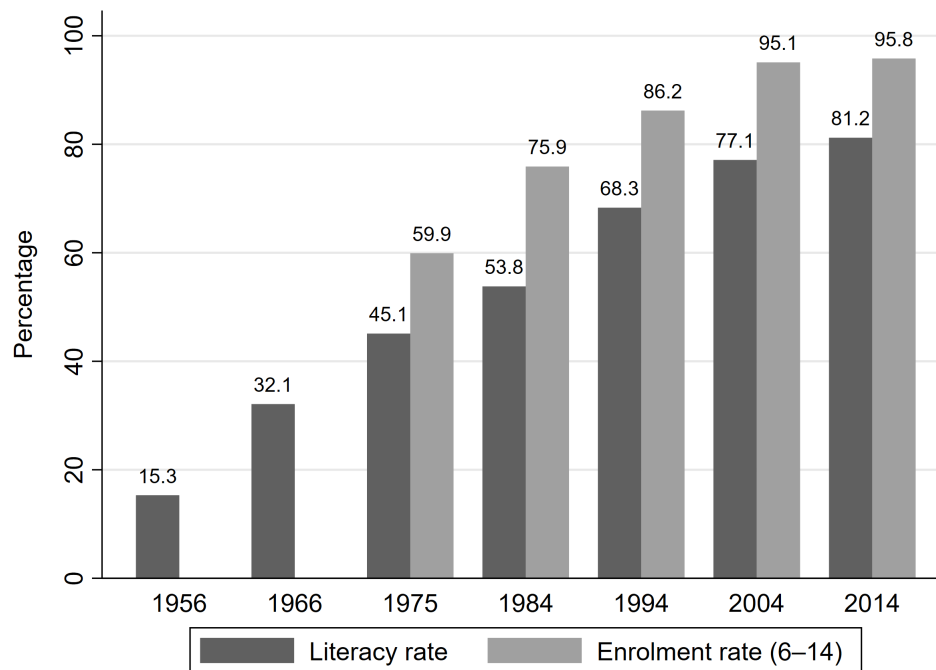
(b) 2014 population census

**Figure 1: 1931 Enrolment Rate in Colonial Public Primary Schools versus Literacy Rate in 1984 and 2014**

*Notes:* This figure shows the unconditional relationship by district between the enrolment rate of Tunisian Muslim pupils in colonial public primary schools in 1931 and the adult literacy rate in 1984 and 2014. The samples are restricted to districts located outside the governorate of Tunis. The pairwise correlation is respectively 0.63 and 0.56 in panel (a) and (b).



(a) Educational Investment



(b) Educational Outcomes

Figure 2: Educational Investment and Outcomes in Tunisia, 1956-2014

*Notes:* The top panel displays the evolution of the ratio of pupils per teacher and per classroom since the 1970s, and testifies to the continuous investment made by successive governments. The bottom panel shows the level of the literacy rate of the Tunisian adult population and the enrolment rate in primary education of 6–14 years old at each wave of the population census since the independence in 1956.

*Sources:* Panel (a): UNICEF (2022: 68–70), and Ministère de l'Éducation, *Évolution des données globales de l'enseignement primaire entre 1984 et 2019* (<http://catalog.data.gov.tn/fr/dataset/f8b555b5-c2b4-4aac-86c7-f79a023523a0>) [Last accessed on 10 August 2024]. Panel (b): Table 1 (p. 9) and Table 19 (p. 25) from the 2014 Tunisian population census.

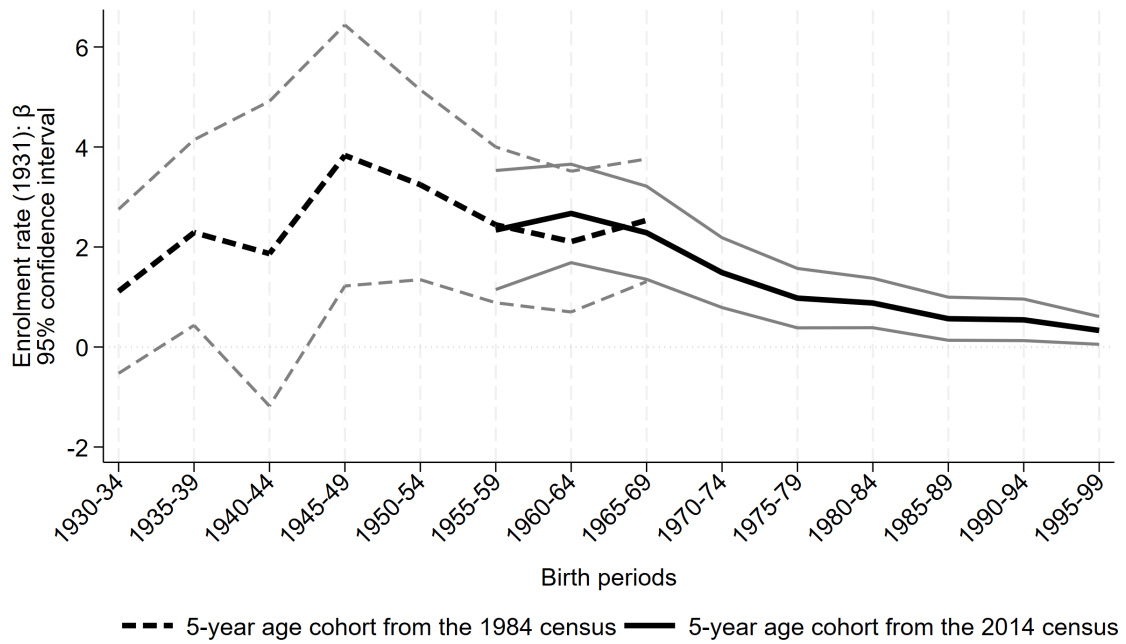


Figure 3: Dynamic Effect of Exposure to Colonial Public Primary Education

*Notes:* This figure shows the dynamic effects of the exposure to colonial public primary education in 1931 on the likelihood of finishing primary school over the second half of the twentieth century. We plot the regression coefficients obtained from estimating Equation 1 for each of the 5-year age cohorts in the 1984 and 2014 censuses. The coefficients are similar to those reported in Panel A in Tables 5 and 6. The dotted and plain grey lines indicate 95 percent confidence intervals, with standard errors clustered by governorate.

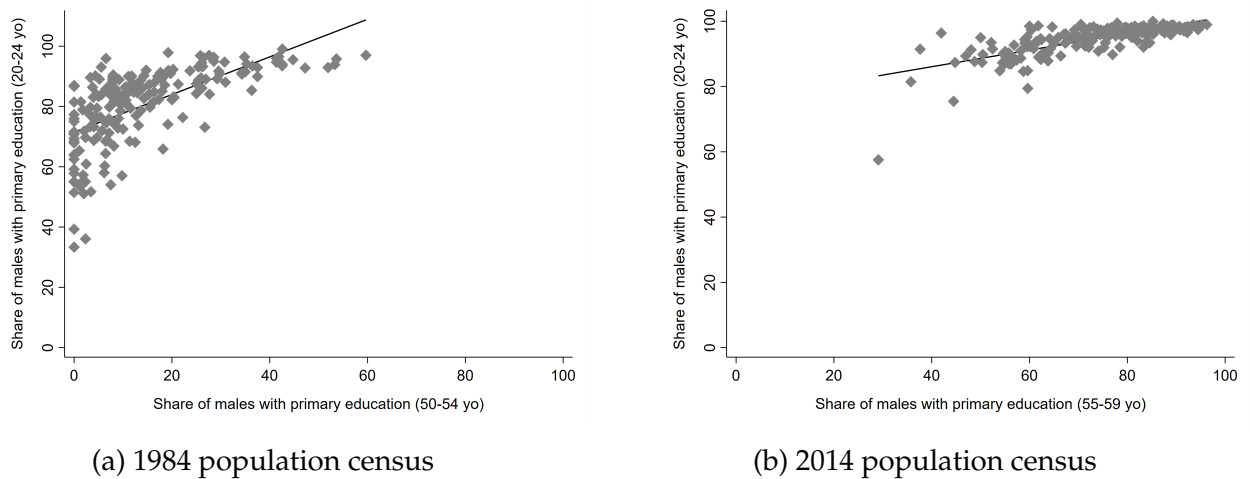


Figure 4: Share of Male with a Primary Education: Young versus Old Generation

*Notes:* This figure shows the unconditional relationship by district between the share of Tunisian male with primary education in younger generations (20–4 years old) and older generations (50–4 years old in 1984, and 55–9 years old in 2014). The samples are restricted to districts located outside the governorate of Tunis. The pairwise correlation is respectively 0.64 and 0.74 in panel (a) and (b).

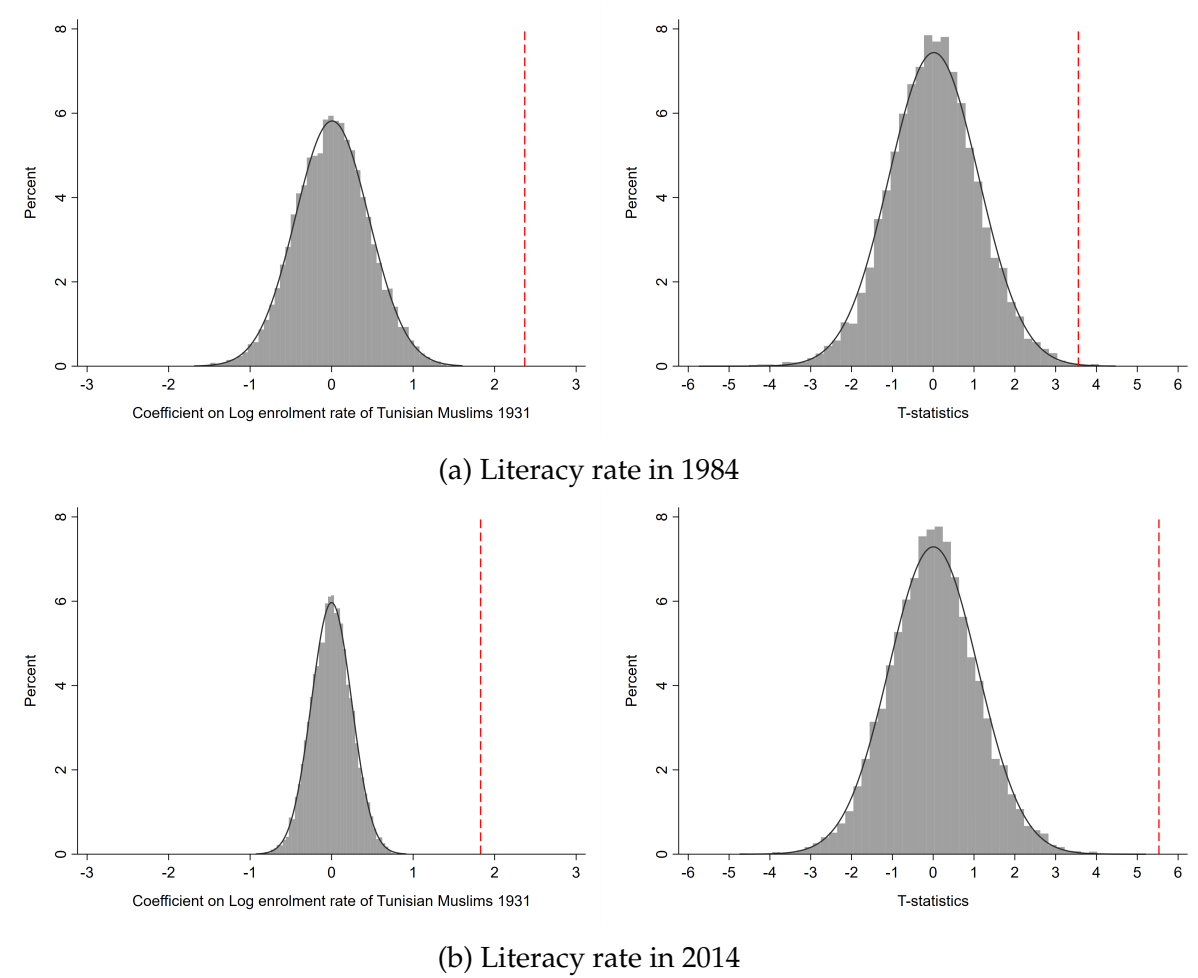


Figure 5: Permutation Tests on the Treatment Variable

*Notes:* The histograms show the distribution of coefficients and t-statistics obtained from permutation exercise, based on 10,000 replications. We perform random permutation using the Stata command `permute`, allowing for reassigning the treatment status across districts within region ( $n = 6$ ). The specification is otherwise similar to specification in column 5 of Table 3. The vertical bars indicate the coefficients and t-statistics, respectively, obtained from using the true value of *Log enrolment rate of Tunisian Muslims 1931* in a given district.



# Tables

Table 1: Summary Statistics: 1984

	N	Mean	Std. Dev.	Min	Max
<b>Literacy rate</b>					
Literacy rate in 1984	184	48	13	19	76
Literacy rate (15-19 yo)	184	69	17	29	97
Literacy rate (20-24 yo)	184	65	17	18	97
Literacy rate (25-29 yo)	184	59	17	13	91
Literacy rate (30-34 yo)	184	46	18	0	86
Literacy rate (35-39 yo)	184	30	17	0	74
Literacy rate (40-44 yo)	184	18	13	0	59
Literacy rate (45-49 yo)	184	13	8.9	0	50
Literacy rate (50-54 yo)	184	10	7.6	0	39
Literacy rate (55 yo and over)	184	7.8	5.6	0	29
<b>Primary school</b>					
Share of males with primary education	184	59	12	30	87
Share of males with primary education (15-19 yo)	184	83	11	49	100
Share of males with primary education (20-24 yo)	184	80	13	33	99
Share of males with primary education (25-29 yo)	184	77	14	36	98
Share of males with primary education (30-34 yo)	184	66	17	0	96
Share of males with primary education (35-39 yo)	184	45	22	0	90
Share of males with primary education (40-44 yo)	184	29	22	0	100
Share of males with primary education (45-49 yo)	184	19	16	0	71
Share of males with primary education (50-54 yo)	184	14	13	0	60
Share of males with primary education (55 yo and over)	184	9.5	9.3	0	51
<b>Historical variables</b>					
Log Tunisian Muslim enrolment rate 1931	184	2.3	1.7	0	5.5
Log Tunisian Israelite enrolment rate 1931	184	1.7	2.6	0	7.3
Log Tunisian enrolment rate 1931	184	2.3	1.8	0	5.6
Log Italian enrolment rate 1931	184	2.3	2.9	0	8.6
Log French enrolment rate 1931	184	3.1	2.8	0	7.8
Log schools per 1,000 inhabitants 1931	184	0.16	0.19	0	1.2
Log teachers per 1,000 inhabitants 1931	184	0.36	0.42	0	2.3
<b>Control variables</b>					
Pre-colonial urban dummy	184	0.022	0.15	0	1
Nb of mines 1905	184	0.5	1.1	0	6
Nb of railways stations 1926	184	1.1	1.4	0	7
Soil suitability for olives (GAEZ)	184	1559	863	0	3904
Soil suitability for wheat (GAEZ)	184	2711	1584	0	5889
Slope index	184	0.96	0.66	0.04	3
Distance to the coast (km)	184	57	55	0.45	219
Average rainfall (mm)	184	278	113	65	530
Latitude	184	35	1.1	32	37

Table 2: Summary Statistics: 2014

	N	Mean	Std. Dev.	Min	Max
<b>Literacy rate</b>					
Literacy rate in 2014	211	76	9.8	44	94
Literacy rate (15-29) in 2014	211	94	5.5	56	99
Literacy rate in 2004	211	72	9.3	42	91
<b>Primary school</b>					
Share of male with primary education	211	82	8.8	45	96
Share of male with primary education (15-19 yo)	211	96	3.8	63	100
Share of males with primary education (20-24 yo)	211	95	4.7	58	100
Share of males with primary education (25-29 yo)	211	93	5.6	54	99
Share of males with primary education (30-34 yo)	211	91	6.7	49	99
Share of males with primary education (35-39 yo)	211	89	8.1	41	99
Share of males with primary education (40-44 yo)	211	86	9.6	37	98
Share of males with primary education (45-49 yo)	211	79	13	30	97
Share of males with primary education (50-54 yo)	211	77	14	26	96
Share of males with primary education (55-59 yo)	211	75	14	29	96
Share of males with primary education (60 yo and over)	211	46	16	15	86
<b>Historical variables</b>					
Log Tunisian Muslim enrolment rate 1931	211	2.1	1.8	0	5.2
Log Tunisian Israelite enrolment rate 1931	211	1.5	2.5	0	7.3
Log Tunisian enrolment rate 1931	211	2.1	1.8	0	5.5
Log Italian enrolment rate 1931	211	2.2	2.8	0	7.8
Log French enrolment rate 1931	211	2.9	2.8	0	6.9
Log schools per 1,000 inhabitants 1931	211	0.16	0.2	0	1.2
Log teachers per 1,000 inhabitants 1931	211	0.34	0.41	0	2
<b>Control variables</b>					
Pre-colonial urban dummy	211	0.019	0.14	0	1
Nb of mines 1905	211	0.48	1	0	6
Nb of railways stations 1926	211	0.92	1.2	0	5
Soil suitability for olives (GAEZ)	211	1571	866	0	3904
Soil suitability for wheat (GAEZ)	211	2753	1617	0	6418
Slope index	211	0.99	0.68	0.04	3.3
Distance to the coast (km)	211	56	53	0.48	219
Average rainfall (mm)	211	282	114	65	530
Latitude	211	36	1.2	32	37

Table 3: Exposure to Colonial Public Primary Education and Literacy Rate

	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Medium Run</b>					
	Literacy rate in 1984				
Log enrolment rate 1931	4.8687 (0.4402) [0.0000]	4.4303 (0.7156) [0.0000]	3.1540 (0.8266) [0.0010]	2.2785 (0.6558) [0.0023]	2.3688 (0.6661) [0.0019]
Number of districts	184	184	184	184	184
Dependent Variable Mean	47.8	47.8	47.8	47.8	47.8
R <sup>2</sup>	0.421	0.434	0.458	0.605	0.611
<b>Panel B: Long Run</b>					
	Literacy rate in 201				
Log enrolment rate 1931	3.1869 (0.4696) [0.0000]	3.2414 (0.5698) [0.0000]	2.4143 (0.6738) [0.0017]	1.5243 (0.4703) [0.0038]	1.8851 (0.3417) [0.0000]
Number of districts	211	211	211	211	211
Dependent Variable Mean	75.7	75.7	75.7	75.7	75.7
R <sup>2</sup>	0.326	0.326	0.342	0.661	0.703
European population 1931		✓	✓	✓	✓
Teachers' ratio 1931			✓	✓	✓
Control variables				✓	✓
Region FE					✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 1984 and 2014, respectively. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table 4: Exposure to Colonial Education and Literacy Rate: Placebo

	(1)	(2)	(3)	(4)	(5)	(6)
	Literacy rate in 1984			Literacy rate in 2014		
Log Italian enrolment rate 1931	0.2625 (0.3656) [0.4808]			0.1450 (0.2428) [0.5565]		
Log French enrolment rate 1931		-0.1339 (0.5422) [0.8073]			0.1685 (0.2583) [0.5209]	
Log Tunisian Israelite enrolment rate 1931			0.5220 (0.2633) [0.0607]			0.5007 (0.1858) [0.0132]
Number of districts	184	184	184	211	211	211
Dependent Variable Mean	47.8	47.8	47.8	75.7	75.7	75.7
European population 1931	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
R <sup>2</sup>	0.579	0.578	0.585	0.669	0.669	0.679

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 1984 and 2014, respectively. The independent variable is the log of the enrolment rate in public primary schools of the Italian, French, and Tunisian Israelite population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table 5: Exposure to Colonial Education and Male Primary Education by Age Cohort in 1984

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age-group	+10	Over 55	50–54	45–49	40–44	35–39	30–34	25–29	20–24	15–19
Birth period	All	b. 1929	1930–4	1935–9	1940–4	1945–9	1950–4	1955–9	1960–4	1965–9
<b>Panel A: Tunisian Muslims</b>										
Log enrolment rate 1931	1.8490 (0.6115) [0.0065]	0.0385 (0.6555) [0.9538]	1.1145 (0.8372) [0.1974]	2.2893 (0.9464) [0.0247]	1.8679 (1.5545) [0.2429]	3.8314 (1.3318) [0.0090]	3.2453 (0.9688) [0.0030]	2.4431 (0.7946) [0.0058]	2.1082 (0.7181) [0.0079]	2.5341 (0.6249) [0.0006]
<b>Panel B: All Tunisians</b>										
Log enrolment rate 1931	1.8625 (0.6158) [0.0064]	0.1103 (0.6655) [0.8700]	1.2681 (0.8456) [0.1486]	2.4119 (0.9407) [0.0181]	1.8371 (1.5457) [0.2479]	3.7572 (1.3338) [0.0103]	3.1903 (0.9771) [0.0037]	2.4198 (0.7777) [0.0053]	2.1105 (0.7110) [0.0073]	2.5460 (0.6255) [0.0005]
<b>Panel C: Italians</b>										
Log enrolment rate 1931	0.1290 (0.3396) [0.7080]	-0.0028 (0.2824) [0.9923]	0.0410 (0.4215) [0.9234]	-0.0474 (0.5138) [0.9273]	-0.0003 (0.6794) [0.9997]	-0.2372 (0.6984) [0.7375]	-0.2949 (0.6344) [0.6468]	0.1804 (0.4511) [0.6933]	0.1345 (0.3946) [0.7366]	0.4424 (0.3808) [0.2584]
Number of districts	184	184	184	184	184	184	184	184	184	184
Dependent Variable Mean	59.2	9.5	14.4	19.1	29.1	44.7	65.6	77.1	80.5	83.1
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (14 districts). All variables are defined at the district level. The dependent variable is the share of male who completed primary education in 1984. The independent variable is the log of the enrolment rate in public primary schools of the population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table 6: Exposure to Colonial Education and Male Primary Education by Age Cohort in 2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Age-group	+15	Over 60	55–59	50–54	45–49	40–44	35–39	30–34	25–29	20–24	15–19
Birth period	All	b. 1954	1955–9	1960–4	1965–9	1970–4	1975–9	1980–4	1985–9	1990–4	1995–9
<b>Panel A: Tunisian Muslims</b>											
Log enrolment rate 1931	1.5928 (0.3196) [0.0001]	2.9295 (0.9299) [0.0046]	2.3400 (0.6071) [0.0009]	2.6709 (0.5023) [0.0000]	2.2850 (0.4750) [0.0001]	1.4879 (0.3563) [0.0004]	0.9775 (0.3031) [0.0039]	0.8806 (0.2522) [0.0021]	0.5658 (0.2199) [0.0174]	0.5437 (0.2121) [0.0177]	0.3319 (0.1420) [0.0289]
<b>Panel B: All Tunisians</b>											
Log enrolment rate 1931	1.6431 (0.3231) [0.0000]	2.9932 (0.9161) [0.0035]	2.3677 (0.5987) [0.0007]	2.7111 (0.5025) [0.0000]	2.3197 (0.4758) [0.0001]	1.5416 (0.3634) [0.0003]	1.0311 (0.3160) [0.0036]	0.9350 (0.2643) [0.0019]	0.6166 (0.2310) [0.0140]	0.5848 (0.2182) [0.0137]	0.3593 (0.1461) [0.0223]
<b>Panel C: Italians</b>											
Log enrolment rate 1931	0.1556 (0.2114) [0.4695]	-0.1591 (0.3798) [0.6793]	0.1278 (0.3395) [0.7103]	0.1154 (0.3584) [0.7505]	0.1258 (0.3121) [0.6907]	0.2317 (0.2668) [0.3946]	0.3568 (0.2083) [0.1008]	0.2950 (0.1780) [0.1117]	0.2484 (0.1343) [0.0779]	0.1505 (0.0968) [0.1344]	0.0707 (0.0777) [0.3730]
Number of districts	211	211	211	211	211	211	211	211	211	211	211
Dependent Variable Mean	81.6	46.2	75.0	77.4	79.4	85.7	88.8	91.4	93.4	95.0	96.4
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (6 districts). All variables are defined at the district level. The dependent variable is the share of male who completed primary education in 2014. The independent variable is the log of the enrolment rate in public primary schools of the population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.



Table 7: Test for the Persistence of Investment in Education

	(1) Literacy rate in 1984	(2) Literacy rate in 1984	(3) Literacy rate in 2014	(4) Literacy rate in 2014	(5) Log schools per 1,000 inhab. 2014	(6) Log teachers per 1,000 inhab. 2014
Log schools per 1,000 inhab. 1931	13.7652 (5.1451) [0.0142]		7.9726 (3.0488) [0.0158]		-0.0626 (0.0868) [0.4780]	
Log teachers per 1,000 inhab. 1931		12.1332 (2.0775) [0.0000]		7.6318 (1.7860) [0.0003]		-0.0768 (0.0419) [0.0804]
Number of districts	184	184	211	211	211	211
Dependent Variable Mean	47.8	47.8	75.7	75.7	0.5	2.0
European population 1931	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
R <sup>2</sup>	0.524	0.578	0.631	0.668	0.583	0.594

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. In columns 1 and 2, the dependent variable is the literacy rate of the population aged over 10 in 1984. In columns 3 and 4, the dependent variable is the literacy rate of the population aged over 10 in 2014. In column 5, the dependent variable is the log of the number of schools per 1,000 inhabitants in 2014. In column 6, the dependent variable is the log of the number of primary school teachers per 1,000 inhabitants in 2014. The independent variable is the log of the number of public primary schools (teachers) per 1,000 Tunisian Muslim inhabitants in 1931. *European population 1931* is the log of the European population in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table 8: Employment Share by Economic Sub-sector in 2014

	(1) Agriculture & Fishing	(2) Mining	(3) Industry & Manufacture	(4) Trade
Log enrolment rate 1931	-0.3176 (0.6988) [0.6540]	-0.3045 (0.2344) [0.2074]	1.8661 (0.5103) [0.0014]	1.0184 (0.2606) [0.0008]
Number of districts	211	211	211	211
Dependent Variable Mean	17.4	1.8	12.9	10.4
European population 1931	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓
Control variables	✓	✓	✓	✓
Region FE	✓	✓	✓	✓
R <sup>2</sup>	0.374	0.316	0.534	0.241

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (6 districts). All variables are defined at the district level. The dependent variable is the share of employment in an economic sub-sector in 2014. The independent variable is the log of the enrolment rate in primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

## **Online appendix**

### **The Colonial Legacy of Education: Evidence from Tunisia**

# Contents

<b>A Additional information on data</b>	<b>3</b>
<b>B Additional results</b>	<b>6</b>

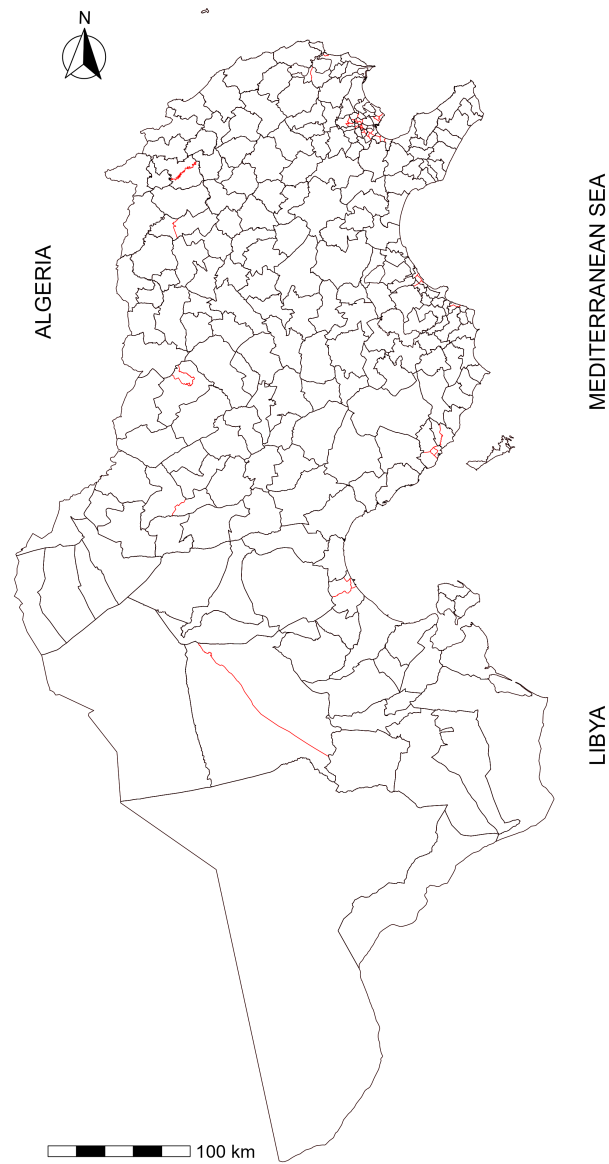
## List of Figures

A.1 The borders of districts in Tunisia in 2014 . . . . .	3
A.2 Population, Public Primary Schools, and Enrolment Rate in 1931, and Literacy Rate in 2014 . . . . .	4
A.3 Permutation Tests on the Placebo Treatment . . . . .	6
A.4 Distribution of the Different Measures of the Enrolment Rate in 1931 (1984 Sample) . . . . .	7
A.5 Distribution of the Different Measures of the Enrolment Rate in 1931 (2014 Sample) . . . . .	8
A.6 Moran's I scatter plots of residuals . . . . .	8

## List of Tables

A.1 Population in Tunisia during the French protectorate, 1881–1956 . . . . .	5
A.2 Colonial investment in education in Tunisia, 1891–1931 . . . . .	5
A.3 Number and Share of Inhabitants and Pupils Without Coordinates in 1931	5
A.4 Exposure to Colonial Public Primary Education (All Tunisians) and Literacy Rate . . . . .	9
A.5 Alternative Measures of the Literacy Rate . . . . .	10
A.6 Alternative Measures of the Exposure to Colonial Education . . . . .	11
A.7 Exposure to Colonial Education and Male Literacy Rate by Age Cohort in 1984 . . . . .	12
A.8 Exposure to Colonial Public Primary Education: Male Primary Educa- tion by Age Cohort in 1984 . . . . .	13
A.9 Exposure to Colonial Public Primary Education: Male Primary Educa- tion by Age Cohort in 2014 . . . . .	14
A.10 Beta regressions . . . . .	15
A.11 Alternative Divisions of Districts . . . . .	16
A.12 Controlling for Latitude and Longitude . . . . .	17
A.13 Correction of Standard Errors Using a Bartlett Spatial Weights Correction	18

## A Additional information on data



*Notes:* The black lines represent the borders of the 217 districts (*délégations*) in our sample. The red lines represent the initial borders of the districts we merged to get our sample.

Figure A.1: The borders of districts in Tunisia in 2014

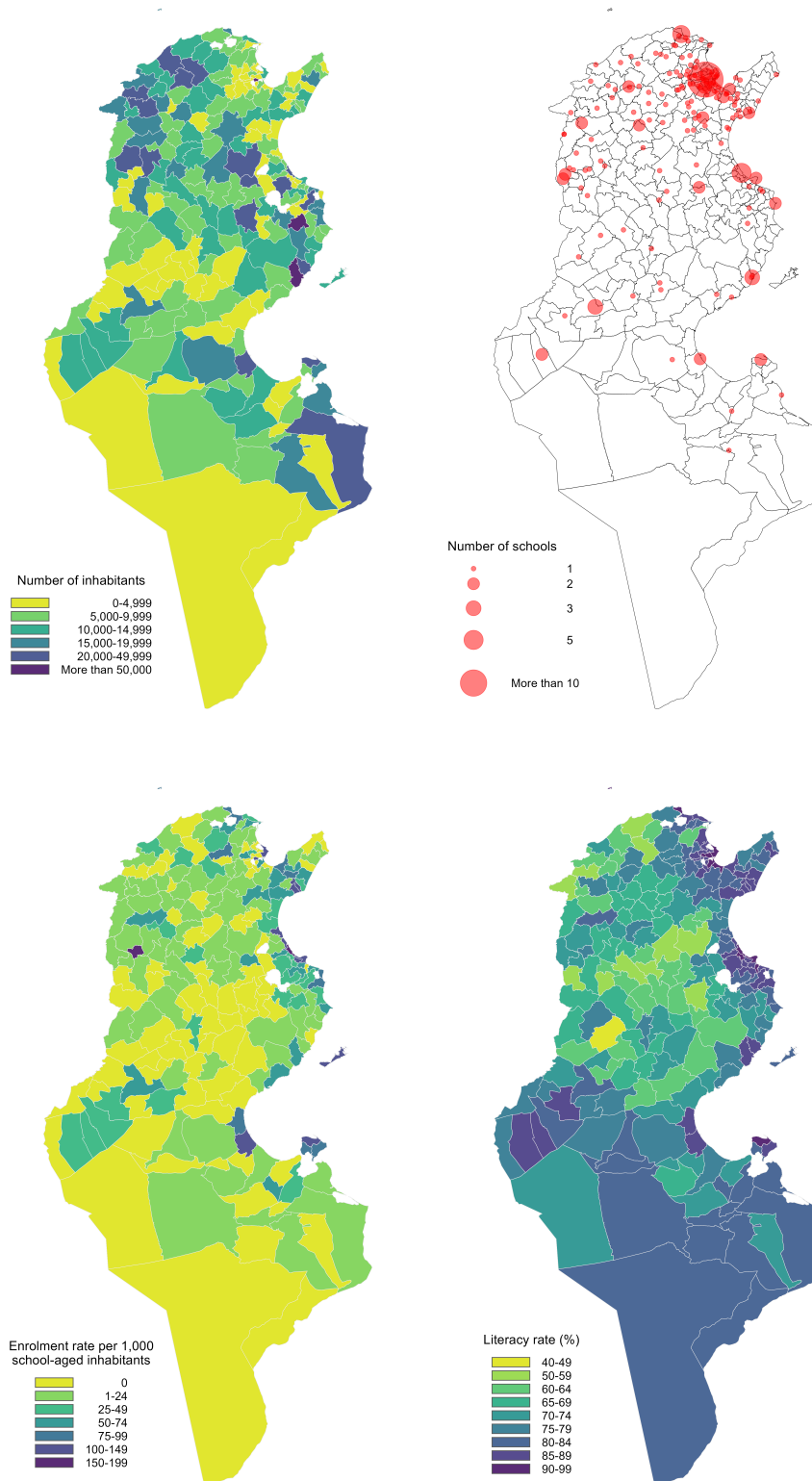


Figure A.2: Population, Public Primary Schools, and Enrolment Rate in 1931, and Literacy Rate in 2014



Table A.1: Population in Tunisia during the French protectorate, 1881–1956

	Europeans					Tunisians		
	French	Italian	Maltese	Others	Total	Muslim	Israelite	Total
<b>1881</b>	300*	11 206**	-	-	-	-	-	-
<b>1886</b>	-	-	-	-	-	-	-	876 861*
<b>1889</b>	-	-	-	-	-	-	-	907 642*
<b>1891</b>	9 973	21 016**	11 706***	-	-	-	-	-
<b>1896</b>	16 207	-	-	-	-	-	-	-
<b>1901</b>	24 201	-	-	-	-	-	-	-
<b>1906</b>	34 610	81 156	10 330	2 799	128 895	-	-	-
<b>1911</b>	46 044	88 082	11 300	3 050	148 476	1 740 144*	50 467*	1 790 611*
<b>1921</b>	54 476	84 799	13 520	3 320	156 115	1 826 545	48 436	1 874 981
<b>1926</b>	71 000	89 216	-	13 065	173 281	1 864 908	54 243	1 919 151
<b>1931</b>	91 427	91 178	8 643	4 145	195 393	2 086 762	56 248	2 143 010
<b>1936</b>	108 068	94 289	7 279	3 569	213 205	2 265 750	59 585	2 325 335
<b>1946</b>	143 977	84 935	6 459	4 178	239 549	2 832 978	71 543	2 904 521
<b>1956</b>	180 450	66 909	-	-	255 332	3 383 213	57 786	3 440 999

Notes: \*Does not come from a census. Estimates made by the French administration, which can underestimate the actual numbers. The number of French in 1881 before colonisation comes from an estimation found in the *Statistique générale de la Tunisie* from 1881–92. The 1889 statistics were compiled by the Secretary General of the Tunisian Government. The 1896 statistics were compiled by civilian controllers and military commanders. The statistics of 1911 come from the *Statistique générale de la Tunisie* of 1913. \*\*The number of Italians before 1906 is given by the Italian government. \*\*\*These numbers correspond to the number of British and Maltese drawn from a census made by the British General Consulate.

Table A.2: Colonial investment in education in Tunisia, 1891–1931

	1891	1901	1911	1921	1931
Number of schools	76	132	244	336	468
Number of 2014 districts with a school	43	66	107	136	165
Total number of pupils	8,208	14,272	24,497	36,639	67,089
Number of Tunisian Muslim pupils	2,651	3,226	7,487	13,026	34,556
Share of Tunisian pupils	32%	21%	31%	36%	52%
Number of teachers	-	434	706	1,174	1,833
Number of Tunisian teachers	-	37	80	141	272

Sources: See Section 3.3.

Table A.3: Number and Share of Inhabitants and Pupils Without Coordinates in 1931

	<i>N</i>	<i>N missing</i>	% missing
French inhab.	91,500	1,898	2.07
Italian inhab.	91,192	1,645	1.80
Tunisian Muslim inhab.	2,086,762	26,684	1.28
Tunisian Israelite inhab.	110,680	0	0
French pupils	7,375	103	1.40
Italian pupils	4,437	25	0.56
Tunisian Muslim pupils	31,158	259	0.83
Tunisian Israelite pupils	3,627	0	0

## B Additional results

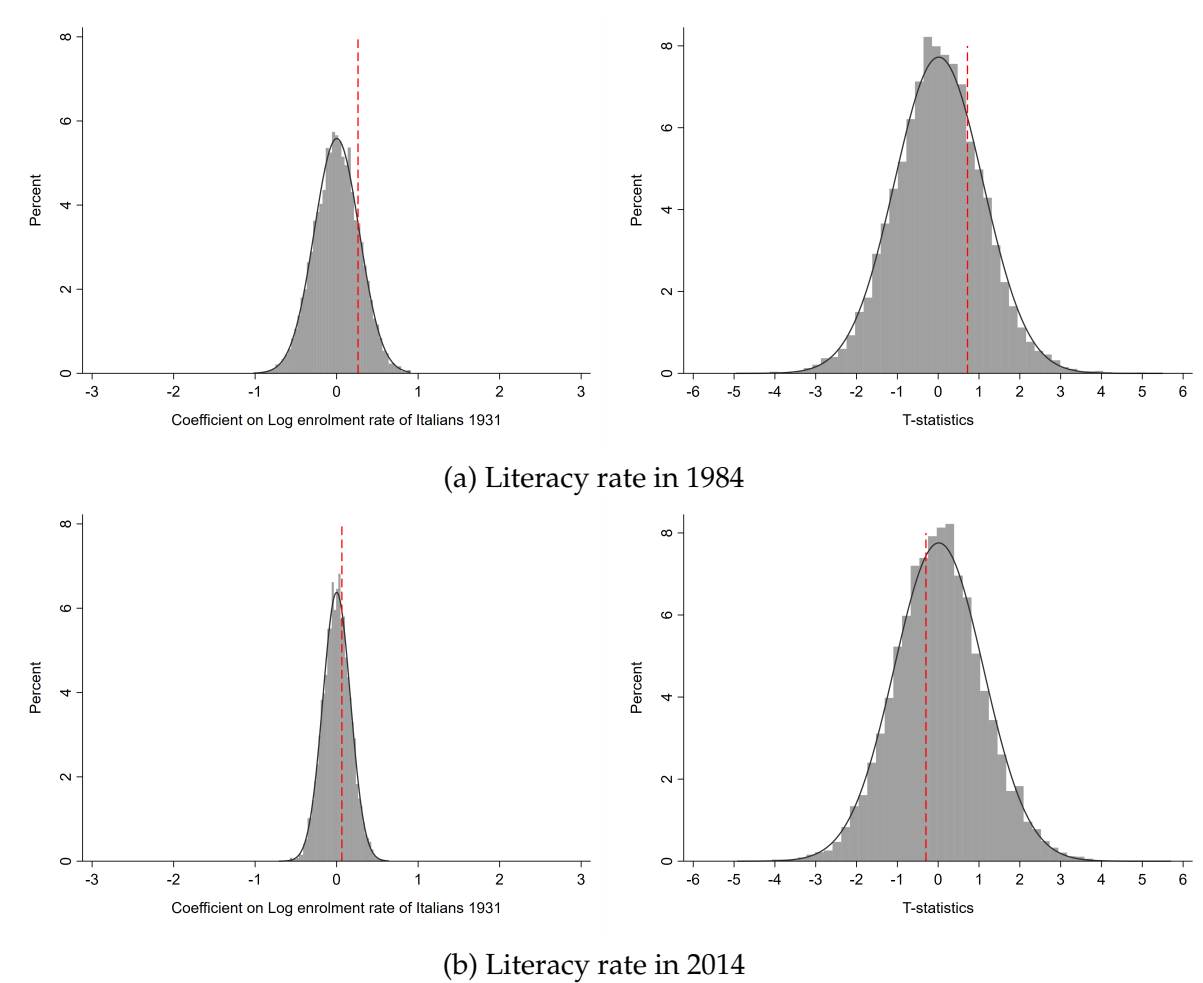
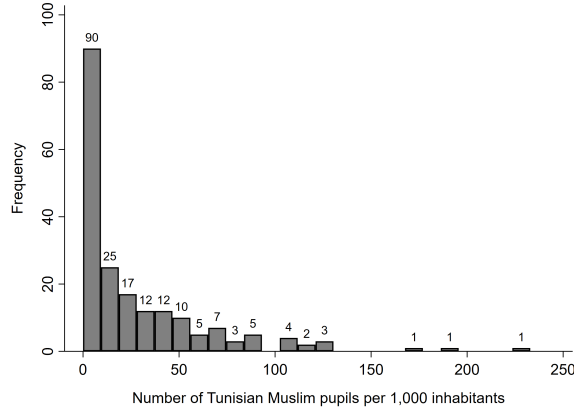
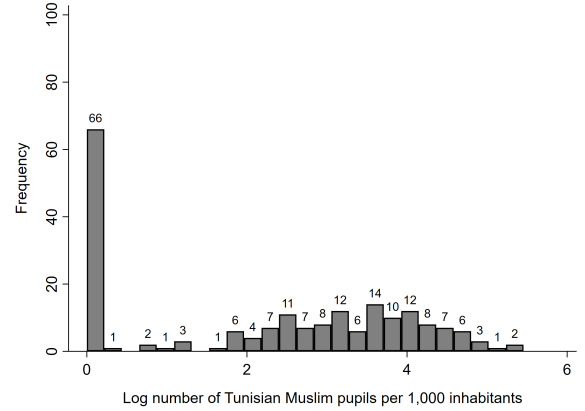


Figure A.3: Permutation Tests on the Placebo Treatment

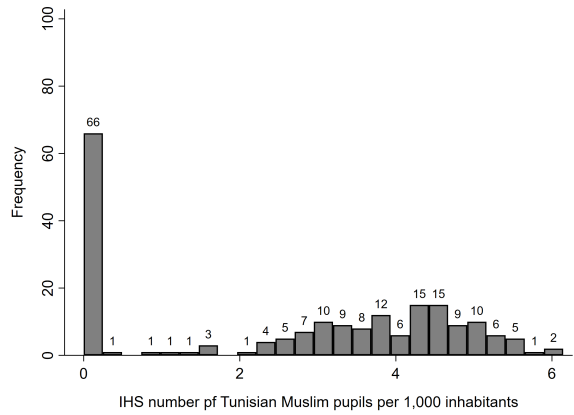
*Notes:* The histograms show the distribution of coefficients and t-statistics obtained from permutation exercise, based on 10,000 replications. We perform random permutation using the Stata command `permute`, allowing for reassigning the treatment status across districts within region ( $n = 6$ ). The specification is otherwise similar to specification in Columns 1 and 3 of Table 4. The vertical bars indicate the coefficients and t-statistics, respectively, obtained from using the true value of *Log enrolment rate of Italians 1931* in a given district.



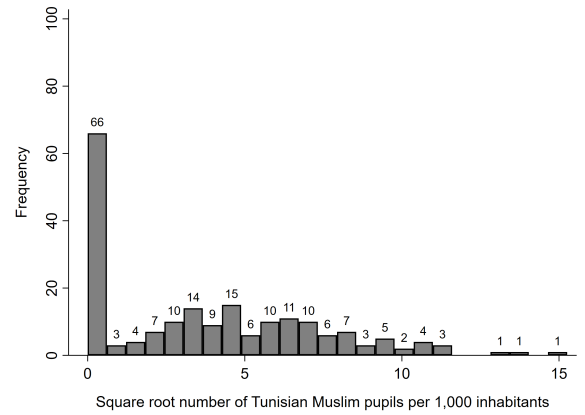
(a) Ratio



(b) Log transformation



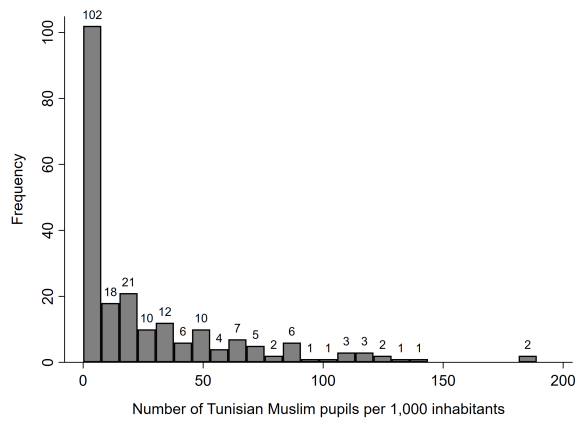
(c) IHS transformation



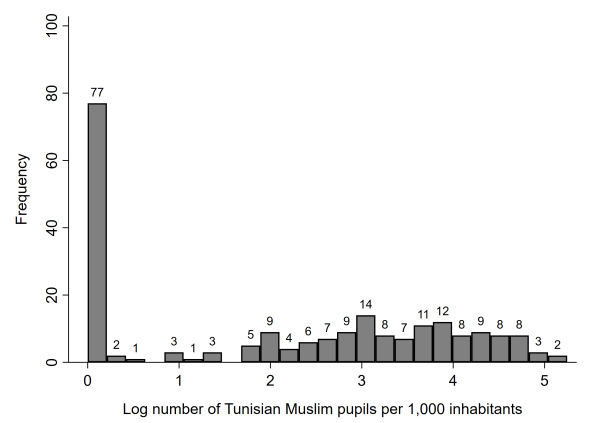
(d) Square root transformation

**Figure A.4: Distribution of the Different Measures of the Enrolment Rate in 1931 (1984 Sample)**

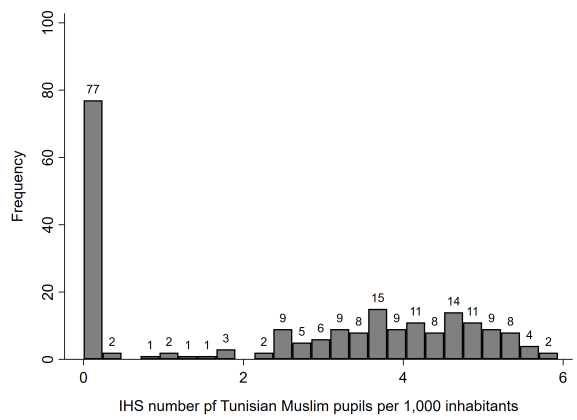
*Notes:* The histograms show the distribution of the enrolment rate of the Tunisian Muslim population in public primary schools in 1931, using the data sample from 1984 ( $n = 198$ ). Panel (a) reports the distribution of the enrolment rate without further transformation. Panel (b) displays the distribution of our preferred measure of the enrolment rate: the log transformation (adding 1 to the ratio to retain zero-value observations). Panel (c) shows the distribution of inverse hyperbolic sine (IHS) transformation, while Panel (d) displays the square root of the enrolment rate. In Tables A.6 and A.8, we report the results from estimating Equation 1 using these different measures. All results are qualitatively unchanged.



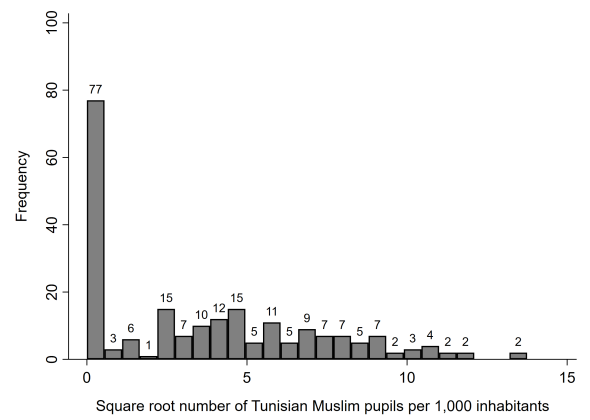
(a) Ratio



(b) Log transformation



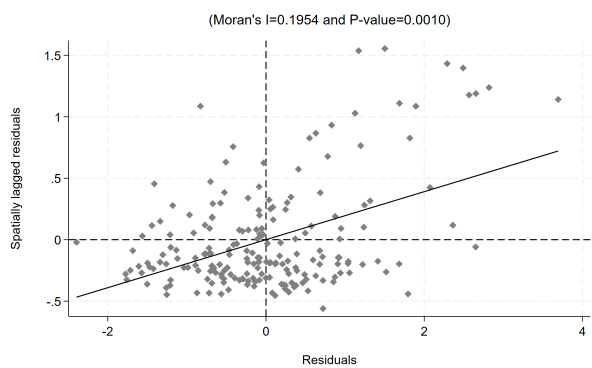
(c) IHS transformation



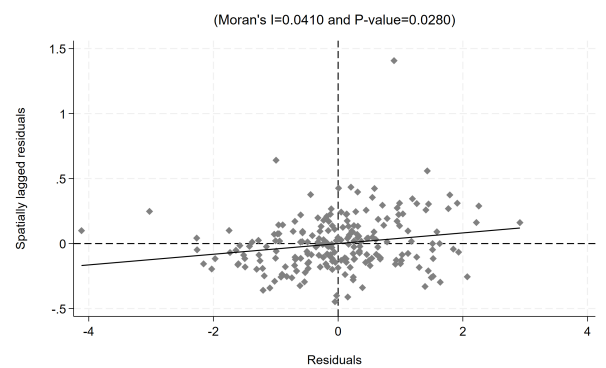
(d) Square root transformation

Figure A.5: Distribution of the Different Measures of the Enrolment Rate in 1931 (2014 Sample)

*Notes:* The histograms show the distribution of the enrolment rate of the Tunisian Muslim population in public primary schools in 1931, using the data sample from 2014 ( $n = 217$ ). Panel (a) reports the distribution of the enrolment rate without further transformation. Panel (b) displays the distribution of our preferred measure of the enrolment rate: the log transformation (adding 1 to the ratio to retain zero-value observations). Panel (c) shows the distribution of inverse hyperbolic sine (IHS) transformation, while Panel (d) displays the square root of the enrolment rate. In Tables A.6 and A.9, we report the results from estimating Equation 1 using these different measures. All results are qualitatively unchanged.



(a) Literacy rate in 1984



(b) Literacy rate in 2014

Figure A.6: Moran's I scatter plots of residuals

Table A.4: Exposure to Colonial Public Primary Education (All Tunisians) and Literacy Rate

	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Medium Run</b>					
	Literacy rate in 1984				
Log enrolment rate 1931	4.8063 (0.4298) [0.0000]	4.4036 (0.7212) [0.0000]	3.1579 (0.8318) [0.0011]	2.3107 (0.6637) [0.0022]	2.3969 (0.6739) [0.0019]
Number of districts	184	184	184	184	184
Dependent Variable Mean	47.8	47.8	47.8	47.8	47.8
R <sup>2</sup>	0.425	0.436	0.458	0.606	0.612
<b>Panel B: Long Run</b>					
	Literacy rate in 2014				
Log enrolment rate 1931	3.1364 (0.4618) [0.0000]	3.2182 (0.5691) [0.0000]	2.4227 (0.6701) [0.0015]	1.5702 (0.4675) [0.0028]	1.9394 (0.3415) [0.0000]
Number of districts	211	211	211	211	211
Dependent Variable Mean	75.7	75.7	75.7	75.7	75.7
R <sup>2</sup>	0.327	0.328	0.343	0.663	0.705
European population 1931		✓	✓	✓	✓
Teachers' ratio 1931			✓	✓	✓
Control variables				✓	✓
Region FE					✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 1984 and 2014, respectively. The independent variable is the log of the enrolment rate in public primary schools of all the Tunisian population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Control variables* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.5: Alternative Measures of the Literacy Rate

	(1) Literacy rate 2014	(2) Literacy rate 2004	(3) Literacy rate age group 15–29
<b>Panel A: Tunisian Muslims</b>			
Log enrolment rate 1931	1.8851 (0.3417) [0.0000]	1.6772 (0.4461) [0.0011]	0.7032 (0.1995) [0.0019]
<b>Panel B: All Tunisians</b>			
Log enrolment rate 1931	1.9394 (0.3415) [0.0000]	1.7107 (0.4409) [0.0008]	0.7448 (0.2017) [0.0013]
<b>Panel C: Italians</b>			
Log enrolment rate 1931	0.1450 (0.2428) [0.5565]	0.1320 (0.2305) [0.5727]	0.2251 (0.1304) [0.0983]
Number of districts	211	211	211
Dependent Variable Mean	75.7	72.3	93.8
European population 1931	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓
Control variables	✓	✓	✓
Region FE	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (14 districts). All variables are defined at the district level. In columns 1 to 3, the dependent variable is respectively the literacy rate of the population aged over 10 in 2014, and the literacy rate of the population aged 15–29 in 2014. The independent variable is the log of the l rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.



Table A.6: Alternative Measures of the Exposure to Colonial Education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Literacy rate in 1984				Literacy rate in 2014			
Log enrolment rate 1931	2.3688 (0.6661) [0.0019]				1.8851 (0.3417) [0.0000]			
IHS enrolment rate 1931		1.9132 (0.5897) [0.0039]				1.5136 (0.3010) [0.0000]		
Enrolment rate 1931			0.2118 (0.0335) [0.0000]				0.1212 (0.0203) [0.0000]	
Square roots enrolment rate 1931				2.5065 (0.3448) [0.0000]				1.5706 (0.2081) [0.0000]
Number of districts	184	184	184	184	211	211	211	211
Dependent Variable Mean	47.8	47.8	47.8	47.8	75.7	75.7	75.7	75.7
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓
R <sup>2</sup>	0.611	0.607	0.601	0.641	0.703	0.701	0.686	0.716

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. In columns 1 to 4, the dependent variable is the literacy rate of the population aged over 10 in 1984. In columns 5 to 8, the dependent variable is the literacy rate of the population aged over 10 in 2014. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (column 1), the inverse hyperbolic sine (IHS) transformation of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (column 2), the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (column 3), and the square root of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (column 4). *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.7: Exposure to Colonial Education and Male Literacy Rate by Age Cohort in 1984

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age-group	+10	Over 55	50–54	45–49	40–44	35–39	30–34	25–29	20–24	15–19
Birth period	All	b. 1929	1930–4	1935–9	1940–4	1945–9	1950–4	1955–9	1960–4	1965–9
<b>Panel A: Tunisian Muslims</b>										
Log enrolment rate 1931	2.0653 (0.6363) [0.0039]	0.9089 (0.7673) [0.2494]	1.7198 (0.8613) [0.0590]	2.8558 (0.9492) [0.0067]	2.2100 (1.4797) [0.1502]	3.9967 (1.3126) [0.0062]	3.3531 (0.9126) [0.0014]	2.4501 (0.7999) [0.0059]	2.1578 (0.6907) [0.0051]	2.5427 (0.6291) [0.0006]
<b>Panel B: All Tunisians</b>										
Log enrolment rate 1931	2.0891 (0.6402) [0.0037]	1.0071 (0.7755) [0.2081]	1.9006 (0.8664) [0.0397]	2.9667 (0.9430) [0.0049]	2.1995 (1.4656) [0.1483]	3.9342 (1.3111) [0.0068]	3.3162 (0.9173) [0.0016]	2.4365 (0.7838) [0.0053]	2.1612 (0.6820) [0.0046]	2.5574 (0.6314) [0.0006]
<b>Panel C: Italians</b>										
Log enrolment rate 1931	0.2089 (0.3293) [0.5326]	0.1288 (0.3386) [0.7074]	0.1024 (0.4438) [0.8198]	0.2100 (0.5339) [0.6980]	0.1837 (0.6379) [0.7761]	-0.0228 (0.6579) [0.9727]	-0.2002 (0.5995) [0.7417]	0.2656 (0.4440) [0.5562]	0.1776 (0.3937) [0.6565]	0.4951 (0.3703) [0.1956]
Number of districts	184	184	184	184	184	184	184	184	184	184
Dependent Variable Mean	60.6	13.5	18.5	23.6	33.0	47.2	66.2	77.3	80.4	83.1
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (14 districts). All variables are defined at the district level. The dependent variable is the literacy rate of the male population in 1984. The independent variable is the log of the enrolment rate in public primary schools of the population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.8: Exposure to Colonial Public Primary Education: Male Primary Education by Age Cohort in 1984

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age-group	+10	Over 55	50–54	45–49	40–44	35–39	30–34	25–29	20–24	15–19
Birth period	All	b. 1929	1930–4	1935–9	1940–4	1945–9	1950–4	1955–9	1960–4	1965–9
<b>Panel A: Inverse hyperbolic sine transformation</b>										
IHS enrolment rate 1931	1.8229 (0.5861) [0.0053]	-0.0609 (0.3230) [0.8523]	0.2188 (0.4424) [0.6261]	0.5714 (0.4340) [0.2022]	0.5196 (0.7334) [0.4864]	1.6718 (0.9055) [0.0790]	2.5486 (0.9211) [0.0116]	2.4848 (0.8389) [0.0074]	2.9342 (0.7727) [0.0011]	3.2981 (0.7795) [0.0004]
<b>Panel B: Ratio</b>										
Enrolment rate 1931	0.2139 (0.0339) [0.0000]	0.0646 (0.0207) [0.0051]	0.0820 (0.0286) [0.0092]	0.1300 (0.0278) [0.0001]	0.1890 (0.0425) [0.0002]	0.2827 (0.0558) [0.0001]	0.2857 (0.0516) [0.0000]	0.2715 (0.0423) [0.0000]	0.2880 (0.0387) [0.0000]	0.3010 (0.0419) [0.0000]
<b>Panel C: Square Root</b>										
Square roots enrolment rate 1931	2.5096 (0.3420) [0.0000]	0.7090 (0.1911) [0.0013]	0.8209 (0.3612) [0.0337]	1.3695 (0.3427) [0.0007]	1.7537 (0.4620) [0.0011]	3.0955 (0.5926) [0.0000]	3.4504 (0.5367) [0.0000]	3.2087 (0.5174) [0.0000]	3.4797 (0.5244) [0.0000]	3.6377 (0.5097) [0.0000]
Number of districts	184	184	184	184	184	184	184	184	184	184
Dependent Variable Mean	47.2	5.6	8.0	10.4	16.1	28.5	45.5	58.6	65.6	69.2
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (14 districts). All variables are defined at the district level. The dependent variable is the share of male who completed primary education. The independent variable is the inverse hyperbolic sine (IHS) transformation of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel A), the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel B), and the square root of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel C). *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.9: Exposure to Colonial Public Primary Education: Male Primary Education by Age Cohort in 2014

Age-group	(1) +15	(2) Over 60	(3) 55–59	(4) 50–54	(5) 45–49	(6) 40–44	(7) 35–39	(8) 30–34	(9) 25–29	(10) 20–24	(11) 15–19
Birth period	All	b. 1954	1955–9	1960–4	1965–9	1970–4	1975–9	1980–4	1985–9	1990–4	1995–9
<b>Panel A: Inverse hyperbolic sine transformation</b>											
IHS enrolment rate 1931	1.2864 (0.2771) [0.0001]	2.3105 (0.8010) [0.0086]	1.8856 (0.5245) [0.0016]	2.1748 (0.4397) [0.0001]	1.8416 (0.4171) [0.0002]	1.2094 (0.3071) [0.0007]	0.7971 (0.2621) [0.0060]	0.7264 (0.2135) [0.0026]	0.4688 (0.1855) [0.0192]	0.4456 (0.1750) [0.0184]	0.2621 (0.1164) [0.0347]
<b>Panel B: Ratio</b>											
Enrolment rate 1931	0.0980 (0.0186) [0.0000]	0.2597 (0.0413) [0.0000]	0.1420 (0.0262) [0.0000]	0.1385 (0.0257) [0.0000]	0.1293 (0.0267) [0.0001]	0.0754 (0.0203) [0.0012]	0.0534 (0.0160) [0.0030]	0.0427 (0.0121) [0.0019]	0.0273 (0.0086) [0.0043]	0.0258 (0.0091) [0.0096]	0.0190 (0.0062) [0.0054]
<b>Panel C: Square Root</b>											
Square roots enrolment rate 1931	1.2832 (0.1986) [0.0000]	3.0349 (0.4407) [0.0000]	1.8907 (0.2781) [0.0000]	1.9226 (0.2848) [0.0000]	1.8423 (0.2950) [0.0000]	1.1254 (0.2497) [0.0002]	0.7734 (0.2087) [0.0012]	0.5903 (0.1603) [0.0013]	0.3640 (0.1211) [0.0065]	0.3484 (0.1353) [0.0173]	0.2742 (0.1041) [0.0151]
Number of districts	211	211	211	211	211	211	211	211	211	211	211
Dependent Variable Mean	81.6	46.2	75.0	77.4	79.4	85.7	88.8	91.4	93.4	95.0	96.4
European population 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded (6 districts). All variables are defined at the district level. The dependent variable is the share of male who completed primary education. The independent variable is the inverse hyperbolic sine (IHS) transformation of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel A), the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel B), and the square root of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931 (Panel C). *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.10: Beta regressions

	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Medium Run</b>		Literacy rate in 1984			
Log enrolment rate 1931	0.0493 (0.0049) [0.0000]	0.0448 (0.0062) [0.0000]	0.0318 (0.0070) [0.0000]	0.0232 (0.0067) [0.0005]	0.0239 (0.0075) [0.0014]
Number of districts	184	184	184	184	184
<b>Panel B: Long Run</b>		Literacy rate in 2014			
Log enrolment rate 1931	0.0298 (0.0033) [0.0000]	0.0298 (0.0041) [0.0000]	0.0200 (0.0050) [0.0001]	0.0137 (0.0038) [0.0003]	0.0176 (0.0042) [0.0000]
Number of districts	211	211	211	211	211
European population 1931		✓	✓	✓	✓
Teachers' ratio 1931			✓	✓	✓
Control variables				✓	✓
Region FE					✓

*Notes:* Beta regression using a logit as link function. Marginal effect is reported with robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 23 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 1984 and 2014, respectively. To be restricted to the unit interval (0, 1), we divide it by 100. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.11: Alternative Divisions of Districts

	(1) Literacy rate 1984	(2)	(3)	(4) Literacy rate 2014	(5)	(6)
Log enrolment rate 1931	2.3688 (0.6661) [0.0019]	1.9013 (0.6075) [0.0049]	1.8851 (0.3417) [0.0000]	2.2433 (0.4343) [0.0000]	1.7670 (0.3130) [0.0000]	1.1727 (0.3072) [0.0009]
Number of districts	184	198	211	211	217	264
Dependent Variable Mean	47.8	49.3	75.7	75.7	76.0	78.1
R <sup>2</sup>	0.611	0.587	0.703	0.714	0.701	0.673
District selection	(baseline)	Tunis	(baseline)	5km buffer	Tunis	All
European population 1931	✓	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓

Notes: OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 24 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 2014. Column 1 reproduces the baseline estimate using the 1984 census. Column 2 includes the governorate of Tunis (14 districts). In column 3, we reproduce the baseline estimate using the 2014 census. In column 4, we redistribute pupils between districts within 5 km around borders. Column 5 includes the governorate of Tunis (6 districts). Column 6 uses the full sample of 264 districts. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.12: Controlling for Latitude and Longitude

	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Medium Run</b>					
	Literacy rate in 1984				
Log enrolment rate 1931	2.3688 (0.6661) [0.0019]	2.2209 (0.6212) [0.0018]	2.4633 (0.6706) [0.0014]	2.1926 (0.6202) [0.0020]	2.2084 (0.6218) [0.0019]
Number of districts	184	184	184	184	184
Dependent Variable Mean	47.8	47.8	47.8	47.8	47.8
<b>Panel B: Long Run</b>					
	Literacy rate in 2014				
Log enrolment rate 1931	1.8851 (0.3417) [0.0000]	1.7886 (0.3288) [0.0000]	1.9949 (0.3456) [0.0000]	1.7627 (0.3271) [0.0000]	1.7801 (0.3292) [0.0000]
Number of districts	211	211	211	211	211
Dependent Variable Mean	75.7	75.7	75.7	75.7	75.7
Spatial control	(baseline)	lon.	sq. lat.	sq. lon.	lat. × lon.
European population 1931	✓	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓

*Notes:* OLS estimations. Robust standard errors clustered at the governorate level and p-values in parentheses and brackets respectively. There are 6 regions and 24 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 2014. Column 1 reproduces the baseline estimate. Column 2 controls for the longitude, column 3 for the squared latitude, column 4 for the squared longitude, and column 5 for the interaction between latitude and longitude. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.

Table A.13: Correction of Standard Errors Using a Bartlett Spatial Weights Correction

	(1)	(2)	(3)	(4)
<b>Panel A: Medium Run</b>		Literacy rate in 1984		
Log enrolment rate 1931	2.3688 (0.6661) [0.0019]	2.3688 (0.6682) [0.0004]	2.3688 (0.6990) [0.0007]	2.3688 (0.6633) [0.0004]
Number of districts	184	184	184	184
Dependent Variable Mean	47.8	47.8	47.8	47.8
<b>Panel B: Long Run</b>		Literacy rate in 2014		
Log enrolment rate 1931	1.8851 (0.3417) [0.0000]	1.8851 (0.3704) [0.0000]	1.8851 (0.3949) [0.0000]	1.8851 (0.3854) [0.0000]
Number of districts	211	211	211	211
Dependent Variable Mean	75.7	75.7	75.7	75.7
Distance cutoff (km)	(baseline)	25	50	75
European population 1931	✓	✓	✓	✓
Teachers' ratio 1931	✓	✓	✓	✓
Control variables	✓	✓	✓	✓
Region FE	✓	✓	✓	✓

Notes: OLS estimations. In column 1, robust standard errors clustered at the governorate level. In columns 2 to 4, standard errors are estimated using a spatial correction at three different thresholds: 25 km, 50 km and 75 km, respectively. We use the modified Bartlett spatial weights that decay linearly with distance. P-values in brackets. There are 6 regions and 24 governorates. The governorate of Tunis is excluded in both panels: 14 districts in 1984, and 6 districts in 2014. All variables are defined at the district level. The dependent variable is the literacy rate of the population aged over 10 in 1984 and 2014, respectively. The independent variable is the log of the enrolment rate in public primary schools of the Tunisian Muslim population aged 0–18 in 1931. *European population 1931* is the log of the European population in 1931. *Teachers' ratio 1931* is the log of the number of public primary school teachers per 1,000 Tunisian Muslim inhabitants in 1931. *Controls* include a measure of terrain slope, latitude, distance from the coast, soil suitability for wheat and olives cultivation, average rainfall per year between 1901 and 1911, the number of mines in 1905, the number of railway stations in 1926, and a dummy for pre-colonial major urban centres.