

# Local institutions and human capital formation in pre-industrial societies: evidence from Valencia

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This article analyses the relationship between institutions and human capital formation. We use literacy rates in 1860 at the municipal level in Valencia where the expulsion of the *Moriscos* in 1609 was followed by the Christian resettlement. Our findings show that male literacy was consistently lower in Morisco areas by mid-19th century. Yet, the analysis also shows the disappearance of this effect at the beginning of the 20th century. We argue that the deployment of the liberal state would have entailed the gradual decoupling of educational outcomes from the institutional heterogeneity characteristic of the Old Regime.

## 1. Introduction

This article investigates whether local institutions had an impact on human capital formation. Before the development of State-infrastructure, which in the case of Europe unfolded mainly throughout the 19th century, formal education was neither hierarchical nor uniform. The building and funding of elementary schools, for instance, was a local affair and thereby largely depended upon the initiative of the authorities (the local council) and/or a benefactor (Church, wealthy families, etc.), as well as the parents themselves. Also, the institutional framework that shaped exchanges and interactions between the members of a community could directly affect the incentives of the local elites to invest in education and/or household incomes (through rent-seeking) and thus the social demand for education. Therefore, differences in the institutional framework might have relevant implications regarding schooling and educational attainment.

This line of research is at the core of the debate on human capital and economic development. On the one hand, institutions shape social and economic exchanges and consequently

economic development (Engerman and Sokoloff 2000; Acemoglu *et al.* 2001; Ogilvie and Carus 2014). It has also been shown that in some cases, a particular institutional framework could have long-lasting effects (Nunn 2008; Dell 2010; Michalopoulos and Papaioannou 2016), a feature that would be of particular relevance for education, as the stock of human capital has proved central for economic development (Gennaioli *et al.* 2013; Waldinger 2017; Valencia Caicedo 2019). Understanding how institutions affect human capital formation thus remains paramount. Although skills and knowledge are learned through different means, formal schooling has often been at the center of this process in Europe, especially after the Protestant reformation and the ensuing Counter-Reformation. Thus, in the absence of a leveller, or a strong State, the existence of sizable differences in educational outcomes has put local institutions and living conditions in the spotlight.

However, the so-called nation building literature stresses that heterogeneities within a territory in terms of ethnicity, language, or religion, could harm its economic development by reducing the provision of public goods (Alesina and La Ferrara 2005) or by increasing the probability of conflict and social unrest (Alesina *et al.* 2020). Under these circumstances, central states used primary education as an instrument of homogenization, which became one of the key aspects in the deployment and consolidation of liberal states throughout the 19th century (Alesina *et al.* 2021). It would, therefore, be reasonable to think that increasing state intervention in the organization of primary education might have shifted educational outcomes away from local institutional diversity.

In this study, we exploit the heterogeneity existing in the Valencia region at the dawn of the contemporary period to empirically assess the effect of local institutions on human capital formation. At that time, the involvement of the central Spanish administration, or the recently created Liberal State, was negligible. It can thus be considered that the literacy levels recorded by mid-19th century were the result of past differences being local institutions and/or endowments, among others, potential explanations for such differences (Beltrán Tapia *et al.* 2019). Particularly, during the Old Regime, when the capacity of the State was limited, the Spanish Crown often delegated the authority to private agents who were responsible for the local government, essentially administration and justice. In terms of the existing institutional diversity, the population could live under different jurisdictions, mainly royal domains (*realengos*) or lordships (*señoríos*). Given their intrinsic nature, these jurisdictions could be more or less conducive to extraction and rent-seeking and, therefore, have an impact on educational attainments either through the supply or the demand for education. For instance, it may well be that lords were not particularly fond of elementary schooling, being more interested in maintaining the status quo and protecting their own economic and social position. In turn, lower incomes arising from harsh living conditions and greater socioeconomic inequality would discourage many families to invest in education.

Nevertheless, in 1857, a time marked by significant socioeconomic change in which various countries were taking their first steps toward mass schooling and the use of education as a nation-building policy, Spanish liberal government passed the Public Instruction Act (PIA), commonly known as the Moyano Act. Indeed, this law was one of the great reforms introduced in Spain in the 19th century. The law established that municipalities with more than 500 inhabitants should have a public school, and that primary education would become “compulsory for all Spaniards” between the ages of 6 and 9 years (Art. 7), and free in cases where the “parents, guardians or providers are unable to pay for it” (Art. 9). It also listed the obligations that fell to families (the schooling of their children) and municipalities (the opening of schools). Summing up, the regulatory framework for primary education in force in Spain from 1857 on served to organize and homogenize the Spanish education system and,

gradually, attenuated the large territorial differences in educational outcomes bequeathed by the Old Regime.

Studying Valencia provides a unique framework for analyzing the effects of institutions on human capital formation since it is possible to identify territories in which the institutional framework (or the “rules of the game”) was more demanding. In 1609, it was decreed the expulsion of the Moriscos (Moslem converts to Christianity or New Christians) which, in the former Kingdom of Valencia, accounted for approximately a third of the total population. Interestingly, historical studies have suggested that their living conditions were particularly harsh. In fact, their situation has been even compared to that of “black slaves” in the United States.<sup>1</sup> After their expulsion, these territories were repopulated with Old Christians from other areas but, importantly, the institutional framework that shaped the exchanges and interactions between the new settlers and the existing landlords remained rather severe when compared to other territories (Reglà 1964; Torres Morera 1969; Casey 1971; Ardit 2009; Chaney and Hornbeck 2016).

To empirically assess whether local institutions had an impact on human capital formation and whether such impact was persistent over time, we constructed a novel data set with information at the municipal-level on literacy from the 1860 and 1900 Population Censuses. The data set contains information for 570 municipalities, covering the whole Valencia region.<sup>2</sup> Then, a list of population entities (or *pueblos*) inhabited by Moriscos before their expulsion is taken from several sources (Boronat i Barrachina 1901; Lapeyre 1959, 1986; Reglà 1964; Bernat i Martí and Badenes Martín 1994), while the institutional characteristics of each entity at the end of the Old Regime comes from the Census of Population of 1787 (Instituto Nacional de Estadística 1991). In addition, the data set includes information on other idiosyncratic elements that may be affecting human capital formation such as population size, settlement pattern, income level, and language (Catalan or Spanish) spoken. Finally, first- and second-nature geographical dimensions have also been included to better identify the distinct link between local institutions and education.

We first use an ordinary least square (OLS) model to regress male literacy on the population type (Morisco and non-Morisco), including as controls the aforementioned variables and district fixed effects. However, the OLS estimations could be biased if being a Morisco municipality was not a random phenomenon, that is, if characteristics that increase the probability of being a Morisco municipality have an impact on the literacy level too. To overcome the possible potential endogeneity of being a Morisco municipality our empirical strategy thus relies on a treatment-effects estimator. To put it differently, the characteristics of our data set and the nature of our research question call for the use of quasi-experimental methods. In particular, we make use of the Inverse-Probability-Weighted Regression Adjustment (IPWRA) estimator in order to explore whether there were any significant differences in literacy between those places inhabited by Old Christians and those repopulated after the expulsion of the Moriscos in 1609.

The results show that municipalities that had been inhabited by Moriscos until 1609 and then repopulated exhibited, on average, lower education levels in mid-19th century. This result is robust to considering exclusively the towns that were under seignorial jurisdiction (lordships), and to different specifications and subsamples (for different population size) and,

<sup>1</sup> Reglà (1964, p.141) remarks that Earl Hamilton “... has compared the situation of the lords’ Morisco vassals with that of black slaves in the South of the United States, slaves protected by big landowners.”

<sup>2</sup> The number of observations decreases from 570 municipalities (1860) to 536 municipalities (1900) due to the merger and aggregation phenomena.

therefore, confirms existing qualitative historical accounts that stress the extractive nature of these local institutions. However, this effect disappears when analyzing municipal educational results in 1900, i.e., more than 40 years after the approval of the Moyano Act inaugurated the state intervention in the education system in Spain. The deployment of primary education played an important role in the nation-building process and, as a result, the differences in educational outcomes observed in the territory by the turn of the century could no longer be explained by the institutional conditions prevailing during the Old Regime.

This study thus contributes to wider debates. A number of works claim that the consolidation of institutional frameworks that led to a more uneven distribution of income or resources, thus concentrating economic and political power in the hands of elites, could have had a negative effect on the rise of public schooling (Chaudhary 2009; Galor *et al.* 2009; Go and Lindert 2010; Vollrath 2013). Within this literature, the existence of a relationship between institutions and education is linked to the conditions affecting the demand for it. It has been argued that extractive institutions could be related to poverty and inequality, which might limit the number of families that can afford the direct economic cost of schooling, thus decreasing the social demand for it. The economic basis for this has been well established by Galor and Zeira (1993), who pointed out that, in the presence of capital market imperfections, economic inequality generates long-term effects on human capital investment. Several investigations have empirically confirmed the existence of this relationship (Cinnirella and Hornung 2016).

Within this strand of the literature, Beltrán Tapia and Martínez-Galarraga (2018) have analyzed the case of Spain in mid-19th century. These authors find a negative relationship between land access inequality and male literacy rates at the district level in 1860. Further, they argue that the disparities in the local institutions and in the distribution of land were the outcome of the different historical phases of the *Reconquista*.<sup>3</sup> In a similar vein, Oto-Peralías and Romero-Ávila (2016) argue that this lengthy historical process had a persistent negative effect on regional economic development by favoring the existence of differences in the concentration of economic and political power across Spain and this political inequality translated into regional income differences that can be still seen today. Analyzing the frontier of the Nasrid Kingdom of Granada, these authors illustrate these forces at a more local level (Oto-Peralías and Romero-Ávila 2017).

By analyzing the relationship between institutions and human capital in a context in which the involvement of the State was still limited, our paper also contributes to the literature on state capacity (Acemoglu *et al.* 2015b; Dell *et al.* 2018). A strand of this literature has explored whether the existence of local powers erode the ability of central rulers to implement policies across the territory, thereby limiting the provision of infrastructures and public goods in an institutional framework characterized by fragmented jurisdictions (Epstein 2000; Grafe 2012; Dincecco and Katz 2014; Acemoglu *et al.* 2015a). In the case of Spain, Oto-Peralías (2018) has shown that the delegation of governmental authority to lordships during the Old Regime had a negative effect that is still visible in today's economic outcomes.<sup>4</sup> Our paper sheds further light on these issues by showing that there is significant variation within lordships as those in former Moriscos lands suffered a larger negative effect. Besides, our study follows

<sup>3</sup> They do not find however a negative effect in the case of female literacy levels -which at that time were very low in Spain, around 10%-. In addition, the effect of the Reconquista on land distribution only appeared in the former territories of the Crown of Castile, but not for the Crown of Aragon where the Kingdom of Valencia was located.

<sup>4</sup> Recent reviews including the potential issues which might be present in persistence studies can be found in Kelly (2019, 2020) and Voth (2020).

in the footsteps of previous studies that have shown a negative and persistent effect of the institutional framework introduced in the territories previously inhabited by the Moriscos in Valencia on economic development (Chaney and Hornbeck 2016).

However, our study also shows that persistence can be reversed. For example, through the transformation implied by the emergence of modern states in Europe in the course of the 19th century. Thus, the negative effect of the Morisco presence during the Early Modern Age that we have found on male literacy rates in the mid-19th century would have disappeared with the intervention of the new state, namely with the passing of an educational law. And this happened even in the context of Spain, a country characterized by a weak state capacity and the enormous difficulties experienced in the deployment of the liberal State during the 19th century.

The remainder of the paper is organized as follows. Section 2 provides historical background on the education outcomes, the regulatory framework, the institutional setting, and the presence of Moriscos in the former Kingdom of Valencia. Section 3 introduces the data used and the sources, and then presents a first descriptive analysis. Section 4 contains the econometric estimation and the main results at the beginning of the liberal period, in 1860, while Section 5 analyses whether the main results persist in 1900 once the Spanish State had deployed its action on the organization and regulation of primary education. Finally, Section 6 closes the article with some concluding remarks.

## 2. Historical background

The Valencia region (or *Comunitat Valenciana*) is located on the eastern side of the Iberian Peninsula, on the Mediterranean Sea. It covers an area of 23,255 km<sup>2</sup> and is geographically longer than it is wide, with approximately 435 km of coastline. Today, it has around 5 million inhabitants and its capital, Valencia, is Spain's third largest city after Madrid and Barcelona. In relative terms, it represents 10.6% of the Spanish population while its economy accounts for 9.2% of the GDP. Back in 1860, the Valencia region had 1.3 million inhabitants, which represented around 8.1% of the Spanish population and 8.6% of its GDP (Rosés *et al.* 2010; Prados de la Escosura 2017), being a markedly agrarian society since almost two-thirds of the labor force was in agriculture.

Given the economic and social context in the Valencia region (Furió 1995; Ardit 1996), education levels had traditionally been somewhat modest. Based on the information published in the Census of Population of 1860, less than two out of ten males could read and write which was well below Spain's average. Indeed, a striking characteristic of mid-19th century Spain was the sizable territorial disparities in educational attainments. This is true not only across Spain's provinces (Núñez 1992), but also within Spanish provinces (Beltrán Tapia *et al.* 2019). A good illustration of this is the region of Valencia, where municipal male literacy ranged between 0.9% and 46.6% in 1860.

### 2.1. Elementary education in Spain: From the old regime to the liberal state

The regulatory framework for elementary (or primary) education in Spain in 1860, the first year for which countrywide information on literacy exists, was the result of a long gestation process that culminated in 1857 with the passing of the Public Instruction Act (PIA), or Moyano Act. The enlightened reformers of the late 18th century had already identified education as a driving force for socioeconomic development. Jovellanos, for example, noted



in his 1802 ‘Memorandum on Public Education’ that “the origins of social prosperity are many; but all spring from the same source, and this source is public instruction”. These words indicate that the intellectuals or knowledge-elites were fully aware of the importance of education. However, the reality was that Spain was lagging behind other Western European countries at the time. Before the mid-19th century, in the absence of a uniform and hierarchical education system, the building, running, and funding of elementary schools was a local affair.<sup>5</sup> The local council and pupils’ parents covered the expenses, essentially the teacher’s salary and materials (Viñao 1990). In other words, school funding in the Old Regime were the responsibility of local councils and parents.<sup>6</sup> Given these circumstances, education in Spain presented a bleak picture.<sup>7</sup>

It was in this historical context that Article 366 of the Constitution of 1812 (Item IX. On public education) set out that “all the towns in the Kingdom shall establish elementary schools in which children will be taught reading, writing and counting, and the catechism of the Catholic religion, which will also include a brief outline of civil obligations”. It also aimed to create a uniform education system (Art. 368) and a Ministerial Education Board in charge of inspections (Art. 369). These ideas were given shape in the Quintana Report of 1814 (Report and Draft Decree on the Regulation of Public Education). Following this report, the General Regulations for Public Instruction were established in 1821, but the plans to implement them were halted due to political and social instability and not pursued further. This was also the case with the Duque de Rivas Plan of 1836. During the first half of the 19th century, therefore, primary schools followed no specific education plan and were left to their own devices as far as funding was concerned. In other words, primary education was a municipal responsibility like in the old days.

Therefore, it was not until 1857, a time marked by great socioeconomic change in which various countries were taking their first steps toward mass schooling, that the Moyano Act was passed. This regulated education from 1857 to 1970, when it was replaced by the General Education Act (GEA).<sup>8</sup> Indeed, the Moyano Act was one of the great reforms introduced during the 19th century. Education was split into primary, secondary and higher education (Art. 1), with a curriculum being established for each education level. At the same time, primary education would become “compulsory for all Spaniards” (Art. 7) between the ages of 6 and 9, and was free in cases where the “parents, guardians or providers are unable to pay for it” (Art. 9).<sup>9</sup> The Moyano Act also laid down a minimum threshold requirement for

<sup>5</sup> Although elementary education was essentially a local affair, the Spanish Crown did intervene in a relevant aspect, the language of instruction. From the mid-18th century, it had been established that Spanish should be the language of instruction (Gonzalez-Portilla and Urrutikoetxea 2016).

<sup>6</sup> Student fees were paid in cash or kind. Besides, the contribution of local councils to teachers’ wages was usually in cash but could sometimes be in kind, usually board and keep. For instance, in the village of Càrcer, according to Madoz (1845), “the master has no funding other than the monthly payments made by his pupils”, while in Carpesa, a village of similar size, a sum of 1000 *reales* had been allocated.

<sup>7</sup> Viñao (1990) estimates that only about 23.3% of the population between ages 6 and 13 were being schooled in 1797.

<sup>8</sup> Although the Moyano Act continued until 1970, successive changes were introduced during the 113 years that it remained in force. Compulsory education, for example, initially from ages 6 to 9, was extended to age 12 in 1909 and age 14 in 1964.

<sup>9</sup> The compulsory nature of education was not absolute, since pupils could ask to be excused when they were “sufficiently provided with this type of education in their homes or in a private establishment” (Art. 7). And to obtain free primary education, a “certificate issued by the relevant parish priest and endorsed by the town mayor” had to be provided (Art. 9).

schools for each town according to its size.<sup>10</sup> Nevertheless, public schools, i.e., those that were “fully or partly maintained by public funds or by religious or other similar foundations” (Art. 97), continued to be the responsibility of local forces.<sup>11</sup>

## 2.2. Local institutions: Royal domains and lordships, a legacy of the old regime

The institutional setting of the Old Regime had its roots in the Medieval period. As the so-called, not without controversy, *Reconquista* advanced from north to south, the different Christian Crowns had to decide how the repopulation and distribution of land from the territories conquered was carried out. In some instances, land remained under royal jurisdiction while in other cases it was granted to the nobility or an ecclesiastical order (Beltrán Tapia *et al.* 2020). In this respect, a lordship involved the delegation of power by the Crown (Dewald 1996). The territories occupied by lordships initially took shape during the 9th and 10th centuries and spread over the course of the Middle Ages, generally because it was a way in which the Crown would reward nobles who took part in this process. The second stage took place during the early modern era, in particular during the period of the House of Habsburg and was driven by financial needs. From the point of view of the powers involved when a lordship was granted to its holder (either a noble or an ecclesiastical one), there are at least two basic types of power to be considered: the jurisdictional (*señorío jurisdiccional*) and the territorial (*señorío solariego*), which also includes the so-called vassalage.

In a jurisdictional lordship, the Crown delegated a royal power such as justice to the holder of the title. Full jurisdictional lordship meant delegating the administration of justice, along with the capacity to appoint judges, officials, and council members (or at least to approve the appointment). This was a clear delegation of royal power to the local elites.<sup>12</sup> The second way in which the Crown could delegate power was through a territorial lordship, which involved a set of rights in connection to the legal ownership of the land. To gain an idea of its importance, suffice it to say that the abolition of this power was a priority of the liberal reformists in Spain in 1812 (Ardit 1968). Being given territorial control involved the delegation of rights over the lordship estates, regardless of whether they were worked directly by the lord or by tenant farmers. The deeds of cession usually included the right to collect the rents paid by those who had the right to use the land subject to charges (*censo*), i.e., those with emphyteutic contracts.

<sup>10</sup> Communities of over “500 souls,” for example, should have at least one public primary school for boys and another for girls (Art. 100). Communities of at least “2000 souls” should have two complete schools each for boys and girls, while those with “4000 souls” should have three, and so on (Art. 101). It was also recommended that communities of fewer than “500 souls” should form districts so that they could have a complete primary school (Art. 102).

<sup>11</sup> Art. 97 stipulated that every year there would be an allocation of “one million *reales*, at least, to help those towns and villages that are unable by themselves to cover the cost of primary education.”

<sup>12</sup> For example, in many 16th-century deeds (*escrituras de donación*) involving lordships and bishopric towns and monasteries that reverted to the Crown when the holder of the title died (*amortización de encomiendas*), the Habsburgs—whose intention it was now to sell the properties to secular lords—would include in the formula of bestowal the phrase: “civil and criminal jurisdiction, high and low justice, simple and mixed rule”. In the original Spanish: “*la jurisdicción civil y criminal, alta y baja, y mero y mixto imperio*” (Moxó 1965). It was this formula that granted the right to appoint the mayor (*alcalde mayor*) and other figures of authority, the clerks of the court and council (*escribanías del juzgado y concejo*), and to pass sentences (*penas de cámara, fiscales y arbitrarias*). It therefore involved a complete transfer of administrative, civil, fiscal and penal jurisdiction, along with the right to collect the taxes and charges that would fund it.

They also included the income deriving from local land tax (*pecho*).<sup>13</sup> Finally, another right that could form part of the territorial lordship was the income from vassalage. This income included taxes that came from neither the jurisdictional services nor the working of the land, but from the servitude that a territory's inhabitants owed to their lord. It would have included tolls, road use charges (*portazgos*), personal taxes on Moors and Jews, monopolies on ovens, mills, and presses; sales taxes if the local lord charged them (*alcabalas*); and even military service under the lord's orders.

All in all, distinguishing between territories under royal domains and lordships may shed some light on two basic aspects. The first of these is decision making. In a large number of lordships, the mayor, the council, and all the posts associated with local issues were appointed by the lord. Besides, the lordship also often involved the delegation of territorial rights, i.e., rights over the actual land (*derechos solariegos*). Given such a situation, the incentives of the local elites as far as the provision of education was concerned would relate to its impact on unskilled workers, a factor used intensively in the activity from which they extracted a large part of their income, i.e., agriculture. If human capital accumulation meant that unskilled labor became more expensive, then the local elites would have an incentive to block the provision of elementary education.<sup>14</sup>

The second aspect is related to the social demand for education. In preindustrial societies living close to subsistence levels, and where agricultural labor is the main source of income, investing in schooling might be too onerous. An institutional framework that imposed more obligations on their vassals (i.e. greater fiscal pressure, corvee, etc.) would result in harsher living conditions and therefore affect the capacity to pay for the direct cost of schooling, as well as increasing the opportunity cost of attending school, especially in a preindustrial setting in which the benefits of education were still not perceived.

### 2.3. *The Morisco population in Valencia and the expulsion in 1609*

As shown previously, the basis of the local institutional setting arose during the Medieval period. As far as Valencia is concerned, the change of political power from Muslims to Christians did not bring about the need to repopulate the entire territory (Burns 1967; Furió 1995). Large areas were already populated by Moslems who continued to inhabit them after the Christian occupation. Gradually, the once Moslem population, forcibly converted to Christianity in 1525 (then Moriscos), became concentrated in rural areas in the hinterland, settling in villages, and hamlets mainly under lordship jurisdiction. Under the umbrella of an apparently similar institutional regime, however, historians have recorded that the living conditions of the Moriscos were particularly burdensome compared to those in lordships populated by Old Christians (Reglà 1964; Torres Morera 1969; Ardit 1987, 2010). The Moriscos were often obliged to provide labor services to the lords and present them with a high percentage of their harvests (Ciscar Pallarés 1977, pp. 228–235, estimates this to be 40%), a relationship that was much more onerous or extractive than in neighboring lordships inhabited by Old Christians (Ciscar Pallarés 1993, p.200; Chaney 2009, p.182).

<sup>13</sup> This type of tax has different names and forms across the length and breadth of Spain (*martiniegas, tercios del pan, de la fruta* ...).

<sup>14</sup> Galor *et al.* (2009) argue that, given the scant complementarity between agriculture and human capital, the large landowners would have had the incentive to keep investment in education to a minimum. A similar argument can be found in Galor (2011) and Cinnirella and Hornung (2016).



The state of affairs experienced a shock when Philip III ordered the immediate expulsion of the New Christians or Moriscos in 1609. This historic event opened up a new gap between the conditions existing in lordships granted during the Medieval period and in those that underwent renewal and enabled the lordship regime to continue in territories previously populated by Moriscos. With the expulsion of the Moriscos, the lords lost the income they used to receive from them, which had gone toward paying off debts secured using the lands and dwellings they had occupied as collateral. The nobility argued that the expulsion would make it impossible to pay the taxes on their properties and strongly urged the Crown to mitigate the impact that it would have on their rents. Political bargaining finally resulted in the Crown devising a formula that, without renouncing to the expulsion of the Moriscos, would make it possible to attend the claims of the lords without causing lasting harm to the commercial and financial bourgeoisie to whom money (*censos*) was owed.

As well as pressing for the creditors (*censalistas*) to allow remission of the lords' debts, the Crown hoped to drive repopulation of the lands left empty by the expelled population and, importantly, compensated the lords of these areas by reviewing the deeds of bestowal (*escrituras de otorgamiento*) under which their lordship rights had been granted. In the new town charters (*cartas pueblas*) applying to territories affected by the expulsion, the territorial powers of the lords were extended and they were granted ownership of the farms (*haciendas*) and real estate (*bienes raíces*) that used to belong to the Moriscos until 1609. In addition, with the granting of beneficial ownership came the introduction of extremely pernicious conditions for the new settlers insofar as they not only had to pay taxes and levies but also took on obligations in connection with vassalage, including limitations to their freedom of movement (Reglà 1964).

Importantly, royal charters somehow followed a template that specified the payments that had to be made by the settlers: a sixth, eighth, or ninth part of the proceeds (*sexta, octava o novena parte de los frutos*), tithes (*diezmos*), third tithe (*tercio diezmo*), first fruits (*primicia*), and feudal dues (*percepción feudal*). Besides, it was also established that lords could grant beneficial ownership to new settlers in exchange for payments in cash and kind. In short, the institutional arrangements established after the expulsion virtually transformed new settlers into serfs, reinforcing poverty and economic inequality as a characteristic of these resettled territories. It has been argued that these coercive arrangements stemmed from the co-ordinated efforts of the Crown and the political elites (Chaney and Hornbeck 2016). In fact, the involvement of peasants from former *Morisco* territories in the revolts (*Segones Germanies*) of 1693 (García Martínez 1991) and the way these territories took a stance in favor of Archduke Charles in the Spanish War of Succession (1700–1714) have also been used as qualitative evidence.

Then, and following this strand of the literature, in this paper we empirically investigate whether the harsh institutions bestowed in Moriscos territories, most of them lordships, were also less conducive to human capital formation.

### 3. Sources, data description, and descriptive analysis

The data set used to perform the empirical analysis was created by collecting and homogenizing information from different sources. The dependent variable is the male literacy rate while the main explanatory variable is whether a municipality was inhabited by Moriscos before their expulsion in 1609. Another variable of paramount importance is the jurisdiction of the municipalities during the Old Regime, which enables us to approach the local institutions that historically prevailed in the municipalities of Valencia. Our empirical strategy relies on

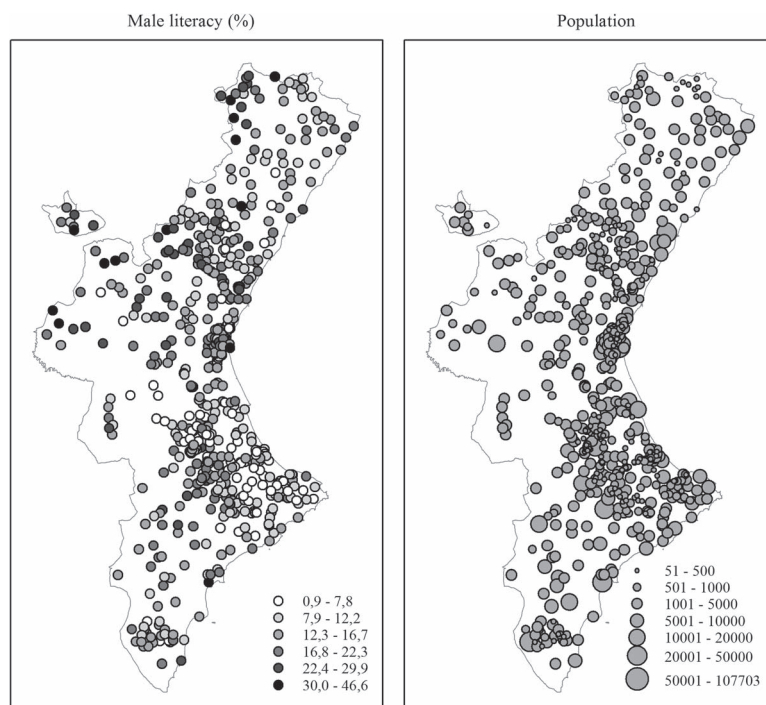


Figure 1. Male literacy and population in 1860 by municipality (%). Source: see text.

an econometric analysis that starts with a standard OLS estimation but, in the end, it is mainly based on the IPWRA treatment-effect estimator. Importantly, in both cases, we control for additional municipal features that may affect human capital formation. Among them, we include population dispersion, language (Catalan or Spanish) spoken, and first- and second-nature geographical variables.

Our main variable is the male literacy rates in the 570 municipalities that comprised the region of Valencia in 1860 (figure 1).<sup>15</sup> The male literacy rates refer to the share of males who could read and write, which come from the Spanish population census of 1860. There are two issues regarding this variable. First, the census provides information on the number of inhabitants who could read and write, distinguishing between men and women but not by age group. Given this situation, throughout the text when we talk about literacy rates, we are referring to people who could read and write as a percentage of total population. Second, although there is information for women, we focus only on male literacy rates due to the existence at that time of a large gender gap in literacy, paired with low levels for female literacy and substantial differences in attitudes, infrastructure, and investment in girls' education.

Information on which municipalities were *Morisco*, i.e., inhabited by New Christians before their expulsion in 1609, was obtained from different sources (Boronat i Barrachina 1901; Lapeyre 1959, 1986; Reglà 1964; Bernat i Martí and Badenes Martín 1994). These

<sup>15</sup> In 1860 the city of València had 107,703 inhabitants, with other important population centres being Alacant (31,162), Orihuela (25,208), Alcoi (25,196), Castelló (20,123) and Elx (18,734). The distribution of population across space can be approached by the map included in figure 1 (right).

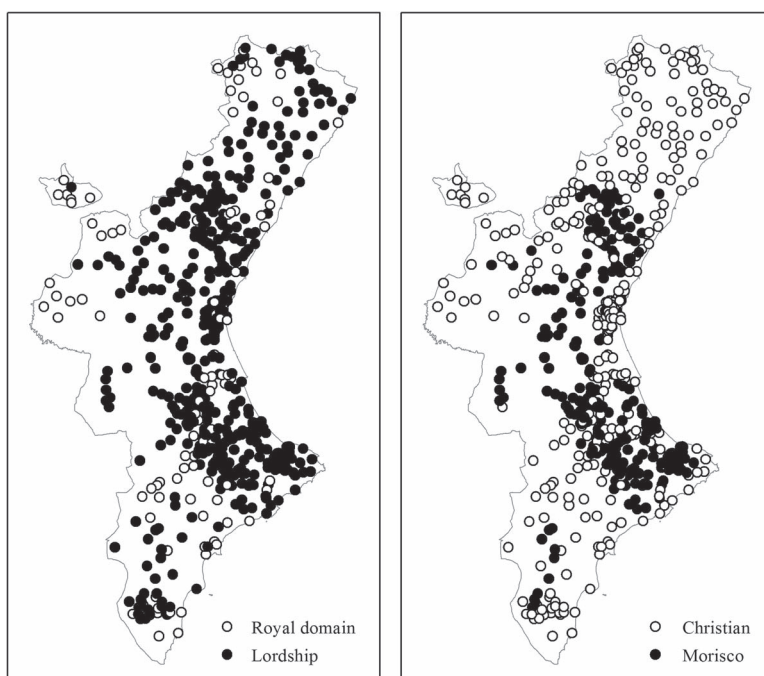


Figure 2. Valencian municipalities by jurisdiction and population type. Source: see text.

meticulous works provide the Morisco and non-Morisco (or Old Christian) population entities (town, village, hamlet), as well as clearly distinguishing between Morisco and non-Morisco municipalities, there were also mixed cases in which both coexisted. Specifically, the sample contains 43 mixed cases, 17 municipalities with more than 50% of Morisco population and 26 municipalities with less than 50% of Morisco population. We classify a municipality as Morisco if more than 50% of the population were New Christians. Therefore, of the 570 municipalities, 252 are classified as Morisco and 318 as non-Morisco (figure 2).

As detailed in Section 2.2, an important aspect to be considered in the analysis is the institutional framework of any territory as far as it can affect both the provision and the social demand for education and, therefore, the human capital accumulation at a local level. In order to deal with this issue, we rely on the information contained in the population census of 1787, known as the Census of Floridablanca. This census, “the most perfect product of the rulers of the Old Regime in Europe” (Livi Bacci 1987, p.147), provides information, at the population entity-level (or *pueblo*), of the existing jurisdictional regimes during the late years of the Old Regime, classifying them as royal domains or lordships. We have identified the jurisdictional regime of the 570 municipalities, being 471 of them designated as lordships and 99 as royal domains (figure 2).<sup>16</sup>

<sup>16</sup> There are different categories within lordships: secular lordships (391), ecclesiastical lordships (39) and military orders (41). The census does not provide information on the jurisdictional features for 40 Valencian municipalities. We have completed the information from alternative and varied historical sources.

Table 1. *Jurisdictional rights in 1609 and 1787 in the former Kingdom of Valencia*

1609	1787 RD	1787 SL	1787 EL	1787 MO	1787 Total
<b>Royal domain (RD)</b>	69.2	19.2	6.4	5.1	100.0
<b>Secular lordship (SL)</b>	2.7	95.5	1.0	0.7	100.0
<b>Ecclesiastical lordship (EL)</b>	4.3	17.4	78.3	0.0	100.0
<b>Military order (MO)</b>	5.3	15.8	0.0	78.9	100.0

Source: Own elaboration based on Boronat i Barrachina (1901), Lapeyre (1959, 1986), Reglà (1964), Bernat i Martí and Badenes Martín (1994) and Census of 1787.

A major difficulty in completing our data set was to match the population entities of the Old Regime (1609, 1787) with the municipalities of 1860. During the Old Regime, the territory was organized into cities, villages, towns, places, hamlets, etc. However, this territorial and administrative structure radically changed in the 19th century with the creation of the Liberal State. The new division of the territory in the 1830s established municipalities as the basic administrative unit since the approval of the Law of Municipalities of 1835. Thus, linking the Census of 1787 and the Population Census of 1860 is not straightforward, especially if the aim is to avoid loss of observations in the process. That said, it is worth noting that between 1609, when the Moriscos were expelled and 1787 at the end of the Old Regime (Census Floridablanca), the spatial distribution of royal domains and lordships remained relatively stable as table 1 illustrates.

We also take into account the dispersion of population within a municipality. There existed municipalities that included various population entities within their borders, a situation that predominated, albeit not exclusively, in the north of Spain, and was particularly acute in the north-west (Reher 1990; Oto-Peralías 2017). It has been claimed that a more dispersed population, together with a poor transport infrastructure, negatively affected schooling (Viñao 1990; Borrás 2002). To account for this, we compute the share of the population that lived in the head or capital of the municipality.<sup>17</sup> This information comes from the *Nomenclator* of Spain for 1887.

Likewise, literacy in Valencian municipalities could also be related to the existence of a mismatch between the compulsory language of instruction (Spanish) and the mother tongue (Spanish or Catalan) prevailing in each municipality (Beltrán Tapia *et al.* 2021). From an education supply perspective, the presence of a language mismatch would affect those cases where funding was a municipal-level responsibility and the local elites believed that the use of a language of schooling that was not their own posed a threat to their position of privilege (Cvrcek and Zajicek 2013; Cinnirella and Schueler 2016). Moreover, it has also been pointed out that the existence of a language mismatch can reduce the demand for education (Angrist and Lavy 1997; Bruthiaux 2002; Bleakley and Chin 2004; Jain 2017). In order to consider this potential effect, we have classified the 570 municipalities into Catalan or Spanish language areas as defined by the *Llei d'ús i ensenyament del valencià* passed by the *Generalitat Valenciana* regional government in 1983 (DOGV 1983).<sup>18</sup> In this case, the prevalence of one language or

<sup>17</sup> In preindustrial societies where agriculture was the main subsistence activity, families not only resided in the main municipal settlement but also in minor entities (i.e., hamlets, homesteads, mills, rural dwellings, and isolated buildings).

<sup>18</sup> Catalan language is locally known as *valencià*.

the other dates back to medieval and early modern times, so the situation today is roughly the same as that found at the end of the Old Regime or the mid-19th century (Guinot 1999). A total of 423 municipalities are assigned to the Catalan language area and 147 to the Spanish.

In addition, since geographical characteristics could also affect literacy levels, the analysis includes controls for both first-nature (temperature, rainfall, and ruggedness)<sup>19</sup> and second-nature geography (distance to roads, distance to Valencia and capital districts, and distance to the coast).<sup>20</sup> In general, geographical and climatological conditions may have an influence on agrarian specialization and productivity and, indirectly on human capital investment, both from the supply and the demand side. In the particular case of Valencia, the geographical distribution of the Morisco population may have followed a pattern that connected the areas inhabited by Moriscos with certain first-nature geographical characteristics, such as temperature and the ruggedness of the terrain, which may have had an effect on agricultural specialization and labor productivity. This is certainly an element that, based on historical records, should be taken into account in the analysis. Further, as we are working with municipalities, we include as controls the longitude and latitude coordinates (and their square) to control for directional gradients and possible spatial patterns, such as north–south or west–east (Kelly 2020).

Likewise, access to markets or second-nature geography is also relevant. Proximity to the transport network, such as to main roads or to the capital and administrative city of the district (*partido judicial*) may open up economic opportunities—and favor the transmission of information—that influence how families do approach to education, given that remoteness may disincentive human capital investment. Additionally, as a coastal region engaged in a traditionally open and export-oriented economy since Medieval times (Braudel 1996), Valencia enjoyed trade opportunities in the Mediterranean Sea. Indeed, the port of Valencia, together with Barcelona were key in the Western Mediterranean area. Proximity to the road network (including Roman roads), to the capital city of Valencia or to the coast could also affect education investment profitability, so these variables have been included in the analysis.

The descriptive statistics of the variables previously commented are presented in table 2. Table 3, in turn, shows descriptive statistics for the male literacy rates in both Morisco and non-Morisco municipalities. When we consider the whole sample (N = 570), it is worth noting that according to the census of 1860, the average rate of male literacy was 14.3%, whereas the minimum and maximum values ranged between 0.9% and 46.6%, respectively, indicating the existence of high spatial heterogeneity. Further, significant differences in human capital average levels appear when we distinguish between Morisco municipalities (12.0%) and non-Morisco municipalities (16.1%). Given that most of the Morisco municipalities were under a lordship jurisdiction, we include information separately for the whole set of lordships (N = 471). The penalty for Morisco municipalities in terms of literacy levels remains, although the gap is somewhat lower.

<sup>19</sup> Climate information, which can be to a certain extent considered time-invariant, refers to the average temperature and average rainfall during the period 1950–2000 (Hijmans *et al.* 2005). Ruggedness is the standard deviation of altitude obtained using the SRTM 90-m resolution digital elevation data (<http://srtm.csi.cgiar.org>). There is also information about the altitude mean of the municipality (meters above sea level), but due to the high correlation between this variable and temperature ( $-0.968$ ), we decided to exclude it from the econometric analysis.

<sup>20</sup> We have used GIS techniques to compute these variables. We would like to thank Pau de Soto for sharing his work digitalizing the Spanish road network in the middle of the 19th century (Mercator-e Project): <http://fabricadesites.fcsh.unl.pt/mercator-e/results-2/xixth-century-roads/>



Table 2. *Main descriptive statistics of all the variables*

Variables	N	Mean	Sd	Min	Max
<b>Main variables</b>					
Male literacy	570	14.31	6.77	0.92	46.58
Morisco	570	0.44	0.50	0.00	1
<b>Main control variables</b>					
Lordship	570	0.83	0.40	0.00	1
Population in the core entity (%)	570	86.16	18.47	4.64	100
Catalan speaking	570	0.74	0.4	0.00	1
<b>First-nature geography</b>					
Temperature (degrees)	570	15.72	1.91	10.50	18.30
Rainfall (mm)	570	469.54	61.34	289	594
Ruggedness	570	170.62	69.66	24.92	338.73
<b>Second-nature geography (kilometres)</b>					
Distance to main road	570	17.19	16.22	0.01	68.47
Distance to secondary road	570	14.00	14.63	0.00	63.96
Distance to tertiary road	570	6.35	5.83	0.00	30.82
Distance to main Roman road	570	19.74	16.15	0.01	64.19
Distance to Valencia	570	68.16	38.67	0.00	168.89
Distance to the capital district	570	8.85	6.58	0.00	49.79
Distance to the coast	570	24.51	19.92	0.20	105.60

Source: See text (section 3).

Table 3. *Main descriptive statistics for male literacy (%) in 1860*

	Municipalities	N	Mean <sup>a</sup>	sd	Min	p25	p50	p75	Max
-	All	570	14.3	6.8	0.9	10.1	13.5	17.7	46.6
1	Morisco	252	12.0	5.8	0.9	7.7	11.8	15.3	33.4
	Non-Morisco	318	16.1	7.0	3.6	11.5	14.6	20.3	46.6
2	Lordship, Morisco	248	12.0	5.8	0.9	7.6	11.8	15.3	33.4
	Lordship, non-Morisco	223	15.2	6.1	3.6	11.2	14.1	18.1	44.0

Note: Male literacy is computed as the percentage of men who could read and write in a given municipality. <sup>a</sup> A two-sample t-test (with equal variance) for each group was performed to compare average values. The results indicate that the averages are statistically different with a p-value equal to 0.0000. Source: See text (section 3).

Next, we further explore the relationship between being a Morisco municipality and male educational levels by plotting kernel density estimates. Figure 3 shows the kernel densities for male literacy percentages. Generally speaking, the differences that appear in table 3 are clearly visible in the Kernel densities of figure 3. When we first look at male literacy in the whole sample of municipalities (N = 570) distinguishing those formerly inhabited by Moriscos and by non-Moriscos (left panel), the distribution of the former is located to the left of the non-Morisco, indicating that male literacy was lower in the Morisco areas. Although interesting, these results could to some extent be due to the fact that some of the categories were determined simultaneously (e.g., the percentage of municipalities classified as lordships being higher among Morisco municipalities than in the sample as a whole). Focusing only on the lordship municipalities (N = 471), the kernel densities in figure 3 (right panel) also

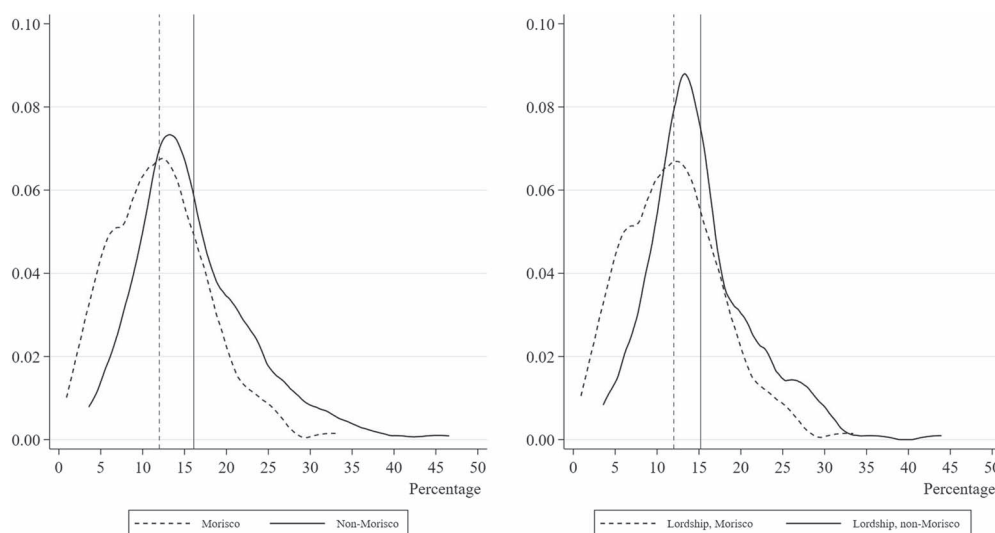


Figure 3. Kernel distribution for male literacy (%). Note: a) Left panel: Morisco vs. non-Morisco domains ( $N = 570$ ); b) Right panel: lordship, Morisco vs. lordship, non-Morisco domains ( $N = 471$ ). Source: See text.

illustrate that there was a consistently lower level of male literacy in Morisco than in non-Morisco lordships.

#### 4. Econometric analysis

In this section we present the econometric strategy that allows us to complement the previous descriptive analysis and test our research hypotheses, namely whether the harsh living conditions on Morisco municipalities had a negative effect on human capital formation. As a preliminary approximation we use an ordinary least square model (OLS) to regress male literacy on the population type (Morisco and non-Morisco) and other control variables and fixed effects. This approach seeks to further establish whether there is a relationship between male literacy rates in mid-19th century and being a municipality formerly inhabited by Moriscos adding to the previous descriptive evidence. However, the recursive relationship between the two variables, and the potential problems of omitted variables or measurement errors in the specification imply that OLS estimates may be biased and thus that do not necessarily show the presence of causal effect. Bearing this in mind, we start estimating through OLS the following baseline equation:

$$male\_literacy_i = \alpha_0 + \alpha_1 morisco_i + \beta X_i + \gamma_i + \delta_j + u_i, \quad (1)$$

where the endogenous variable is the percentage of male literacy in 1860 and the subscript  $i = 1, \dots, 570$  refers to the municipality. The dummy variable *morisco* is equal to one if the municipality was mostly inhabited by Moriscos before their expulsion in 1609 and zero otherwise. Apart from the vector of control variables ( $X_i$ ) described in the previous section, unobserved locations-specific characteristics are captured using latitude–longitude

coordinates of the municipalities ( $\gamma_i$ ) and district fixed effects ( $\delta_j$ ), where the subscript  $j = 1, \dots, 43$  refers to the district (*partido judicial*) in 1860. The parameter  $u_i$  represents the error term.

Table 4 presents the results of estimating equation (1) using OLS with standard errors corrected for spatial dependence (Conley 1999).<sup>21</sup> While column (1) reports the baseline model without controls, column (2) incorporates the control variables (lordship, settlement pattern, and language), and columns (3)–(6) add sequentially fixed effects and geographical control variables. The estimated coefficients of the dummy variable Morisco are statistically different from zero and negative, implying that male literacy in 1860 was lower in Morisco than in non-Morisco municipalities. More specifically, and depending on the model employed (excluding the two first columns), the percentages of male literacy in Morisco municipalities range between 1.8 and 2.5 percentage points lower than in non-Morisco ones.<sup>22</sup>

Nevertheless, the Morisco municipalities were not evenly dispersed through the former Kingdom of Valencia, but they were concentrated in some specific areas, as shown in figure 2. The historiography has stressed that, over the course of time, they were pushed toward the inland, mountainous areas where geographical conditions were harder than in the more fertile areas near the coast, which were kept by Old Christians (Furió 1995). Geographical characteristics may arguably affect the educational attainment through different ways. For instance, municipalities with a favorable geography tend to be specialized in agricultural production, where unskilled worked was used more intensively. In this case, the high opportunity cost of sending children to schools would discourage families to invest in education. In turn, in areas with low agrarian productivity, the lack of prospects could lead the families to lower investment in education. Therefore, if geographical characteristics affected both the fact of being a Morisco municipality and the literacy achievement, the Morisco coefficient of the OLS will be capturing several aspects and not only the fact of being a Morisco municipality.

In short, the OLS estimations could be biased if being a Morisco municipality was not a random phenomenon, namely if characteristics that increase the probability of being a Morisco municipality have an impact on the literacy level too.<sup>23</sup> To overcome the possible potential endogeneity of being a Morisco municipality our empirical strategy relies on a treatment-effects estimator. The objective of this estimator, very common to assess the impact of specific programs or public policies, is to analyze whether a treatment has an effect on

<sup>21</sup> Although a couple of tests (Moran's I, LM) do not reject the null hypothesis of spatial independence of the residuals thus ruling out the existence of spatial autocorrelation, the standard errors are computed using the Conley method considering a cutoff of 24.2 kilometers, namely considering the five nearest spatial units. As robustness, it is considered a higher cutoff (42.8 kilometers), which includes the ten nearest municipalities, and the significant level of the coefficient does not change. These results are available on request.

<sup>22</sup> When the sample is restricted to lordships the results are virtually the same. In addition, in an alternative specification that we do not show here, we also include a measure of wealth per capita around 1845 based on the data collected by Madoz (*Diccionario Geográfico-Estadístico-Histórico*). This information comes from INE (2002). The aim is to control for the average income of the municipalities given that the Moriscos occupied the poorest areas of Valencia. However, this variable is not fully satisfactory. There is, first, a measurement problem because this variable may not be the best way to capture whether municipalities were wealthier or poorer. Moreover, the spatial coverage of the data is limited and this reduces the number of observations from 570 to 496. And finally, as income level is endogenous to literacy, the coefficients may be biased. In this specification the Morisco effect falls to  $-1.4$  and is significant at 10%. Results are available on request.

<sup>23</sup> Specifically, using our dataset and the econometric analysis, we can confirm that the distance to the coast affects positively the likelihood of being a Morisco municipality and negatively the literacy level achieved by a municipality (see table A.1 and table 4).

Table 4. *Estimation results for 1860*

Dependent variable: percentage of male literacy in 1860						
Econometric model: ordinary least squares (standard errors corrected for spatial dependence)						
	(1)	(2)	(3)	(4)	(5)	(6)
Morisco	-4.10*** (0.87)	-4.07*** (0.73)	-2.53*** (0.64)	-2.38*** (0.68)	-2.34*** (0.70)	-1.79*** (0.67)
Lordship		-3.18*** (1.01)	-2.34** (0.96)	-2.02** (0.88)	-2.14** (0.88)	-1.80** (0.87)
Settlement pattern		0.07*** (0.01)	0.07*** (0.01)	0.07*** (0.01)	0.07*** (0.02)	0.07*** (0.02)
Catalan		-3.05*** (0.90)	-1.60* (0.90)	-0.79 (0.98)	-0.78 (0.95)	-0.43 (1.04)
District fixed effects	No	No	Yes	Yes	Yes	Yes
First-nature geography	No	No	No	Yes	Yes	Yes
Latitude and longitude	No	No	No	No	Yes	Yes
Latitude and longitude (sq)	No	No	No	No	Yes	Yes
Second-nature geography	No	No	No	No	No	Yes
Observations	570	570	570	570	570	570
R-square	0.0906	0.1804	0.3545	0.3681	0.3759	0.4052

*Note:* First-nature geography includes temperature, rainfall, and ruggedness. Second-nature geography includes (in natural logarithms) distance to Valencia, distance to capital district, distance to coast, distance to main road, distance to secondary road, distance to tertiary road, and distance to main Roman road. Conley standard errors are in parentheses. Cutoff: 24.2 km (five nearest neighbors). The intercept is not reported. Coefficients are statistically significant at \*  $p < 0.1$ , \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$ .

a specific outcome. In an ideal experiment each subject should be observed twice, having received the treatment and having not received the treatment. As this is almost never possible using observational data, we employ quasi-experimental methods. In particular, we use the Inverse-Probability-Weighted Regression Adjustment (IPWRA) estimator, which combines elements of the inverse-probability weighted (IPW) estimator and the regressions adjustment (RA) estimator.

One of the most difficult challenges to analyze the impact of treatment is to construct a credible counterfactual, above all when the treatment status is not random and depends on some characteristics that also affect the outcome. The IPW estimator considers these counterfactuals as missing values and weights the observed units by the inverse of the probability of being in a specific group (treatment or control, Morisco or non-Morisco municipalities in our case). On the other hand, the aim of the RA estimator is to predict potential outcomes after considering the effect of relevant covariates. The advantage of the IPWRA estimator respect to other methods, such as propensity score matching (PSM), is that it is more robust to misspecification since only one of the models must be correctly specified in order to obtain a consistent estimator (StataCorp 2021a). Finally, and importantly, one of the main reasons for using IPWRA compared to other PSM techniques is that with IPWRA, in the second stage (RA estimator), we can include additional controls to the geographic ones included in the first stage.

The validity of this technique relies on two key assumptions. According to the unconfoundedness assumption (also known as conditional independence assumption), all the characteristics in which the treated and control groups differ are observed by the researcher.

Then, once we control for all observed variables, the potential outcomes are independent of treatment assignment (StataCorp 2021a). Although this assumption is crucial to obtain unbiased results (Heinrich *et al.* 2010), it is difficult to fully assess this and, as a result, the validity relies on economic theory and previous empirical findings (Cappelli and Vasta 2020).<sup>24</sup> The other important assumption to accurately estimate a counterfactual is the common support or overlap condition, which implies that each individual have a positive probability of receiving treatment. This assumption ensures that predicted inverse-probability weights do not become too large (StataCorp 2021a).

To estimate the treatment effects, the IPWRA estimator follows a three-step approach. First, the treatment model in order to compute the inverse probability weights is estimated. We use a probit model that takes as explanatory variables both first- and second-nature geographical variables, as well as latitude-longitude coordinates.<sup>25</sup> The IPW is computed as the inverse of the probability of being in a specific group.<sup>26</sup> Figure 4 shows the estimated probability of being Morisco municipalities and the sizes of the points are proportional to the estimated IPW. Both Morisco municipalities with low estimated probability of being Morisco municipalities and non-Morisco municipalities with high estimated probability of being Morisco municipalities will have a high IPW. Moreover, figure 4 confirms the existence of a common support and shows a negative (although weak) correlation between the estimated probability and the education achievement. In the second step, for each treatment level and using the IPW, the weighted regression models of the outcome are estimated and, for each subject, the treatment-specific predicted outcomes are obtained. Finally, the average treatment effects are estimated, with both treated and untreated units, and also the average treatment effect on the treated, which considers treated subject only.<sup>27</sup>

Table 5 presents the magnitude and significance of the average treatment effect on treated municipalities (ATET), namely Morisco municipalities. The control variables used in the RA estimator (column 1 in table 5) are the same that those used in the preliminary OLS estimation (column 6 in table 4).<sup>28</sup> We also estimate the specification in column (1) of table 5 for different subsamples. In the case of Spain, it has been argued that the municipal size historically conditioned the provision of schools (Pérez Moreda 1997, p.249).<sup>29</sup> In addition, Moriscos were expelled from the cities, which in principle might be wealthier locations, more trade-oriented and, in general, enjoyed more dynamic economic environments than towns located in rural areas, at least in the case of the Valencia region. To take all this into consideration, we repeat the exercise but this time excluding the largest locations, i.e., those above 20,000, 10,000, and 5000 inhabitants in 1860 (columns 2–4).<sup>30</sup>

<sup>24</sup> See Appendix B for a more detailed explanation of the importance of this assumption.

<sup>25</sup> Table A1 in the Appendix presents the marginal effects of the probit model used to calculate the inverse probability weight. In most cases, the coefficients are highly statistically significant.

<sup>26</sup> Specifically,  $ipw = 1/prob$  for Morisco municipalities and  $ipw = 1/(1 - prob)$  for non-Morisco municipalities, where  $prob$  is the estimated probability of being a Morisco municipality computed after running the probit model.

<sup>27</sup> We use the Stata command “teffects ipwra” (StataCorp 2021b). See StataCorp (2021a) for further details on the second and third steps.

<sup>28</sup> With the exception of the square of longitude and latitude because IPWRA model does not converge when these variables are included.

<sup>29</sup> As figures A1 and A2 in the appendix show there appears to be a remarkable persistence of the spatial distribution of population within the Valencia region between 1609, 1787, and 1860.

<sup>30</sup> Additionally, to be consistent with history, we estimate an alternative specification that excludes from the baseline equation (column 1) the ten municipalities that were not part of the Kingdom of Valencia during the Old Regime and that joined Valencia region in mid-19th century. These municipalities are: Camporrobles, Caudete de las



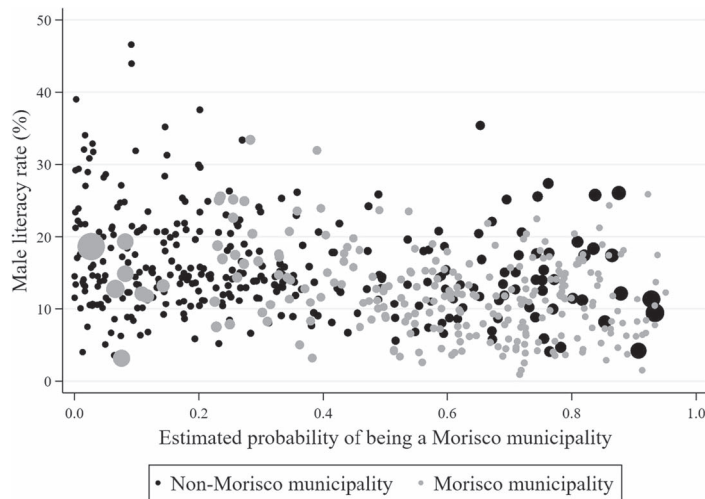


Figure 4. Visual representation of the estimated probability of being a Morisco municipality. Note: The estimated probability has been computed after running a probit model where the explanatory variables are both first- and second-nature geographical variables, as well as latitude-longitude coordinates.

Regardless the specification used, our results show that Morisco municipalities had lower male literacy rates in all cases than non-Morisco (or Old Christian) municipalities.<sup>31</sup> We find that male literacy rates in Morisco municipalities were around 2.3 to 2.6 percentage points lower than in non-Morisco municipalities, a noteworthy effect given the relatively low average values of the male literacy at that time (14.3%). Hence, the IPWRA estimator allows us to detect and quantify a (negative) differential effect on education levels in those locations formerly inhabited by Moriscos.

On the basis of these results, we further extend our analysis taking on board other elements that are important in our story, i.e., local institutions. As argued above, institutional variation during the Old Regime might be behind the spatial heterogeneity observed in the male literacy rates in mid-19th century (when the Moyano Act was passed). This suggests that the institutional framework, captured by the jurisdictional rights of the different territories could have played a role in determining educational levels. For instance, being a royal domain or a lordship implied living under different conditions for their inhabitants (Oto-Peralías 2018), and that may ultimately affect either the supply of schools by the lords or the social

Fuentes, Fuenterrobles, Requena, Sax, Sinarcas, Utiel, Venta del Moro, Villargordo del Cabriel, and Villena. The results obtained, which are available from the authors on request, are virtually the same.

<sup>31</sup> The standard probit model used to compute the IPW assumes that error terms in the latent function are homoscedastic (StataCorp 2021a). As a robustness to our results, we use the heteroscedasticity probit model modelling the error variance as a function of a set of variables (quadratic function of temperature, quadratic function of rainfall, quadratic function of ruggedness, quadratic function of distance to Valencia, quadratic function of distance to coast, quadratic function of distance to main Roman areas, and intersection among the three different distances). The magnitude and significance of the ATET is robust to all these changes.

Table 5. *Treatment-effects estimation for all jurisdictions, 1860*

Dependent variable: percentage of male literacy in 1860				
Estimator: Inverse-probability-weighted regression adjustment				
Outcome model: linear				
Treatment model: probit				
	(1)	(2)	(3)	(4)
	All municipalities	Municipalities < 20,000	Municipalities < 10,000	Municipalities < 5000
ATET	-2.38***	-2.37***	-2.35***	-2.59***
Morisco (1 vs 0)	(0.77)	(0.79)	(0.80)	(0.88)
Potential-outcome mean (Morisco = 0)	14.41***	14.39***	14.37***	14.56***
	(0.72)	(0.74)	(0.75)	(0.83)
<b>Control variables in the RA estimator</b>				
Lordship	Yes	Yes	Yes	Yes
Settlement pattern	Yes	Yes	Yes	Yes
Catalan	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-nature geography	Yes	Yes	Yes	Yes
Latitude and longitude	Yes	Yes	Yes	Yes
Second-nature geography	Yes	Yes	Yes	Yes
Observations	570	565	555	521

*Note:* First-nature geography includes temperature, rainfall, and ruggedness. Second-nature geography includes distance to Valencia, distance to capital district, distance to coast, distance to main road, distance to secondary road, distance to tertiary road, and distance to main Roman road. The control variables in the IPW estimator are temperature, rainfall, ruggedness, distance to Valencia, distance to coast, distance to main Roman road, latitude and longitude. All the variables related to distance are transformed to natural logarithms. Robust standard errors are in parentheses. The ATET is statistically significant at \*  $p < 0.1$ , \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$ .

demand for education.<sup>32</sup> Now, we aim at testing the robustness of the negative effect found in Morisco municipalities on male literacy by isolating the potential effect of the jurisdictional heterogeneity at the local level.

In so doing, we restrict our analysis to the male literacy rates in those municipalities with the same type of jurisdiction (either lordship or royal) comparing, on the one hand, those classified as Moriscos, and, on the other, those classified as non-Moriscos. Given that almost all Morisco municipalities were lordships, we thus perform the analysis only for the lordship subsample, which includes 471 municipalities. Again, we estimate the IPWRA treatment effects for the lordship sample (column 1), excluding the municipalities with a population above 10,000 and 5,000 inhabitants (columns 2–3).<sup>33</sup> The results are shown in table 6, and once again confirm the negative effect of Morisco municipalities on male literacy which, in this case, vary between 1.6 and 2.1 percentage points lower than in non-Morisco

<sup>32</sup> In our previous and exploratory OLS estimation, this heterogeneity has been addressed including the dummy “lordship” as a control variable.

<sup>33</sup> In this case, there is no municipality being a lordship larger than 20,000 inhabitants.

Table 6. *Treatment-effects estimation for lordship jurisdictions, 1860*

Dependent variable: percentage of male literacy in 1860			
Estimator: Inverse-probability-weighted regression adjustment			
Outcome model: linear			
Treatment model: probit			
	(1)	(2)	(3)
	All municipalities	Municipalities < 10,000	Municipalities < 5000
ATET	-1.63*	-1.59*	-2.10**
Morisco (1 vs 0)	(0.94)	(0.95)	(0.92)
Potential-outcome mean (Morisco = 0)	13.62*** (0.91)	13.59*** (0.92)	14.04*** (0.89)
<b>Control variables in the RA estimator</b>			
Settlement pattern	Yes	Yes	Yes
Catalan	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes
First-nature geography	Yes	Yes	Yes
Latitude and longitude	Yes	Yes	Yes
Second-nature geography	Yes	Yes	Yes
Observations	471	468	444

Note: see table 5.

municipalities. These results thus reinforce our previous findings, although the estimation yields lower values than those obtained for the whole sample.<sup>34</sup>

### 5. Was the negative Morisco effect persistent? From the Old Regime to the Liberal state

In order to test the persistence of this effect beyond 1860, we next include the year 1900 in our analysis. This allows us to cover the second half of the 19th century, that is, the period of consolidation of the Liberal State in Spain to see if the negative effect that we found in 1860 as a legacy of the Old Regime was still present.<sup>35</sup> First, we replicate the exercises carried out in the previous section, but this time taking the male literacy rate in 1900 as the dependent variable. The OLS estimation results in table 7 show that the size of the effect has been considerably reduced and, more importantly, that the effect is no longer statistically significant.

However, this methodological approach using OLS suffers from the same problems as in the previous section, namely the presence of endogeneity that would be biasing the

<sup>34</sup> Although our estimates show that local institutions mattered for literacy, our exercise cannot disentangle whether this effect arose from the local lords not investing in education or from the harsh conditions they imposed (which in turn limited the demand for education).

<sup>35</sup> This implies, as mentioned above, a reduction of observations to 536 municipalities as a result of changes in municipal boundaries in the second half of the 19th century.

Table 7. *Estimation results for 1900*

Dependent variable: percentage of male literacy in 1900  
Econometric model: ordinary least squares (standard errors corrected for spatial dependence)

	(1)	(2)	(3)	(4)	(5)	(6)
Morisco	-1.44 (1.29)	-2.49** (1.14)	-1.33 (0.91)	-1.18 (0.87)	-0.93 (0.85)	-0.63 (0.80)
Lordship		-1.64 (1.25)	-0.91 (1.13)	-0.41 (1.09)	-0.47 (1.12)	-0.50 (1.08)
Settlement pattern		0.12*** (0.03)	0.12*** (0.03)	0.11*** (0.03)	0.11*** (0.03)	0.11*** (0.03)
Catalan		-2.10 (1.50)	-1.34 (1.61)	-0.19 (1.56)	-0.44 (1.54)	-0.28 (1.55)
District fixed effects	No	No	Yes	Yes	Yes	Yes
First-nature geography	No	No	No	Yes	Yes	Yes
Latitude and longitude	No	No	No	No	Yes	Yes
Latitude and longitude (sq)	No	No	No	No	Yes	Yes
Second-nature geography	No	No	No	No	No	Yes
Observations	536	536	536	536	536	536
R-square	0.006	0.064	0.300	0.315	0.318	0.329

Note: See [table 4](#).

Table 8. *Treatment-effects estimation for all jurisdictions, 1900*

Dependent variable: percentage of male literacy in 1900  
Estimator: Inverse-probability-weighted regression adjustment  
Outcome model: linear  
Treatment model: probit

	(1)	(2)	(3)	(4)
	All municipalities	Municipalities < 20,000	Municipalities < 10,000	Municipalities < 5000
ATET	-1.08	-1.24	-1.65	-1.74*
Morisco (1 vs 0)	(1.03)	(1.07)	(1.04)	(1.05)
Potential-outcome mean (Morisco = 0)	26.60*** (0.93)	26.75*** (0.97)	27.14*** (0.91)	27.25*** (0.94)
<b>Control variables in the RA estimator</b>				
Lordship	Yes	Yes	Yes	Yes
Settlement pattern	Yes	Yes	Yes	Yes
Catalan	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
First-nature geography	Yes	Yes	Yes	Yes
Latitude and longitude	Yes	Yes	Yes	Yes
Second-nature geography	Yes	Yes	Yes	Yes
Observations	536	529	514	477

Note: see [table 5](#).

Table 9. *Treatment-effects estimation for lordship jurisdictions, 1900*

Dependent variable: percentage of male literacy in 1900			
Estimator: Inverse-probability-weighted regression adjustment			
Outcome model: linear			
Treatment model: probit			
	(1)	(2)	(3)
	All municipalities	Municipalities < 10,000	Municipalities < 5000
ATET	-0.03	-0.68	-0.89
Morisco (1 vs 0)	(1.18)	(1.12)	(1.06)
Potential-outcome mean (Morisco = 0)	25.63*** (1.10)	26.24*** (1.01)	26.48*** (0.97)
<b>Control variables in the RA estimator</b>			
Settlement pattern	Yes	Yes	Yes
Catalan	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes
First-nature geography	Yes	Yes	Yes
Latitude and longitude	Yes	Yes	Yes
Second-nature geography	Yes	Yes	Yes
Observations	442	434	406

Note: see [table 5](#).

coefficients obtained and would make the OLS unreliable. [Table 8](#), therefore, presents the results of the IPWRA, our chosen econometric approximation to circumvent the endogeneity derived from selection into treatment. If we consider the whole of our municipal sample (i.e. all jurisdictions), further differentiating by the size of the municipalities (columns 2–4), [table 8](#) shows that the negative effect of the Morisco presence would persist only in municipalities with less than 5,000 inhabitants, albeit with a smaller magnitude (–1.74 on an average of 27.25%) and with a statistical significance that is reduced to 10%. However, given that this result may be affected by the institutional heterogeneity existing in the Old Regime in Spain, we restrict, as before, our analysis to those municipalities that had been lordships, since this was the jurisdiction of the entities where most of the Moriscos lived. In this case, as [table 9](#) shows, the effect is no longer statistically significant in all specifications and sizes of municipalities (<20,000 excluded because they are all royal).

These results show, therefore, that being a municipality formerly inhabited by Moriscos no longer exerted a negative effect on male literacy levels in 1900. The effect found in 1860 has disappeared, giving rise to a history of mean reversion. This result would suggest that, in the context of the process of liberal state-building in Spain, the new regulation, organization and promotion of primary education—despite its limitations—played an important role. In these circumstances, it could be argued that these advances would explain how, gradually, the differences in educational results observed in the territory ceased to be linked to the institutional conditions in force during the Old Regime. The legacy of the Old Regime was gradually diluted in parallel with the advance of the educational system promoted by the State as a result of the Public Education Act of 1857.



## 6. Concluding remarks

Prior to the development of modern states in the 19th century, the provision of formal education was a local affair. In this article, we exploit the spatial variation in local institutions at the end of the Old Regime to empirically assess its impact on human capital formation. In this respect, we identify that, in the case of the Valencia region, former Morisco territories resettled with Christians after the expulsion of the Moriscos in 1609 were less conducive to human capital formation, and that this effect was still present at the onset of the Liberal State, in 1860.

In this respect, it appears that the expulsion of the Moriscos in 1609 was not a break with the past as new settlers also faced rather harsh living conditions. Indeed, the historiography provides abundant evidence in this regard (Reglà 1964; Torres Morera 1969; Ardit 2009). Torres Morera (1969) noted that, regardless of the geographical conditions and the type of agriculture, the royal charters issued after the expulsion not only stipulated the rents or rights for the new settlers but these rules of the game were rather coercive as vassals were obliged to reside on a permanent basis and for a number of years under the threat of losing all granted rights. As contemporaries and recent studies have shown, these arrangements persisted until the end of the Old Regime, or early 19th century. In 1811, when the abolition of lordships was under discussion, a Valencian delegate declared that “all the evils that Valencia suffers today began with the expulsion of the Moriscos”, adding in 1813 that those who repopulated former Morisco territories “substituted the expelled in their slavery” (Moxó 1965, pp. 206–207).

All in all, our study shows how, in the absence of a leveller (central or regional government), local institutions can impact on living conditions affecting human capital formation and hence economic development across territories. If equality of opportunity and territorial cohesion are a priority in the political agenda, local specificities should not then be underestimated. However, territorial homogenization was a priority in the process of liberal state building throughout the 19th century and, with this aim, the Moyano Act introduced a public education system in 1857. In this sense, our study also shows that, although sizable disparities in literacy within the Valencia region prevailed until the 20th century, the territorial differences observed in 1900 were no longer related to the heterogeneous local institutional conditions of the Old Regime at least as regards the former Morisco presence. It could be hypothesized that the legacy of the past was diluted in parallel with the progress of the new organizational structure imposed by the new state in the age of mass schooling.

## Supplementary material

[Supplementary material](#) is available at *European Review of Economic History* online.

## Data availability

The data and methods underlying this article are available from the authors on request.

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