THE LONG TERM IMPACT OF FRENCH SETTLEMENT ON EDUCATION IN ALGERIA

Ouarda Merrouche

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Abstract:

In settlement colonies, the economic systems, infrastructure and development projects of the settlers exclusively served their own needs. The disastrous outcomes of this discrimination became apparent in the post-colonial era particularly as regards education. In Algeria under French rule (1930-1962) education was almost exclusively reserved to French and other European settlers and as a consequence only ten per cent of Muslim Algerians were literate at independence. While the majority of the settlers left Algeria in 1962, the infrastructure remained. This paper exploits substantial regional variations in the non-Muslims proportion of the population on the eve of the war of independence (1954) in Algeria to evaluate the long term impact of colonial discrimination in public goods allocation on education levels. Using an instrumental variables approach to correct for endogeneous sorting of settlers and natives into regions my results indicate that settlement regions, which inherited a larger stock of infrastructure per capita at independence, have persistently higher literacy rates relative to extractive regions. However, these disparities tend to vanish over time probably as a result of the massive funds allocated to the education sector by the successive governments in the post-independence era.

1. Introduction

In settlement colonies, the economic systems, infrastructure (e.g. schools but also roads, hospitals, housing etc….) and development projects of the settlers exclusively served their own needs. A well documented historical fact is the denial of education to native populations under colonial rule. Indeed, colonial powers were reluctant to offer education purely for the benefit of the colonized people. In some cases, educational programs were offered but limited and given to a small elitist group. In the three decades of the post-colonial era, most former colonies, either created or significantly expanded the education network. Education, viewed as master determinant of economic growth, became an object of intense effort and enthusiasm. Governments spent considerable human and financial resources to develop the public education system (UNESCO, 2000). The case of Algeria, a former settlement and extractive colony of the French Empire is a good illustration. Under French rule (1830-1962) the huge majority of educated Algerian citizens were French settlers and other Europeans[1]. On the eve of independence less than one-third of school-aged Muslim children were enrolled in schools and only 10 per cent of the total native Algerian population was literate.

At Independence, efforts to nationalize instruction at schools, therefore, required a huge expansion of all levels of education coupled with measures aimed at greatly increasing and encouraging access such as free and compulsory elementary education. The high priority assigned by the government to national education was reflected in the amount of money spent on it and on the existence of free schooling at all levels. Between 1967 and 1979, a total of 171 billion DA was allocated for operating expenditures in this sector. In 1985 approximately 16.5 percent of the government's investment budget was devoted to education; in 1990 the education

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[1] The majority of the settlers (about a million individuals) left immediately after Algeria gained independence in 1962.

sector received 29.7 percent of the national budget. The country also received substantial assistance from the World Bank. Between 1973 and 1980, Algeria contracted five education loan agreements for sums totaling US$276 million.

The purpose of this paper is to determine whether despite these massive investments the discriminative allocation of public resources and infrastructure that characterized the colonial period caused persistent regional disparities in education levels. To do so, I use regional data covering the period 1977-1998 (i.e. 15 to 40 years after independence) to identify the long run relationship between school outcomes and the fraction of non-Muslims who lived in Algeria on the eve of the war of independence (1954). The empirical strategy uses an instrumental variables approach to correct for potential non-random sorting of settlers and natives into regions.

This paper may be related to two strands of literature. The first strand of literature studies the long term economic impact of colonial rule. There has been renewed interest among economists in the question of whether history has a persistent effect on economic performance. Acemoglu et al (2001) show that former settlement colonies perform better than extractive colonies in the long run because they inherited better institutions (which protect private property rights). Banerjee and Iyer (2004) analyze the colonial land revenue system set up by the British in India and show that differences in historical property rights institutions lead to sustained differences in economic outcomes. This paper is part of the same broad research agenda and like Banerjee and Iyer (2004) it focuses on a specific country experience-Algeria. Unlike these studies however, this paper does not focus on colonial institutions but on another much debated issue of colonial history: discrimination in public goods allocation and its long term consequences.

The second strand of literature to which this paper can be related seeks to identify the factors determining the allocation of public school financing. Recent contributions to this literature

includes La Ferrara and Mele (2005) who explore the effect of racial segregation on public school expenditure in US metropolitan areas and school districts and Banerjee, Iyer and Somanathan (2006) who use regional data for India to evaluate how religion and caste fragmentation determine public goods' allocation. The present paper does not focus on the determinants or nature of discrimination in public goods allocation but on its long term consequences. On this aspect this paper is more closely related to Card and Rothstein (2006) study of the effect of racial segregation on the Black-White test score gap in the US.

The remainder of the paper is organized as follows. The next section describes the data and provides a brief historical background to understand the geographical distribution of the European population before independence. Section 3 develops the empirical strategy. Section 4 discusses the results. The last section concludes the paper.

2. Data

Provincial level data are available for the census years 1977, 1987 and 1998. The outcome variables are the literacy rate of individuals aged 10 and older and the school enrollment rate[2] of individuals aged 6 to 15. The proportion of non-Muslims on the eve of the war of independence[3] (i.e. 1954) is used to capture the long term impact of colonial discrimination in public goods allocation on education outcomes. This variable is computed using city level data from the 1954[4] census of Algeria. Some cities with French or Christian connotation changed name after independence or were annexed to other cities but information is available on their current name

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[2] The average number of years of education is not available at provincial level. The national statistics office never grants access to household surveys or censuses. Hence, one can only rely on series published in the census reports.
[3] Since the large majority of native Algerians are Muslims (over 95 per cent) in the censuses of the pre independence period European settlers and natives were differentiated as being or not Muslims.
[4] I use data from 1954 i.e. the date the war of independence started because a number of settlers already left the country during the war.

or city of annexion to match each city to its current province. However, for 20 cities out of 421 the information was not available[5] causing some measurement error in the fraction of non-Muslims. Measurement error in the independent variable attenuates ordinary least squares estimates. Note also that due to population growth the number of provinces increased in 1984 from 31 to 48 provinces.

Map 1 depicts the proportion of the non-Muslim population by province. The map shows that the largest populations of settlers were found in the Northern part of the country around the Mediterranean coast.

In order to understand the factors behind the geographical distribution of the non-Muslim population a brief historical of the conquest of Algeria is necessary. The French conquest of Algeria lasted twenty-seven years and was gradual from North to South. It started with the capture of Algiers in 1830, then Béjaia in September 1932. The army then moved inland to Constantine, which fell in 1837. Resistance to French domination was uneven and was completed only in 1857 with the fall of Kabylia. The Saharan regions of Touat and Gourara, which were at that time Moroccan spheres of influence, were occupied in 1900; the Tindouf area, previously regarded as Moroccan rather than Algerian, became part of Algeria only after the French occupation of the Anti-Atlas in 1934. A large-scale program of dispossessing and confiscating cultivable land made rapid mass settlement possible. The settlers were allocated fertile land and the largest populations of settlers were found in early conquered regions like Oran and Alger.

Table 1 provides some descriptive statistics for the main variables used in the analysis and figure 1 and 2 plot the fraction of non-Muslims against the literacy rate and the school enrollment rate.

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[5] These were either small cities (villages) or cities that had already changed name or been annexed to other cities before independence i.e. between 1954 and 1962.

These figures show a positive but weak relationship between education outcomes and settlements' size with two apparent outliers: Alger and Oran.

3. Empirical Strategy

I exploit the substantial variations in settlements' size across provinces to identify the long term impact of colonial discrimination in public goods allocation on educationa outcomes by running the following regression:

$$S_{it} = \text{constant} + \alpha_t + \beta^{OLS} NM_i + \varepsilon_{it} \tag{1}$$

Where S_{it} is an indicator of the level of education in province i in year t; α_t is a year fixed effect; NM_i is the fraction of non-Muslim in province i in 1954. I do not include province fixed effects since NM_i is fixed for province i over time. However, since my data consist of repeated observations over time for each province I adjust the standard errors for within-province correlation.

As was clear from the data description and historical background provided in the previous section there may be endogenous selection of settlers (and natives) into provinces. For instance, the redistribution of fertile land from the natives to the settlers probably caused more non-Muslims to settle in prosperous provinces while at the same time causing a forced migration of natives into less prosperous provinces. To deal with concerns about exogeneity I employ an instrumental variables (IV) approach. From the brief description of the different phases of the conquest of Algeria given in the previous section an immediate candidate instrument for NM_i is the province distance to the coast. I control for potential independent effects of the instrument by

including in all regression the distance to Algiers[6] (the capital city, which is on the coast) and average rainfall in 1998, a typical year for rainfall.

Formally, the IV approach consists in running the following first stage and second stage equations:

First stage

$$NM_i = \text{constant} + \gamma DC_i + \pi X_i + \upsilon_i \tag{2}$$

Where DC stands for distance to the coast, X_i is the vector of geographical controls and υ is an error term.

Second stage

$$S_{it} = \text{constant} + \lambda_t + \beta^{IV} \overline{NM}_i + \phi X_i + \zeta_{it} \tag{3}$$

Where $\overline{NM}_i$ is the predicted value of NM_i derived from the first stage.

Table 2 column 1 and 2 report the first stage results without and with geographical controls respectively. As expected from the descriptive map distance to the coast is a very good predicator for the fraction of non-Muslims in 1954. In both cases the estimate is sizeable and has the expected sign i.e. the closer the province is located to the coast the larger the fraction of non-Muslims. Adding the geographical controls has the effect of increasing the regression's predictive power and increases the point estimate (in absolute term) on the instrument. In other words the instrument does not seem to capture the effect of other omitted geographical variables.

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[6]The distance to Algiers is correlated with the distance to the coast and the former may determine the outcomes directly because fiscal policy in Algeria is a centralized. I use the shortest distance to Algiers from the province's capital and similarly for the distance to the coast.

3. Results

Table 3 reports the OLS and IV estimates obtained from running regressions (1) and (3) respectively when the outcome variable is the literacy rate for the population aged 10 and older. Both OLS and IV estimates are significant statistically and are only slightly altered when I include geographical controls. These estimates indicate that the fraction of non-Muslims in 1954 is positively associated with the literacy rate even when controlling for endogeneity. OLS estimates are lower than IV estimates which is consistent with the fact that measurement error in the fraction of non-Muslims attenuates OLS estimates. The preferred IV estimate in column (4) indicates that a one standard deviation increase in NM_i is associated with a 3 percentage point increase in the literacy rate, which is almost equal to a fourth of a standard deviation. The effect at the mean is a 2.4 percentage point increase in literacy. Going from a totally integrated (fifty per cent Muslim and fifty per cent non-Muslim) to a totally segregated province (hundred per cent Muslim) causes a 13 percentage point fall in the literacy rate. Hence the magnitude of the effect of colonial discrimination on education appears very sizeable even 15 to forty years after independence. The results are robust to excluding the two outliers (Alger and Oran) from the sample (not reported). The reason why settlement areas show higher literacy rates than extractive areas in the long run may be attributed to the fact that at independence while the majority of the settlers left the country, the infrastructure remained. Hence, settlement areas inherited a higher stock of infrastructure per capita at independence.

This long term effect is however somehow biased because the literacy rate is a stock variable. In particular since the variable used here is the literacy rate for the population aged 10 and older it includes individuals who were school aged either under French rule or immediately after independence and who therefore were too old to fully or even partially benefit from the vast

expansion of the education system that occurred in independent Algeria. Unfortunately, the youth literacy rate is not available by province. However, I have run separate regressions for 1987 and 1998 and the results indicate that the effect of colonial discrimination on literacy decreases over time (not reported) which supports the idea that the massive funds allocated to the education sector by successive governments post-independence may have achieved some equity. In addition, this result may be confirmed by the fact that in 2002 the whole country average youth literacy rate (for individuals aged 15-24) reaches approximately 90 per cent.

Next, to more accurately determine the extent to which the effect of colonial rule on education persists in the long run I look at two *flow* variables: the school enrollment rate and the number of pupils per classroom. The results are reported in Table 3 for the school enrollment rate of individuals aged 6 to 15. While OLS estimates appear to indicate that the negative effects of colonial discrimination on educational outcomes persist in the long term, the preferred IV estimate reported in column (4) confirms the previous result that this effect vanishes over time. Similarly, the relationship between the fraction of non-Muslims in 1954 and the number of pupils per classroom is insignificant statistically (see Table 5). These two combined effect may not be interpreted as reflecting a causal relationship between school infrastructure and education levels. The reason already stated in the introduction is simply that discrimination in the allocation of public goods under colonial rule affected other sectors in addition to affecting the education sector. For instance, discrimination most probably also affected the allocation of health infrastructure and road infrastructure which are also likely to explain educational outcomes either directly through determining pupils' health status or physical access to school or indirectly through income effects.

6. Conclusion

The question of whether colonialism had a positive impact in the former colonies raises a very emotional issue well illustrated with the recent debates on the content of the Law Fillon in France which attributed a positive role of colonial history on long term development. This paper has brought some pieces of evidence on this issue by focusing on the long run impact of colonial discrimination in public goods allocation on education in Algeria, a settlement and exploitation colony of the former French Empire. The main results indicate that literacy rates tend to be higher in the long run in settlement provinces relative to extractive provinces because the former may have inherited a higher stock of infrastructure per capita at independence. However, there is evidence that these disparities tend to vanish over time with universal access to education.

References

Acemoglu D., Johnson S.. and Robinson J. (2001), "The Colonial Origin of Comparative Development: An Empirical Investigation", American Economic Review 91(5), 1369-140

Banerjee, A., and Lakshmi I., "History, Institutions and Economic Performance: the Legacy of Colonial Land Tenure Systems in India", American Economic Review 95(4) (September 2005): 1190-1213.

Banerjee A., Iyer L., and Somanathan R. (2006), "History, Social Division and Public Goods in Rural India, forthcoming Journal of the European Economic Association.

Card D. and Rothstein J. (2006), "Racial Segregation and the Black-White Test-Score Gap", NBER working paper 12078

La Ferrra E. and Mele A. (2005), "Racial Segregation and Public School Expenditure", Bocconi University mimeo
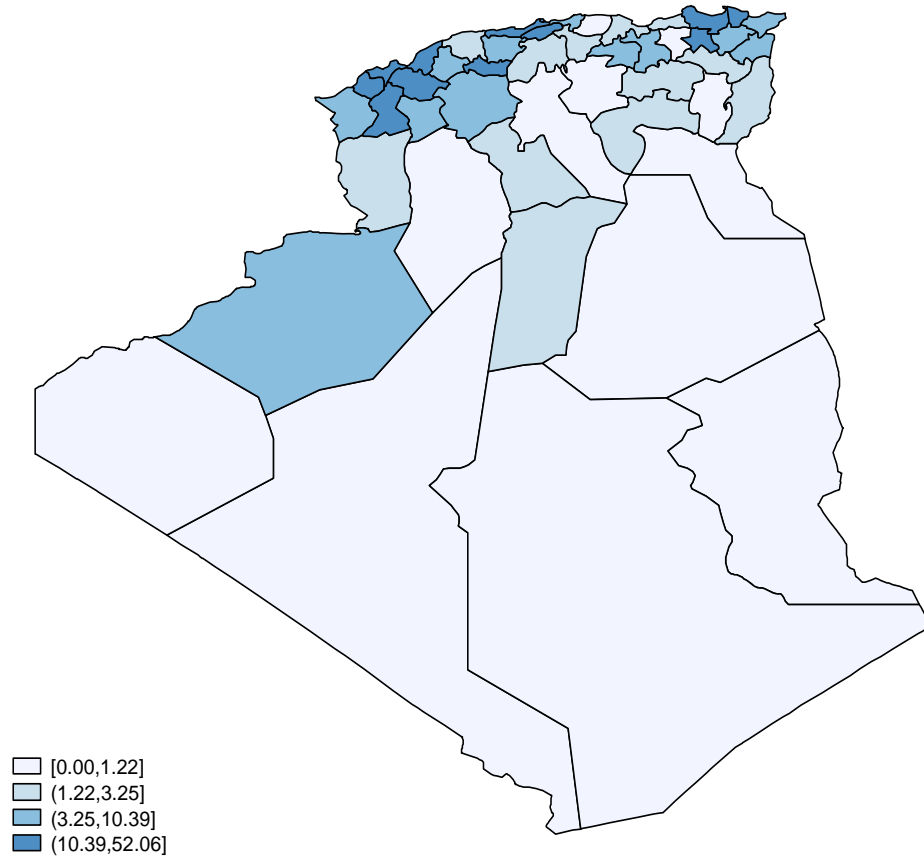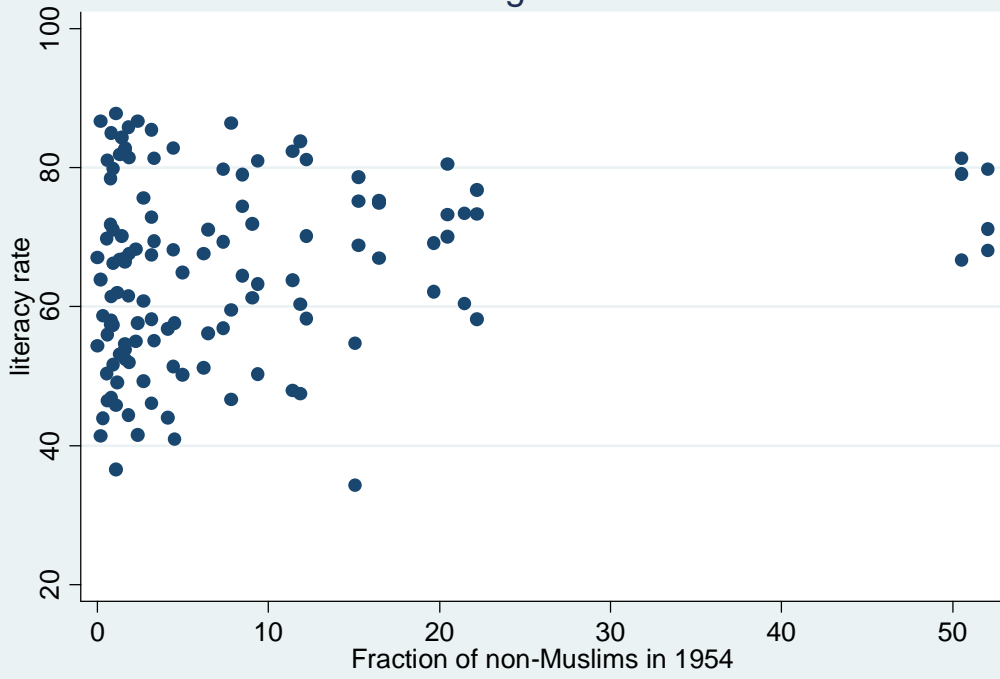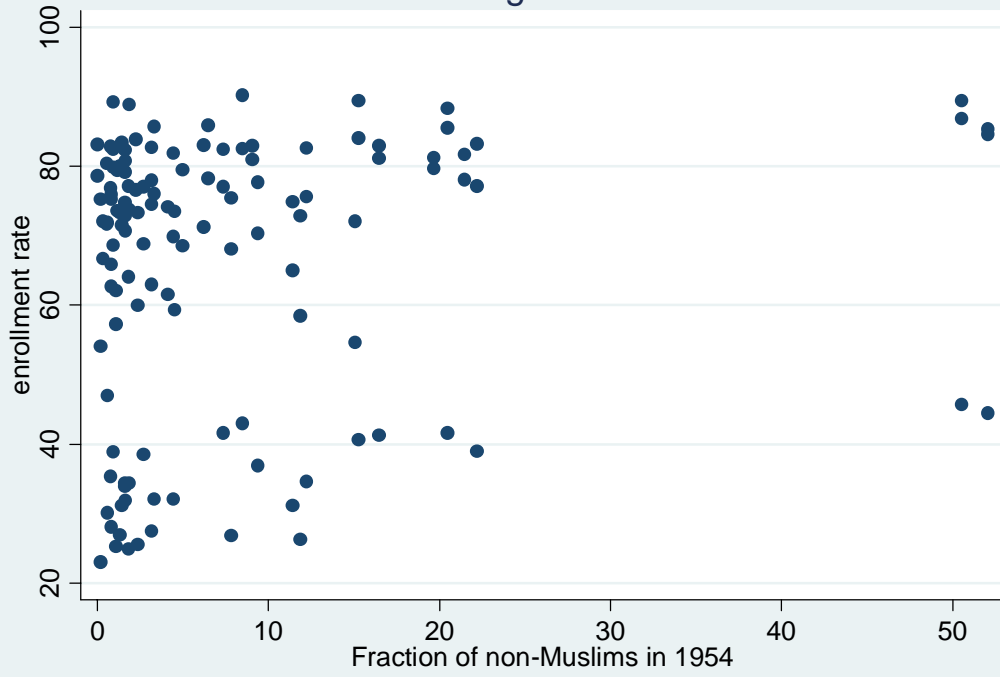
Map1: Fraction of Non-Muslims in 1954

- [0.00,1.22]
- (1.22,3.25]
- (3.25,10.39]
- (10.39,52.06]

Figure 1

Figure 2

TABLE 1: DESCRIPTIVE STATISTICS

Variables	Mean	Standard Deviation
Fraction of non-Muslims in 1954	9,134	11,47
Literacy rate	64,93	13,09
Enrollment rate	65,52	19,9
Distance to the Coast	3,83	2,16
Distance to Algiers	5,52	1,18
Average Annual Rainfall	30,59	24,93

TABLE 2: FIRST STAGE REGRESSIONS FOR IV
Dependent Variable: Fraction of non-Muslims in 1954

Coeffcient on	(1)	(2)
Instrument	-2,96***	-3,44***
Distance to the Coast	(0,617)	(0,774)
R-squared	0,33	0,47
No of observations	48	48
Geographical Controls	No	Yes

Note: Standard errors in parentheses

TABLE 3: IMPACT ON LITERACY

coeffecient on	OLS		IV	
	(1)	(2)	(3)	(4)
Fraction of non-Muslims in 1954	0,215***	0,230***	0,345***	0,263**
	(0,041)	(0,054)	(0,099)	(0,118)
R-squared	0,69	0,7	0,68	0,68
No of observations	127	127	127	127
Geographical Controls	No	Yes	No	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes

Note: Clustered Standard errors in parentheses

TABLE 4: IMPACT ON SCHOOL ENROLLMENT

coeffecient on	OLS		IV	
	(1)	(2)	(3)	(4)
Fraction of non-Muslims in 1954	0,291***	0,306***	0,405**	0,248
	(0,049)	(0,063)	(0,157)	(0,202)
R-squared	0,89	0,9	0,88	0,88
No of observations	127	127	127	127
Geographical Controls	No	Yes	No	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes

Note: Clustered Standard errors in parentheses

TABLE 4: IMPACT ON THE NUMBER OF PUPILS PER CLASSROOM

coeffecient on	OLS		IV	
	(1)	(2)	(3)	(4)
Fraction of non-Muslims				
in 1954	0,031	-0,118	0,249	-0,89
	(0,093)	(0,147)	(0,157)	(0,192)
R-squared	0,16	0,22	0,17	0,22
No of observations	127	127	127	127
Geographical Controls	No	Yes	No	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes

Note: Clustered Standard errors in parentheses