Historical Origins of Schooling: Some Cross-Country Evidence[•]

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Abstract

This paper presents evidence concerning the importance of historical and colonial factors in understanding differences in current levels of schooling. Conditions faced by colonizers, such as potential settler mortality, density of native population, and the characteristics of factor endowments affected the characteristics of educational systems established in the past. These differences in early levels of schooling persist to the present. Results also suggest that while the degree of democratization is closely related to the development of initial or basic levels of education (such as primary enrollment), decentralization of political power is more important to explain differences in higher levels of schooling (such as secondary and higher education). Thus, results suggest that these institutional factors are important to explain (and account for) the effect of historical variables on current levels of schooling.

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1. Introduction

The study of the ultimate determinants of development has received a lot of attention in recent years. Contributions by scholars such as Acemoglu et al. (2001, 2002) –AJR hereafter, Engerman and Sokoloff (1997, 2002) –ES hereafter, and Easterly and Levine (2002) –EL hereafter, have related historical factors to "institutions", which, in turn, would have affected long-run development. Their main objective has been to understand what is behind the formation of "good institutions." To do this they relate empirically, as AJR and EL, or conceptually using anecdotic evidence, as ES, some indicator of institutional development with some historical aspect of the set of countries being studied. It is interesting to observe that actually in both lines of research the term "institutions" refers to a multidimensional set of characteristics of the society that seem to reinforce and complement each other.

From a different point of view, Easterlin (1981), Lindert (2002) and others put emphasis on the role of formal human capital as a key determinant of development. From an historical point of view, Easterlin emphasizes the importance of schooling when trying to answer the question of why the whole World is not developed. He asserts that "the worldwide spread of modern economic growth has depended chiefly on the differences of a body of knowledge concerning new technologies. The acquisition and application of this knowledge by different countries has been governed largely by whether their populations have acquired traits and motivations associated with formal schooling" (p. 1).

Then, it is worth studying if the colonial and historical factors stressed by AJR and ES are related to the origins and extent of schooling among former colonies and if there are some specific institutional factors driving this relationship. This paper studies empirically the effects of colonial factors on current and past levels of schooling of different former colonies. The two main questions this paper tries to answer are:

- Is there an effect of colonial factors on educational policies and schooling?
- Can this relationship be explained by other aspects that are affected by colonial factors (i.e. institutions and inequality)?

This paper extends the above-mentioned theories. It is worth noting that these authors have mentioned the potential relation among colonial factors and schooling. AJR refer to that educational policies are a component of the cluster of institutions that they relate to

development. Engerman et al. (1997) and ES point out that schooling is affected by factors such as inequality and suffrage which are, in turn, influenced by factor endowments that determine the path of development of different countries. Recently, Glaeser et al. (2004) have correctly pointed out that the same colonial factors emphasized in AJR also affect other variables, such as schooling. Their interpretation is that colonial origins matter for development through their effect on schooling. However, there are at least two problems with this interpretation. First, they have *only one* instrument available to disentangle between *two* stories. Second, as discussed below, even theoretically, it is hard to disentangle between several dimensions of the same social structure which comprises a number of institutions in a broad sense.

In order to partially overcome the lack of alternative instruments for different dimensions of the cluster of institutions affecting development, in this paper we will add another source of exogenous variation related to ethnographic information about the number of indigenous cultures existent *at the time* of the arrival of the colonizers.[1]

The paper is organized as follows. Section 2 presents a brief discussion of the theories that relate colonial/historical factors to development, a review of several hypotheses of the determinants of schooling, and, finally, relates both lines of research by providing some historical background and pointing out a number of empirical hypotheses to be tested. Section 3 presents and discusses the data used in cross-country analyses of this paper. The dataset corresponds mainly to an extension of the data used by AJR and EL including measures related to schooling, income distribution, institutional factors and historical characteristics taken from several sources. This extension allows us to work with a group of more than 50 former colonies in most empirical exercises of this paper.

Section 4 presents a number of exercises using cross-country data for 1900 and 1985-1995. Mainly, these exercises show a strong correlation between the level of schooling and the colonial and historical factors stressed by AJR and ES, and confirm with a broader sample recent results in Glaeser et al. (2004). In addition, empirical results show that schooling variables are persistent over the time and that current levels of education depend on a number of institutional and social factors present in 1900.

[1] Data on the number of indigenous cultures come from Murdock (1967) and has recently being used by Gennaioli and Rainer (2003).

Interestingly, when trying to find a more structural connection between schooling and historical factors, results suggest that the relationship can be accounted for the fact that countries with "good" colonial factors tend to have more democratic states and decentralized political power. In particular, primary enrollment is higher in more democratic countries both now and in the past, but democracy seem to matter less when analyzing more advanced levels of schooling. In that case, what matters the most is the degree of decentralization of political power. This result is linked with the modern literature emphasizing the importance of decentralization in the provision of goods such as education (See Oates, 1972 and Inman and Rubinfield, 1997) and with historical papers underlining the role of decentralization in the expansion of primary schooling in the 19th and 20th centuries (See Lindert, 1999 for European countries and the US, Engerman et al., 1997 for the Americas, and Goldin and Katz for the US).

The last factor is worth noting because it suggests that another dimension of the cluster of institutions related to countries having good colonial conditions for development is the extent of political decentralization. This institutional dimension seems to be highly connected to the spread of advanced levels of mass schooling. In addition, these results identify a more specific channel for the well-documented link between education and the extent of democracy (Acemoglu and Robinson, 2000; Meyer et al., 1992; Ramirez and Boli, 1987). More interestingly, however, this paper also shows that the origin of these schooling-friendly institutions can be found in the consequences of some historical aspects on the kind of social organization that settlers established in a particular place.

Finally, the main conclusions and suggestions for further research are provided in section 5.

2. Main Hypothesis and Literature Review

2.1 Determinants of Schooling

This section discusses a simple economic approach to the determinants of schooling. As it is well known, it is possible to argue that education decisions of economic agents depend on individual preferences and the relevant constraints. As in most cases,

individuals will invest more resources in a specific activity as long as the (expected value of the) benefits of doing so exceed its costs.

From a societal perspective, a series of theories relates human capital accumulation with government actions and/or societal characteristics. A first group of arguments emphasizes the role of public policies in overcoming some market failures related to schooling. Among them, it is possible to mention the existence of credit imperfections in financing education and positive externalities associated to the attainment of certain levels of instruction (Banerjee, 2003). In a related line from a normative point of view, schooling is related to concepts like equality of opportunities and social mobility generating additional space for public action (See evidence in Solon, 2002). In all these cases, public policies directed to overcome these failures can produce important increases in the level of schooling of a country.

Second, even if we can identify market failures and normative arguments for public action in education, the implementation of the policies depend on the political institutions. Some authors relate schooling with democracy (Acemoglu and Robinson, 2000; Easterly, 2002; Engerman et al., 1997; Lindert, 2002).[2] In these theories, the higher the level of franchisement, the higher the public expenses in instruction. This is a consequence of social processes that expand participation by creating pressures of redistribution, being education one of the leading beneficiaries of resources and mass schooling is quickly defined as an important social objective. Proponents of this view support it by noting that in many countries, the expansion of franchisement is followed by educational expansion.[3]

However, as it is stressed by a third line of research, there are several collective action problems related to schooling even when the society has agreed in the existence of normative or efficiency reasons to expand schooling. In most cases, the difficulty of different groups agreeing on the type and quality of public services decreases the spending in education. Along these lines some authors stress the role of inequality and

[2] Notice that the inverse causality (i.e. from schooling to democracy) is also plausible; see Barro (1999) for evidence on this point.

[3] It is possible to mention two examples from the U.S. supporting this idea: (i) the "common school movement" in the early-1800s (when democratization precedes education, Engerman et al., 1997), and (ii) the disenfranchisement period of the early-1900s (when limited political participation caused a diminution in the quality and quantity of education for African-Americans in the South, see Margo, 1990).

ethnic or linguistic fractionalization. The basic idea is that in more heterogeneous societies the likelihood of approving taxes and transfers is lower because the distribution of benefits across the population would be quite different from the incidence of taxes and other costs (Engerman et al., 1997). An institutional implication is that countries institutions more capable to deal with these kinds of collective action problems impart more schooling.

Other studies have emphasized that the relation between resources and educational outcomes is not automatic because it depends on the efficiency of the educational system (Hanushek, 1986). This leads us to discuss the effectiveness and accountability of the public sector in providing instruction. Several authors stress that less centralized governments tend to provide more and better education (Engerman et al., 1997; Lindert, 1999 and 2002). The idea behind is that there are efficiency and political economy arguments showing that decentralized administration and, in some cases, financing of schooling produces quantity and quality of education closer to the social optimum (See Oates, 1972; Inman and Rubinfeld, 1997).[4] It is important stressing that the degree of effective decentralization is probably related with the extent of power and voice of local citizens. In a sense, it is not enough having formal decentralization, but having local areas with democratic institutions where the people can express their *voice* in relation to the functioning of education.[5]

Finally, there are other social characteristics affecting schooling (some of them strongly emphasized by sociological studies). First, several authors suggest that the process of consolidation of mass schooling that takes place during the 20th century is related to the consolidation of national identity of several independent countries (Meyer, et al., 1992; Ramirez and Boli, 1987).[6] Second, other factors such as religion and cultural heritage can affect schooling because various civilizations and creeds put different

[4] Other papers present models where decentralization can create more inefficient provision of goods (See Haggard, 1999 for a review, Kremer et al. (2002) for empirical evidence and Gennaioli and Rainer (2003) for a theoretical model. Hence, the empirical evidence should give a more ultimate answer and it tends to bring support for the "decentralized" view (See Hoxby, 2002). Results in this paper confirm this evidence in that the positive effects dominate the negative effects at least for the sample of former colonies included in this paper.

[5] This point is exemplified below using the case of Sierra Leone.

[6] Lindert (1999) reinterprets this process as a consequence of reforms providing greater degrees of decentralization in education especially in Britain.

emphases in formal instruction (Engerman et al., 1997; Lindert, 2002). A recently developed variant of this explanation is that colonial origins are explained by different policies towards the access of missionaries to work in different colonies (Woodberry, 2002). In particular, former British colonies had a more open approach to receive missionaries from different religious denominations.

These explanations indicate a number of patterns that can affect the level of schooling of a country. Interestingly, most of them are related to institutional factors that have historical roots. This suggests a link between the theories explaining a country's social organization using colonial factors and the development of educational institutions. Even though, it remains studying more specific aspects of the relationship. The next subsection expands this discussion and proposes a number of hypotheses to be evaluated empirically in the empirical part of the paper.

2.2 Colonial Origins of Schooling

This section applies the hypotheses proposed by AJR and ES in order to analyze colonial origins of schooling. Notice that both groups of authors suggest that educational policies are influenced by the historical aspects they emphasize (See footnote 3, p. 1370, Acemoglu et al., 2001; pp.26-28, Engerman and Sokoloff, 2002: and Engerman et al. 1997).

The point of departure of the extension is the assumption that European colonization was an exogenous shock that affected a number of social institutions of the colonies, being educational policies one of them. In the case of schooling its own nature implies a present investment with future returns. In addition, the organization of its provision is related to a number of institutional factors. In this sense, the choice of the kind of educational systems organized in the colonies seems to be quite similar to the decision of establishing other institutions such as property rights and check and balances to government action.

European colonizers interested in settle in a specific area will be more willing to spend resources in instruction for their children and for native population. Whereas extractive colonizers will not be interested in investing in an activity that will have (very uncertain) returns in the future. Moreover, the last point is reinforced if considering that

areas having high mortality risk also have profitable opportunities of production of crops or minerals with large economies of scale in native (an illiterate) population. This will imply that educational investments presented very low rates of return for the powerful elite that takes most public policy decisions.

Moreover, considering that the establishment of one kind of institutions can generate externalities on other types, this could imply that the correlation between institutions and human capital reflect the fact that the masses typically did not or could not obtain education in extractive societies, as pointed out by Acemoglu et al. (2002). In particular, the fact that inclusive institutions are more democratic and locally decentralized in terms of political power can be related to the opportunities of instruction.

In addition, the strategy of colonization (extractive vs. inclusive) has implications on schooling. Institutional settings assuring the respect of property and civil rights provide an incentive to accumulate human capital because (i) directly, there is less (political) income uncertainty, in the sense that expropriation is less likely,[7] and (ii) indirectly, these institutions provide more incentives to the accumulation of other forms of capital that are complementary with human capital.[8]

As pointed out in Acemoglu et al. (2001), a simple way to motivate the fact that current institutions (in this case educational policies) are related to historical factors is to show that early and current social arrangements are related.[9] Putting differently, in this case it is necessary to argue that there is inertia in schooling. It turns to be the case that there are several reasons to believe so. A first group of arguments was pointed out by AJR and applied for the cluster of institutions they mention: setting up institutions is costly, the gains of the extractive strategy are shared among the small elite, and there are irreversible complementary investments. This means that educational policies, as part of a *long lasting* and *multidimensional* cluster of institution, present persistence.

[7] In particular, consider the case of "extractive institutions", the concentration of political and social power in the hands of a small elite implies that the majority of the population risks being held up by the powerful after they undertake investments (p. 1263, Acemoglu et al., 2002).

[8] For example, Krusell et al. (2000) show that equipment capital is more complementary to skilled human capital. Interestingly, historical evidence also confirms this point. Clemens and Williamson (2000) show that in the early 1900s, the fraction of population enrolled in schools had a positive, significant, and economically relevant effect on the fraction of British capitals going to different countries.

[9] It is worth mentioning that the persistence that this paper and Acemoglu et al (2001) discuss is related to inertia in cross-country differences in institutional factors. Hence, it is possible to observe an increase in the level of a variable for the whole sample with a similar degree of cross-country variability.

Second, the own character of schooling produces a quite high level of inertia. Notice that the existence of intergenerational inertia creates persistence in educational levels among members of several cohorts.[10] In addition, the effects of changes in policies tend to be very slow (i.e. an increase in educational expenses today will affect –with uncertainty— instruction of one or two future generations). A third source of inertia in cross-country differences is related to the existence of endogenous accumulation of human capital. Increases in the supply of education seem to induce expansions in the demand for these skills, thus, producing additional incentives for the accumulation of human capital, as pointed out by Acemoglu (2002). Putting differently, the existence of a more educated population makes investment in human capital-related technologies more profitable which, in turn, encourages schooling. Fourth, peer-group effects can explain low levels of education in several generations even though there are policies aiming to expand schooling. Interestingly, the last two points rationalize the possibility of multiple equilibria in schooling: while people from some countries present persistently high levels of human capital, other present low levels of education.

Notice that several papers have actually related colonial or historical factors to schooling. First, AJR mention that educational policies *both* are part of the cluster of institutions established by colonizers that persistent to the present *and* that human capital accumulation is a consequence of development of democratic and neo-European social structures. Hence, this view provides two competing hypotheses on the effect of colonial factors on schooling: direct and indirect effects through the development of inclusive institutions.

Engerman et al. (1997) and ES present a review of country experiences and empirical evidence showing that suffrage institutions in the early 1900s were associated with schooling. They relate this finding to the existence of different factor endowments. In addition, they mention that countries having more expanded education in the early 1900s were more decentralized. However, they do not provide evidence of the relationship between factor endowments and democracy or, implicitly, they are assuming that factor

[10] It has been documented in several places that parent education affects children outcomes. For instance, consider the results presented in the Coleman Report (Coleman et al., 1966). In addition, Hanushek and Kimko (2000) and Lee and Barro (2001) show that average years of schooling of the adult population affect positively educational outcomes of children.

endowments are perfectly related to these variables. This point complicates the analysis because (i) they do not show evidence of the effect of endowments on schooling, but of the impact of suffrage on it (this finding can be consistent with alternative hypotheses of the origins of democracy), (ii) they do not control for potential endogeneity of electoral institutions, and (iii) they do not provide evidence that current schooling is correlated with past levels.

Easterly (2002) presents evidence that the middle class consensus is associated with schooling results and the former variable can be explained by a group of factors related to endowments and settler mortality. Even though his main objective is not connected with studying the colonial origins of schooling, but with finding adequate instruments for the middle class consensus, these results support the view discussed here. In particular, Easterly is able to test empirically the ideas of ES in that what matters for schooling is inequality, which is related to factor endowments. However he does not present evidence that schooling differences across countries are persistent and, more importantly, he only analyzes one potential channel of influence of historical factors on education (the middle class consensus) and do not consider others, which creates a potential problem.

In sum, there is room to develop an historical empirical investigation on the effects of colonial factors on schooling. The main hypotheses related to this point are the following. First, educational outcomes and institutions are persistent and, therefore, differences among countries in levels of schooling can have historical origins. Second, the colonial factors emphasized by AJR and ES are related to these origins. Third, there are some institutional factors related to colonial origins, such as the extent of franchisement, the degree of political decentralization, and the degree of economic inequality, that are potential candidates to account for this relationship. These three factors can be related *both* to education *and* to the colonial factors determining the kind of institutions established in different places and, therefore, are potential mechanisms for linking historical factors and schooling. Finally, in order to disentangle between the several dimensions just mentioned, it is needed to get different exogenous variation in the origins of those institutions in order to identify which institutional dimension matters the most.

2.4 Historical background

This section introduces some historical background to support the hypotheses previously suggested and to present some initial evidence on the relevance of the different channels that can account for the relationship among colonial factors and schooling.

Probably the leading group of evidence comes from the impressive performance in terms of schooling of former colonies like Australia, Canada, New Zealand, and United State in 1900. If we consider primary enrollment rates in 1900 (our basic indicator of early educational development), these countries presented rates of 87.3, 90, 87.7, and 95%, respectively (Benavot and Riddle, 1988). These rates are remarkable in a context of a median enrollment rate of 7.9% in 1900.[11] Moreover, these rates are clearly higher than the enrollment rates observed in Great Britain (the colonizer) in the same period: 74.1% in 1900 (which already represents a large increase from an enrollment rate of 46% observed in 1880).[12]

Trying to explain this pattern, Engerman et al. (1997) and Goldin and Katz (2003) describe as the experience of Canada and United States was related to the development of schooling at regional levels. They mention that local authorities were able to organize and finance vast educational systems from the very beginning of the independence in the two countries. A similar point can be stressed regarding Australia and New Zealand. In both nations a massive and heterogeneous educational system was developed from the early 1800s. The fact that both countries had several areas with European settlers in a relatively competitive environment gave place to the development of different schools in each region. These schools were closely associated with the specific characteristics of people in each sector (in terms of religious, cultural, and ethnic aspects).[13] Interestingly, the experience of these four countries shows as colonies having better conditions for settlement developed massive and decentralized educational systems.

At the other extreme are the extractive colonies with small groups having political and economic power. The experience of Algeria is interesting regarding the relationship

[11] Actually, the enrollment rates of these countries are the highest in a sample of 127 countries considering also the most developed nations; see Benavot and Riddle (1988).

[12] The same thing applies to French colonies that present very large enrollment rates, while France was among the leading countries in terms of primary enrollment. This point is at least partially contradictory with the argument in Glaeser et el. (2004) that a channel of the effects of colonial factors on schooling is through the level of instruction of the colonizers.

[13] See Shaw (1967) for a description of the existence of heterogeneous local schools in Australia.

between the willingness of the local elites of European settlers to support the education in extractive colonies. Algeria had a primary enrollment rate of less than 10% in 1900. Harik and Schilling (1984) describe that many initiatives of France (the colonizer) in order to expand schooling among native population in the country were resisted by the French settlers. In a similar way, Hanson (1986) mentions failed efforts of Catholic missionaries in Latin America trying to raise resources among the elite for increasing instruction among the native population.

A similar case can be done regarding Ghana. Graham (1971) documents that education for native children was related to some religious instruction and basic training in English. At the same time children from the elite had access to an educational system relatively similar to the British in terms of resources and teaching.[14] The same author mentions that settlers were aware of the potential political problems related to the expansion of schooling among native people.

But there are other appealing cases among less extreme situations. Argentina is interesting because it was the former Spanish colony having the higher primary enrollment rate in Latin America in 1870-1930. Engerman et al. (1997) show a similar pattern in terms of literacy rates. On one hand, most educational expansion was developed at the provinces with a supplementary involvement of the federal level, especially after the 1860s when President Sarmiento expanded state participation in instruction. Argentina from the mid 1800s has a federal organization. This contrasts with the Mexican experience where central bureaucracy (from the colonial times) had a lot of power and provinces did not have autonomy in most areas. This point is emphasized by Engerman et al. (1997) that relate this lack of independence of local areas with the relative delay of Mexico in terms of schooling in 1900.

In terms of the true relevance of decentralization, Sierra Leone is an interesting case. Reno (1995) shows as some state initiatives after the independence trying to expand and decentralize social services were ineffective because corrupt and autocratic chiefs controlled local government. This shows the difference between the mere existence of various areas, and the existence of voice or democratic power in the regions, which seems

[14] Heyneman (1971) shows that this distinction was also observed in other African countries in terms of school curriculums.

to be key for the expansion of education opportunities. Not surprisingly, in 1985-1995 the adult population of Sierra Leone had an average of 2.1 years of schooling. A contrast comes from the experience of Botswana. This country had an average of 5 years of schooling among the adult population and, accordingly to Acemoglu et al. (2003), from the beginning of the independence has inverted lots of resources in education, health and other social services. What is interesting, however, is that from the colonial times, democratic chiefs with lots of local check and balances characterized Botswana.

Differences among India and Pakistan and Sri-Lanka in franchisement are emphasized by Lindert (2002) as sources of divergent educational developments. While Britain gave Sri-Lanka universal adult suffrage in 1931 (including provincial elections in 1931 and 1936), India received only very limited franchisement in 1919 (centered in the elite members: taxpayers, landowners, and the more educated people). These differences in franchisement extended well before the Independence. Lindert (2002) relates these disparities in political power to educational results in the three countries. The data seem to support this idea: while Sri Lanka had a primary enrollment rate of more than 50% in 1935-40, India had an enrollment rate of less than 15% in the same period.

However, these developments do not necessary reflect causality from electoral rights to schooling because in 1900 (before the formal franchisement was granted) differences were also significant: while Sri-Lanka had gotten a primary enrollment rate of more than 20%, India had an enrollment rate of less than 5%. Probably the dissimilarity is a consequence of the Colebrooke-Cameron Reforms put in place in Sri-Lanka during the first half of the 1800s. These reforms unified the country and gave power and political participation to local citizens. In a sense we can interpret these reforms as an *exogenous* shock to the country's institutions that produced a number of differences in franchisement, schooling, and other aspects with other similar countries (like India). Probably, this historical event is what explains the success of Sri-Lanka in expanding franchisement vis-à-vis India and Pakistan.[15]

Finally, Lindert (1999) studies the experience of European countries in the early 1900 and strongly stresses the role played by decentralization in schooling outcomes before

[15] Zeylanicus (1970) suggests that the relatively high level of education among the population is what explains the Native pressures for extending the franchisement which resulted in the reforms of the 1930s.

1914. The author reconciles the fact that countries with very different political regimes, as Prussia and United States, presented high enrollment rates. Lindert argues that Prussia, a central autocracy, left its schooling more to local forces than has been realized, and the notorious Junker dominance in national politics was largely irrelevant to the provision of schooling. Decentralization helps explain how Germany and North America, seemingly poles apart in their national politics, both led in mass education.

Overall, this group of historical experiences gives support for the potential role of the hypothesis on the effects of colonial factors on schooling and provides some evidence for the specific role that franchisement and local decentralization could have had on this relationship.

3. Data and Descriptive Statistics

This section presents a description of the data used in empirical analyses of this paper. The dataset is mainly an extension of the data for 76 former colonies used by AJR and EL. The enlargement is related to the inclusion of measures of schooling, income distribution, institutional and historical factors taken from several sources (Barro and Lee, 2001; Beck et al., 2000; Benavot and Riddle, 1988; Bourguignon and Morrison, 2002; Cohen and Soto, 2001; Dollar and Kraay, 2002; Easterly, 2002; Hanushek and Kimko, 2000; Lee and Barro, 2001; and Murdock, 1967, among others). This extension allows us to work with a group of more than 50 former colonies in most empirical exercises of this paper.

3.1 Data on schooling

The most important ingredient of the data used in this paper corresponds to information about levels of schooling in different countries. There are some papers presenting datasets of contemporary values for several dimensions of human capital. In all cases average values for the 1985-95 period are used in this paper. In first place, regarding data on educational attainment by country (average years of schooling and highest educational levels achieved), Barro and Lee (2001) provide data for a sample of countries covering the 1960-2000 period. The data used in this paper correspond to the

following variables: average years of schooling of the population above 15 years,[16] and the share of the population that have achieved primary, secondary, and higher education. This implies that there is information for a sample of 61 former colonies for years of schooling and for 58 colonies for shares of population achieving the above-mentioned educational levels. The Barro-Lee dataset does not include data for a group of African countries. To partially fill the gap, information for average years of schooling was taken from Cohen and Soto (2001) for a sample of 8 African countries.[17]

Another dimension of schooling corresponds to enrollment in formal education. This information is related to the current situation of educational policies, while data on attainment give us information concerning past policies (i.e. the policies that were relevant for the adult population when they were attending formal education).[18] Data on primary, secondary and tertiary gross enrollment[19] are available from the *Global Development Network Growth* database for the period 1960-1997.[20] This source presents information for the 76 former colonies included in the database.

An additional aspect of schooling is associated with educational resources and quality. Educational resources in general are related to variables such as expenditure and the teacher-pupil ratio, among others. Educational quality, in general, is measured using results in internationally comparable standardized tests and dropout and repetition rates. Lee and Barro (2001) present data for educational resources for a sample of countries. This allows us obtaining data for public expenses in primary and secondary education (for 68 former colonies), teacher-pupil ratios (for 74 former colonies), school days (for 74 former colonies), dropout rates (for 71 colonies), primary repetition rates (for 70 former colonies), and secondary repetition rates (for 60 former colonies).[21] Hanushek and

[16] This is the variable most commonly used in the literature on economic growth as a proxy of human capital; see Easterly and Levine (1997) for example.
[17] The countries are Angola, Burkina Faso, Cote D'Ivoire, Ethiopia, Gabon, Madagascar, Morocco, and Nigeria. It is worth mentioning that the simple correlation among both indicators for the rest of the countries included in our sample is 0.96 for the 1985-1995 period.
[18] Thomas et al. (2000) put the difference among attainment and enrollment measures in a very intuitive way. While the former are like stocks of human capital, the latter are like flows.
[19] Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to each level of education.
[20] Downloadable from http://www.worldbank.org/research/growth/GDNdata.htm
[21] That paper also presents information for other measures of inputs and outputs, but in most cases they are available for more limited portions of our sample. For instance, there is information on internationally comparable test scores for only 15 former colonies.

Kimko (2000) present information on internationally comparable test scores for 47 of the former colonies included in our sample. This variable adds a new piece of information on educational outcomes correlated with the quality of schooling.

Finally, another dimension of contemporary levels of schooling has to do with the distributional dimension of education. Thomas et al. (2000) construct Gini indices of educational attainment. This allows getting information for 47 of the former colonies for the 1960-1990 period and adding information about distributional aspects of education that are clearly related to the basic hypotheses discussed in this paper.

Regarding historical evidence for schooling, it is not possible to obtain information for a group of dimensions as ample as for current levels of schooling. However, Benavot and Riddle (1988) present information of gross primary enrollment rates for a sample of countries in the 1870-1930 period. This allows getting information for 61 former colonies for 1900. This database, unlike the other sources, has not been amply used in Economics; hence it deserves a more detailed description.

The authors build the database using a number of international and local sources of information. Some of the sources (such as Banks, 1971 and 1975; Mitchell, 1980, 1982, and 1983; and the *Statesman's Yearbook*, various issues) have been used by economic historians.[22] However, the main contributions of the authors are three. First, they make a systematic effort to make compatible data from different sources. Second, they produce enrollment ratios using a similar and reasonable denominator for all countries (the population of ages 5-14).[23] Third, they add sources of information that allow them to get information for colonies and other less developed countries (it is possible to mention publications such as documents by the Colonial Office for 1890-1940 for a number of

[22] Easterlin (1981) uses information from Banks and the *Statesman's Yearbook* to construct his dataset of primary enrollments for 25 countries for the period from 1830 to 1970. Clemens and Williamson (2000) use data from Easterlin (1981), Banks and Mitchell to construct a dataset of school enrollment for 34 countries for the 1970-1913 period. Lindert (2002) uses some information from Banks to construct his dataset of public primary enrollment for 24 countries for the 1881-1937 period. Engerman et al. (1997) use data from Easterlin (1981) that, as mentioned, uses information from Banks and the *Statesman's Yearbook*. Finally, Glaeser et al. (2004) use data from Lindert (2002).

[23] The age category used in the denominator comes from the classification used by UNESCO. The use of a similar age category for all countries has the benefit that gives a similar base to compare the intensity of primary education across countries. However, other sources, such as the data from the *Global Development Network* growth database, use measures such as gross enrollment considering national definitions of age for primary education, and others present *net* enrollments in the numerator (i.e. considering only primary students of ages consistent with the denominator). Of course, it has to be said that the correlation among alternative measures of enrollment is quite high (Benavot and Riddle, 1988).

British colonies; Ortal, 1977 for Latin American countries; Flora et al., 1983 for Western European countries; early volumes of the U.S. Bureau of Education's *Report of the Commissioner of Education* that reports the state of education in territories outside the US; publications in the area of comparative education presenting information for selected countries and colonies, such as Matthews and Akravi (1949) for Arab countries; and a number of government documents reporting information on education and population).[24]

In order to check the compatibility of the figures reported by Benavot and Riddle (1988) with numbers presented in other sources, it is interesting to notice that, first, as reported by the authors the correlation among indicators of enrollment from various sources is quite high, ranging from 0.892 to 0.991. Hence, the different databases (in general, incorporating information for different groups of countries with some common observations) seem to be highly correlated among them and, then, they should not have important differences in terms of methodologies and underlying assumptions. Second, enrollment rates presented by Benavot and Riddle (1988) present a correlation of 0.995 with information reported by Easterlin (1981) and of 0.996 with data from Lindert (2002). Third, Engerman and Sokoloff (2002) present literacy rates for a sample of 17 former colonies of the Americas. However this is a measure more related to the educational level of the adult population, it also shows the extent of schooling in a country. The correlation between literacy rate and primary enrollment rates is 0.84 for *circa* 1900.

The last comparison is interesting by itself because it shows that different measures of schooling were related in 1900. This probably reflects several facts. First, the previously stated existence of persistence in schooling can explain this relationship (in this case primary enrollment rates correspond to flows, while literacy rates represent stocks). Second, primary education was just beginning to expand to masses in 1900 in most countries; therefore, literacy rates are probably a good indicator of schooling. This brings support to the implicit assumption of this paper that primary enrollment rates are good proxies of education in 1900.

[24] This creates a tremendous difference for the purposes of this paper. For example, Easterlin (1981) incorporates data for only 9 former colonies; Lindert (2002) for only 7 former colonies; and Clemens and Williamson (2000) for only 15 former colonies.

This paper uses the data set from Benavot and Riddle (1988) and adjusts the figures for countries having missing data for *circa* 1900. The adjustment consists of assigning the minimum observed enrollment rate in the sample to countries having missing data for 1900.[25] This adjustment is also used by Meyer et al. (1992). The idea is that the existence of missing information for 1900 should reflect that these countries had very small levels of primary enrollment.

Finally, as a way to study the relationship among different measures of schooling, Table 1 presents the correlation of a group of schooling indicators. Gray areas indicate that correlations are statistically significant. As it is evident, most correlations are significant and high, meaning that schooling variables could be considered a cluster of factors. A second interesting factor is that the measure of primary enrollment in 1900 is highly correlated with most current schooling variables, especially the ones related to attainment and educational outcomes. This is initial evidence that there is persistence in cross-country differences of schooling. Third, some measures such as school days and government expenditure in secondary education do not present a strong relationship with the other schooling variables. This could mean that these variables do not accurately capture relevant differences in schooling across countries.[26] Fourth, the variable quantifying educational inequality seems to be highly correlated with a number of measures of schooling. This fact means that countries having higher averages in educational attainment also present more equalitarian distributions of schooling.

3.2 Data on colonial, institutional, and social factors

A second group of data is related to colonial and institutional aspects. First, information on colonial factors was borrowed from AJR. Settler mortality represents the potential mortality risk faced by colonizers. Methodological aspects used in the construction of the series are presented in detail in Acemoglu et al. (2001). Population density in 1500 is a measure of the density of native population and, therefore, adds

[25] A similar adjustment is made by Acemoglu et al. (2001) regarding countries not having information for institutional development in 1900.

[26] For example, the absence of a significant correlation between school days and educational outcomes (such as results of test scores or repetition rates) has been interpreted as evidence that educational output depends not only on resources, but also on the quality of instruction and the incentives facing providers of education (See Lee and Barro, 2001).

another dimension of the conditions faced by colonizers at the very beginning of the colonization. This factor is emphasized by Acemoglu et al. (2002) and, especially, by Engerman and Sokoloff (2002) because adds information about the labor supply and the opportunities of taking over the pre-colonial tax system and establishing extractive institutions. Finally, the share of European population in 1900 is a third historical variable directly related to the kind of institutions established in each country, as emphasized by Acemoglu et al. (2001).

Another cluster of variables is connected with the availability of crops and minerals for production in a specific country. As previously mentioned, Easterly (2002) and EL use a group of 11 dummies indicating whether a country produced any of a given set of leading commodities (crops and minerals) in 1998-1999. The crops/minerals dummies are bananas, coffee, copper, maize, millet, oil, rice, rubber, silver, sugarcane, and wheat. They argue that whether any of a particular good is produced is related to exogenous characteristics of the country (such as soil and climate). The implicit assumption is that these characteristics have remained constant reflecting historical agricultural endowments. In this paper, I will use only two categories of endowments: if countries have any endowment more favorable to development (hereafter, "good endowments") and any endowment less favorable to development (hereafter, "bad endowments"). Following with the rationality of ES and EL the commodities less favorable to development are bananas, coffee, copper, rice, rubber, silver, and sugarcane. The commodities more favorable to development are maize, millet, and wheat. The alternative strategy of using the 11 dummies was not considered because in subsequent sections we will use these variables as instruments for institutions and, in this context, using 11 instruments in a sample of 60 observations creates what is called the "too-many instruments problem" (Bound et al. 1995).

A final group of historical variables used in the analysis is related to the role of cultural and religious heritage as determinants of schooling, as suggested in previous sections. The first is the share of population that is Roman Catholic, Muslim or of another (non-Protestant) religion (These values are taken from La Porta et al., 1999 for the 1985-1995 period and from Barrett (1982) for 1900). The second group is the identity of the colonizer. This variable was constructed using information from CIA (2002).

Regarding institutional and social factors, the first group of indicators corresponds to characteristics of institutions. In this case we use one variable taken from the Polity IV data set (an update of Gurr, 1997): institutionalized democracy in 1900 and 1985-1995. Institutionalized democracy index is derived from indices of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive (See Gurr, 1997). In addition, following to Acemoglu et al. (2001), countries with missed observations were assigned with the minimum level for this variable because they were colonies in 1900.

The Gastil index of civil rights from the Freedom House is used as an alternative measure of democracy (Barro, 1999 uses this measure). The Freedom House definition of civil rights is "civil liberties are rights to free expression, to organize or demonstrate, as well as rights to a degree of autonomy such as is provided by freedom of religion, education, travel, and other personal rights".

Decentralization is another indicator reflecting institutional factors associated with the extent of local democracy and local political power. This variable was constructed taken information from Beck et al. (2000) and the Polity IV data set. Beck et al. (2002) present two variables measuring the extent of local democracy at the state/provincial and municipal levels. The variables measure if state/provincial and municipal governments are locally elected. This is zero if neither the local executive nor the local legislature are directly elected by the local population that they govern; one if either is directly elected and the other is indirectly elected (e.g., by councils at subsidiary levels of government) or appointed; and two if they are both directly and locally elected. The value of the index of local democracy in our paper is the average of the indices for state/provincial and municipal elections. This variable probably reflects not only the extent of formal democracy, but also local political power and the degree of effective decentralization. The decentralization variable in the Polity dataset takes three values, going from 1 to 3, where 1 refers to a centralized state (Unitary state: no more than moderate decision-making authority is vested in local or regional governments. Many nominally "federal" systems, like the Soviet Union, are in fact centralized in this sense), 2 to an intermediate category, and 3 to decentralized states (Federal state: local and/or regional governments have substantial decision-making authority.) For 1985-1995 we use the average of the

Beck et al. (2002) and the Polity indices and for 1900 only the Polity data as an empirical measure of decentralization.

Regarding social characteristics, we include some variables reflecting income heterogeneity. Levels of income inequality were included using the share of the 3 middle-income quintiles. The variable was borrowed from Easterly (2002) and from Dollar and Kraay (2002) for the current period and from Bourguignon and Morrison (2002) for 1900. Dollar and Kraay (2002) presents information for 12 countries that are not included in Easterly (2002).[27]

Finally, we use the data on the number of indigenous cultures in Murdock (1967) as a measure of the number of ethnic groups living in a country when the colonizers arrived. In particular, we use a dummy that takes a value of one if there were more than one ethnic group and a value of zero otherwise. The basic idea is that colonizers established states that, at least partially, resembled preexistent distribution of power. Hence, societies having only one ethnic culture tended to develop more centralized states, whereas countries having a variety of local groups tended to develop more decentralized states.[28] A number of comments regarding this variable should be noted. First, it is worth stressing that we are using information on the ethnic composition of the country at the beginning of the colonization period and, therefore, this measure is probably not contaminated by endogeneity problems related to measures of current levels of ethnic heterogeneity.[29] Second, some empirical exercises suggest that this variable is not correlated with the colonial and historical factors emphasized by AJR and ES.[30] Thus, we are getting information from a different historical factor affecting the development of institutions from the past. Third, as shown Tables 8 and 9 below, this variable has a significant effect

[27] The additional countries included in Dollar and Kraay (2002) are Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, Gambia, Guinea, Mali, Paraguay, and Uruguay. It is worth noting that the mean of the middle class variable for these countries is not statistically significant of the mean of the countries included in both samples (while the mean for these countries is .4356, the mean for the rest of the countries is 0.4443) and that the correlation of the middle class variable in both papers is 0.9462.

[28] An alternative explanation of this pattern is that colonizers settled around the previously existent ethnic groups in order to take over and exploit their economic structures and, afterwards, they demanded political power for each local group.

[29] Moreover, this variable is not significantly correlated with current levels of ethnic, religious or linguistic fractionalization.

[30] In a regression of the indicator variable for the existence of more than one culture on settler mortality, population density in 1500, and endowments, no one of the right hand side variables has a coefficient which is statistically different from 0.

on the level of decentralization, *but* no significant effect on neither other institutional dimensions nor the level of income today. So, even tough we can not prove their validity as an instrument, we can feel relatively safe that this variable is not related with other potentially important dimensions of the cluster of institutions we are analyzing and, therefore, we could use the variable as an instrument for the level of decentralization in 1900 and in 1985-1995.[31]

3.3 Descriptive statistics

As a way to organize and motivate subsequent empirical analyzes, Table 2 presents some descriptive statistics for the whole sample and for groups of countries (above and below the median of settler mortality and population density in 1500, and whether the countries have or not bad and good endowments) and tests for differences in means among groups (bold figures indicate that differences in means are statistically significant). This exercise allows us a first approximation to some of the hypotheses stated previously regarding the effect of colonial and historical factors in development.

Regarding differences in schooling variables, countries with settler mortality above the median of the sample have more developed schooling indicators of attainment, enrollment rates, educational resources, and equality of education. A relatively similar picture emerges from comparison of countries below and above the median of population density in 1500; however, in this case the differences are less important, in particular regarding some educational resources.

Differences in schooling by groups of countries having dissimilar endowments are less clear. Actually, in a somewhat puzzling result if we consider the hypothesis pointed out by ES, countries having good endowments tend to have worse schooling indicators than countries not having good endowments.[32] Interestingly, a similar pattern emerges regarding differences in institutional variables, where the small differences according to this criterion would present the "wrong" sign according to ES (i.e., countries having good endowments have worse institutions).

[31] This point is particularly important because it facilitates the interpretation of the effect of this variable as an instrument for decentralization.

[32] A potential explanation for this result is related to broader assessments of the role of endowments on development. For example, Gylfason (2001) and Sachs and Warner (1995) argue that countries with ample availability of any kind of natural resources (endowments) tend to have lower growth rates than countries without natural resources because they have worse institutions and fewer incentives to accumulate human capital.

In addition, results for comparison among countries having or not bad endowments are more related to the hypotheses pointed out by ES, in particular, countries having endowments less favorable to development have relatively worse schooling indicators. Again, this trend is similar to differences observed regarding institutional development. Interestingly, similar results emerge if we consider differences in variables related to income inequality, but not for variables measuring inequality of educational attainment.

4. Cross-Country Evidence

This section presents and discusses a group of regressions relating colonial and historical factors with schooling variables. The paper presents two basic approaches to test the main hypotheses pointed out in this paper.

The first approach presents reduced-form equations of the following type:

(1) $$S_i = \alpha + Z_i'\beta + X_i'\delta + \varepsilon_i$$

where *i* represents country, *S* is a schooling indicator, *Z* is a group of variables including information for colonial factors related to the hypotheses of interest, *X* is a group of control variables, and ε is a random error term. This equation represents the relation of schooling and colonial factors without considering specific mechanisms that can explain the association.

Next, to study if there is some institutional dimension that can be capturing specific channels for the effect of *Z* on *S*, through a third (group of) variable(s), say *Y*. In this case we will estimate the following system of equations using Two-Stage Least Squares:

(2) $$S_i = \chi + Y_i'\theta + X_i'\phi + e_i$$

(3) $$Y_i = \eta + Z_i'\mu + X_i'\omega + \xi_i .$$

In this case the variable *Z* is an instrument of *Y* that allows us to identify an exogenous source of variation for *Y* that is likely measured with error and, in particular in our case is also affected by *S* (think of the variables suggested in the literature, such as indicators of democracy and the middle-class consensus). However, *Z* will be a valid instrument as long as *Z* is uncorrelated with *e*. Putting differently, this identification strategy is valid if *Z* affects *S* only through *Y*. An over-identification test is a useful first

approach to check this condition.[33] In our case we will have one endogenous variable and four instrumental variables.

A problem with the previous approach is that (i) over-identification tests are not very powerful and, therefore, tend not to reject the null hypothesis too often, thus, suggesting that some specific variable Y is capturing all the effects on historical factors on schooling when that is not true, and (ii) as we previously discussed, we only have one group of instruments to disentangle between at least two institutional dimensions (that are highly correlated in empirical terms). Thus, in order to complement the previous approach, we will use an additional instrument that is related to one particular dimension of the cluster of institutions and not to others. Therefore, in this case *Y* above will include two variables and therefore (2) represents two equations. In this case, we could in principle distinguish between the effects of different institutions because we can identify each of them using different sources of exogenous variation.

Before estimating reduced form equations like (1), it is possible to assess some underlying assumptions of using colonial factors to explain schooling (following the approach of AJR). First, it is interesting to evaluate the persistence of the cross-country variability of schooling. Table 3 presents the results for the correlation of primary enrollment in 1900 and a group of indicators of schooling in 1985-1995.[34] As it is possible to see primary enrollment in 1900 is highly correlated with all dimensions of schooling in 1985-1995, especially with measures indicating stocks and flows of schooling (years of schooling, secondary attainment, secondary enrollment, and educational inequality). In all these cases, the cross-country variability of early schooling explains more than ½ of the volatility of a number of current dimensions of education. In other cases, enrollment in 1900 is highly significant (with absolute values of the t-tests of more than 5 in all cases) but explaining a lower fraction of the variability of these variables (about ¼). Notice, as a comparison, that Acemoglu et al. (2001) conclude that the degree of persistence of institutions is high when their measures of early institutions

[33] The null hypothesis of this test is that *Z* does not explain *e*, i.e., colonial factors do not explain *S* beyond its ability to explain *Y*. This produces a Lagrange multiplier test statistic that under the null hypothesis is distributed χ^2_Q, where *Q* equals the number of excluded exogenous variables minus the number of endogenous variables included as regressors in equation 2.

[34] The dimensions of schooling included were chosen as representative of current attainment, enrollment, resources, educational quality, and educational inequality.

explain about 20% of the variability of current institutions. Therefore, as a whole, the evidence presented in Table 3 suggests that schooling is a highly persistent and, thus, its early and current levels are closely related validating the arguments presented in section 2 of this paper.

A second exercise is related to studying if early values of variables proposed by AJR and ES as determinants of institutional development and our measure of decentralization are related to current levels of schooling. While the former emphasize the role of European population as the main determinant of institutions, the latter suggest variables related to suffrage and inequality.[35]

Panel A of Table 4 presents the relation of current levels of schooling (using average years of schooling, secondary enrollment, and expenditure in primary education as proxies) with factors emphasized in each hypothesis. Results are significant and present expected signs for the variables reflecting the extent of democracy and the share of European population in 1900. However, for income inequality, results are not statistically significant and in two cases present the wrong sign (i.e. a higher middle class share would be associated with lower levels of secondary enrollment and government expenditure in education). Interestingly, regressions considering European settlements in 1900 seem to explain a higher fraction of the variability of schooling variables, suggesting that this variable is more strongly related to current levels of schooling than variables related to democracy in 1900.

The last results deserve a more detail analysis because, as pointed out by Acemoglu et al. (2001), democracy seems to be influenced by the share of European population, while the same can happen with democracy and income inequality (or the other way around, in a reverse causality relation). The same is true for decentralization. As suggested by AJR, it is possible to think that these three variables are elements of the same social structure. For doing this, Panel B of Table 4 studies if the ultimate factors (colonial factors such as settler mortality, population density in 1500, and good and bad endowments) are related to these four variables in a comparable manner.

[35] Unfortunately, the middle class share in 1900 (from Bourguignon and Morrison, 2002) was available only for a sample of 21 former colonies and, therefore, regressions considering this variable have limited statistical power.

The results suggest that ultimate factors affect in a similar way the four variables. In all cases, the higher the settler mortality, the lower the value of the dependent variable. Population density in 1500 is negatively related with all the variables except middle class share in 1900. The existence of good endowments has a positive effect in the four variables, while bad endowments have negative effects on the four variables (but the effect is only marginally significant for democracy). Besides, the variables are more robustly related to European settlements in 1900.[36] These findings insinuate, using a similar argument than Diamond (1997), that the four proximate determinants of current levels of institutions are related to the same group of ultimate factors.

Hence, results presented in Table 4 corroborate the idea that schooling presents a significant degree of persistence in the cross-country dimension, that current levels of schooling are related to historical factors (*circa* 1900), and that those historical factors are correlated with the aspects emphasized in the hypothesis relating colonial factors with institutional development. Therefore, the basic rationality to use our group of colonial factors is supported by the data, suggesting that factors such as potential settler mortality, population density about 1500 and country endowments have an effect on certain historical conditions that affect schooling (such as the presence of European population, the degree of democracy and the share of the middle class in 1900).

The next step is to analyze reduced-form estimates of the relationship between schooling and colonial factors. Panel A of Table 5 presents reduced form estimates for primary enrollment rates in 1900, considering only our group of instruments and also controls for the identity of the colonizer and religion variables (the fraction of Roman Catholic, Muslim, and other non-Protestant in total population in 1900). Results show that the four proposed historical factors affect primary enrollment as expected (i.e. higher settler mortality and population density decrease schooling, good endowments promote schooling, and bad endowments disincentive schooling). Moreover, most variables are statistically significant considering conventional significance levels and explain a relevant share of cross-country variability (more than 50%). The inclusion of variables related to religion and if the country's colonizer was Britain are significant and confirm

[36] This result is interesting by itself because it extends the results presented in AJR by adding the role of endowments among determinants of European settlements. In a sense, these results show as complementary is their view with ES's.

previous findings that former British colonies and Protestant countries tended to develop more extensive educational systems *circa* 1900.[37] However, in general, the inclusion of these variables does not change the statistical significance of previous results verifying their relevance.

Panel B of Table 5 presents reduced-form estimates of equation (1) for schooling variables for 1985-1995. First, regarding average years of schooling, our four basic variables are strongly associated with this variable and present the expected signs. Inclusion of controls for other factors does not change these results. Second, for secondary enrollment rate and current public expenditure in education the results are confirmed for settler mortality and population density; while for the effects of endowments, the results are less clear because the estimates, even tough presenting the expected signs, in some cases are not statistically significant.

In addition, Panel C presents a further check of results in Panel B by adding the log of Per-Capita GDP. The idea behind this exercise is adding a variable reflecting the level of development of a country, having a positive effect on schooling, and being related to our four basic measures. In a sense, this is an extreme and pessimistic exercise for our purposes because (i) potential multicollinearity between GDP and the other regressors can create upward biases in standard errors of the coefficients and (ii) it is possible that the GDP of a country captures the effects of other variables related to development that are affected by colonial factors. Hence, these results are mainly preliminary and try to put an extreme check of robustness of previous results. Results of Panel C show that, in spite of the extreme character of this exercise, all variables present the excepted signs and in most cases estimated coefficients are statistically significant.

Thus, as a whole, results shown in Table 5 present evidence of a robust and significant relationship between the group of colonial factors and schooling variables. For example, results of Panel B of Table 5, after controlling for religion variables, indicate that a country having settler mortality in the lower 25% of the distribution has a population with 1.5 additional years of education, a secondary enrollment rate 17.8 percentage points higher, and a level of government expenditure in education US$ 190

[37] Notice that some authors like Benavot and Riddle (1988) show that religious factors and the identity of the colonizer were more relevant for schooling before World War II than in later periods. These findings are partially confirmed below (see Panel B of Table 5 and Tables 7 and 9).

higher than a country located in the higher 25% of the distribution of the same variable. Analogously, a country situated in the lower 25% of the distribution of population density in 1500 has 1.4 more average years of education, secondary enrollment 11 p.p. higher, and US$375 more of per-pupil expenditure in education than a country in the higher 75% of the distribution. Results for endowments are similar considering only statistically significant results. A country having goods endowments has a population with an average of 2.2 more years of education, and a secondary enrollment rate 17.8 p.p. higher than countries not having good endowments. Finally, countries having "bad" endowments have 1.7 years less of average education than countries not having bad endowments.

An additional step to study the association between colonial factors and schooling is related to the estimation of a structural relationship like the system of equations (2) and (3). Our interest in this case is related to testing if the effect of colonial factors operates through some specific institutional and social factors (as democratic institutions, decentralization, and the middle class consensus) stressed in the literature. To do that our approach will be to estimate if (i) there is a significant relationship among each specific factor and the colonial variables, (ii) the proposed variable has a significant effect on schooling, and (iii) the effect of the colonial factors on schooling is not significant beyond their effects on the proposed variable, i.e. the overidentification test confirms that the instruments are valid.

There are two groups of variables that are candidates to explain the relationship among schooling and colonial factors: democratic institutions and middle class consensus. Before doing the analysis it is worth mentioning that these two groups are not *significantly* related. The correlation between them is less than 0.10 and statistically not significant using several definitions of democracy and inequality.[38] This initial evidence suggests that the idea pointed out by Engerman et al. (1997) and ES that inequality and democracy are closely related is not supported by data taken from a sample of former

[38] The different definitions of democracy considered are: the democracy indicator from Polity IV, the Gastil's civil liberties index from Freedom House, and the index of local participation constructed from Beck et al. (2000). The definitions of inequality considered are: middle class share from Dollar and Kraay (2002), and middle class share and Gini coefficient from Deininger and Squire (1996).

colonies.[39] This means that both variables are probably different and, therefore, we will be testing different channels of the effects of colonial factors on schooling.

Table 6 presents a first group of regressions for 1900. The first column shows results of estimating a structural relationship for determinants of primary enrollment. The findings suggest that democracy had a very important effect on schooling. In addition, the overidentification test shows that the effect of colonial origins on education in 1900 is not significant beyond their effects on democracy. Therefore, it is reasonable to point out that democratic institutions capture the effect of colonial factors on schooling in 1900. In addition, the effects are economically relevant: a country with a level of democracy equivalent to the higher 25% of the distribution of democracy in 1900 had 7.3 p.p. more of primary enrollment than a country in the lower 25% (remember that the median primary enrollment in 1900 was 7.9).

The second column shows a structural estimation using the decentralization index in 1900, in this case we also find a significant effect and the over-identification test also suggest that this measure is able to account for the effects of historical and colonial factors on schooling. This shows both the limitations of the over-identification test we are using and the fact that both institutional dimensions are highly correlated (the correlation between them is 0.58) and their effects on schooling are identified using the same group of instruments. Thus, we need to take an additional approach in order to disentangle which institutional dimension is more important.

Finally, the third column presents results using the middle class share in 1900 as the endogenous variable. These results should be interpreted with caution because of the small sample size and suggest that the middle class share had a positive, but not significant, effect on primary enrollment. This result is not unexpected considering results from Panel B of Table 6 showing that colonial factors are not robustly related to the middle class share in 1900.

Table 7 studies structural relationships using data for 1985-1995. In first place, Panel A presents the relationship between the two measures of democracy reflecting different dimensions of citizen participation (the democracy indicator from the Polity database, the Gastil's political rights index from Freedom House), our indicator of decentralization, the

[39] Remember that their argument is based in evidence only from the Americas.

middle class share and our group of colonial factors. The results in the first two columns are quite similar: the colonial variables explain roughly ½ of the cross-country variability of democracy, the effect of settler mortality and population density is negative and statistically significant, the effect of having good endowments is positive and significant, and the impact of having "bad endowments" is negative but statistically not significant.

The third column shows results for the relationship among colonial factors and decentralization. In this case, all variables are significant and present the expected signs. The global relationship between colonial factors and the dependent variable is not as strong as in the case of formal democracy but independent variables explain roughly ¼ of the variability of local democracy, which is in the acceptable range for first stage estimates. Thus, this group of results confirms that colonial factors are related to democratic institutions and decentralization verifying their potential as instruments for a more structural approach.[40]

The last two columns, however, presents less favorable results for the hypothesis that colonial factors and middle class share are correlated. Overall, all variables are only marginally significant, one of them presents the wrong sign (population density in 1500), and colonial factors can account for only 10% of the variability of middle class share. The last point diminishes the importance for arguments pointing out that multicollinearity among regressors can explain these findings.

This result contradicts results reported in Easterly (2002). However, by comparing the last two columns, it is noticeable that differences do not come from differences in both samples. [41] Taken as a whole, these results suggest that middle class share is not a good candidate as a channel for explaining the effects of colonial factors on schooling in our sample of former colonies. Thus, we will not continue studying the effect of the middle class share because the first stage does not seem to be relevant.

Panel B of Table 7 presents the result of the structural estimates for average years of schooling for 1985-1995.[42] In this case, log of per-capita GDP was also included in the

[40] Recall that very similar results were obtained in Panel B of Table 4.

[41] Several, non-reported exercises confirm the robustness of the results to different specifications. For example, adding the 11 endowment dummies included in Easterly (2002) increases only marginally the R^2 of the regression.

[42] Similar results are obtained for other dimensions of schooling; however, they are not reported in order to save space. Average schooling was chosen to be reported in order to make our results comparable with

regressions to control for the effect of initial development on schooling variables. This variable is intended to capture the effect of income and other omitted variables related to development on schooling (See Banerjje, 2003 for a theoretical rationale for the effects of income on schooling that go beyond the traditional argument that emphasizes the existence of liquidity or borrowing constrains). However, there is a potential endogeneity problem because schooling also may affect per-capita GDP and the instruments are also related with this variable. Thus, in order to identify the effect of per-capita GDP on schooling we will use terms of trade shocks as an instrument for the level of income.[43] Arguably, this variable shouldn't have a direct effect on schooling and on other variables and, therefore, can be used as an instrument for income.

Columns 1 and 2 show that the two measures of formal democracy are positively related to schooling but that overidentification tests reject that these variables are capturing all the effects of colonial origins on schooling. Hence, these results suggest that the effects of colonial factors on schooling go beyond than their influence in formal democracy. Of course, this does not mean that formal democracy does not affect schooling, but that democracy cannot fully account for the causal effect of colonial factors on schooling.

Column 3 of the table shows the results considering our measure of decentralization. The use of this variable is appealing because it is probably capturing not only the effect of decentralization but also of local power on schooling. Results presented in column 3 suggest that this variable is not only related to schooling but also that the effects of colonial factors are not related to education beyond their influence on decentralization. This is interesting because it identifies a specific channel for the impact of democratic institutions on schooling and confirms the relevance of local voice as suggested by the historical background and the modern theories of decentralization previously discussed. Of course, as previously discussed, this approach relies on the validity of the over-identification test that is not very powerful.

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other papers and because it is the proxy of the stock of human capital of a country typically used in the literature.

[43] Specifically, terms of trade shocks were computed as the growth of terms of trade between 1960 and 1995 using the terms of trade indicator taken from the WDI.

In order to overcome some of the pitfalls of the previous approach our next exercise will take advantage of a different approach using our measure of existence of indigenous cultures as an instrument for decentralization. As previously discussed, despite its theoretical appeal as a determinant of decentralization, we need to show that this variable is a potential valid instrument. Results in Panels A of Tables 8 and 9 show that this variable is correlated with our decentralization measures and not correlated with democracy in neither 1900 nor today. Thus, this variable allows us to pin down one source of exogenous variation that is different from the other historical determinants we are using as instruments. Moreover, results in the last column of Panel A of Table 9 suggest that our instrument for decentralization does not have an effect on the level of income and, therefore, we can be relatively confident of using it as an instrument.

Panel B of Table 8 presents estimates of the horse-race between both institutional dimensions and seems to suggest that what matters the most for primary enrollment in 1900 is democracy, which has a positive and significant effect on primary enrollment. At the same time, the decentralization index is positive but insignificant. Moreover, the value of the effect of democracy on schooling is basically unchanged with respect to estimates in Table 6.

Panel B of Table 9 presents a similar exercise but using indicators of schooling in 1985-1995 as dependent variable. Interestingly, in this case decentralization is the variable that wins the race. This result confirms our previous evidence that decentralization seems to matter the most for schooling levels today. One way to make compatible both results is that the small group of more democratic countries in our sample in 1900 (i.e., Australia, Canada, New Zealand, and United States, among them) had relatively decentralized political structures, suggesting that early democratization was closely related to local decentralization, while modern democratization is not clearly related to decentralization in terms of political power. However the evidence of Table 8 does not support this view because the regression in Panel B is already including a control for decentralization.

Probably a more plausible line of reasoning can be related to the fact that the effects of democracy on schooling could have changed in the time. While early democratization was functional for the development of initial instructional institutions (related to the

expansion of primary education), the complexities of modern education require instructional structures closer to users that can be better found in more decentralized democracies. Interestingly, results in Table 10 bring additional support to this approach. Regressions of primary enrollment in 1960-1995 on measures of democracy and decentralization show that what is more important for primary enrollment also today is democracy. Thus, the idea that the relative importance of democracy and decentralization changes for different levels of schooling seems to be supported by current and historical data.

Another way of interpreting this result is that in order to have a well functioning basic educational system where people are enrolled in primary schools is by having a democratic system (or alternatively, the lack of democratic institutions can explain the failure of some educational systems even to provide primary education). But, when the countries want to expand education to higher levels and pass from enrollment to attainment some form of decentralization is more important than democracy. This result is in harmony with some ideas presented in Engerman et al. (1997) and Lindert (1999) and with the historical background previously discussed. It is also coherent with modern analyses suggesting that decentralization considering voice of local citizens is important for the provision of quantity and quality of public services (such as education).[44]

Putting in a different way, the results presented in this table suggest that local political power (local democracy and decentralization) is a key feature in linking the colonial factors stressed in this paper and schooling results. There are a number of theoretical features that can explain this correlation, as previously discussed. In addition, the effects are not only significant, but also economically relevant. Using the results from Table 7, a country located at the higher 25% of the distribution of decentralization has 1 year more of average education than a country from the lower 25% of the distribution.

Finally Table 11 presents some robustness exercises. First, Panel A presents regressions excluding the so-called Neo-Europes, excluding countries with imputed data, and finally including a proxy for the level of per-capita income *circa* 1870 taken from

[44] Other candidates for accounting for the association between schooling and colonial factors are related to institutions like protection against government expropriation. A number of exercises, not presented in the paper in order to save space, confirm that this channel is not able to accounting for the association among historical factors and schooling.

Madison (2003) as an additional exogenous regressor.[45] In all the cases, the basic results remain unchanged. Panel B presents similar exercises for 1985-1995, and again the basic results are unchanged. Finally, Panel C presents regressions considering each of the two components of our decentralization index separately. Results suggest that the local democracy index from Beck et al. (2002) present a slightly more robust relationship with schooling.

5. Conclusions

This paper has presented evidence concerning the importance of historical roots in understanding differences in current levels of schooling of former colonies. These disparities are enormous, from countries having populations with more than 10 years of schooling, to countries having population with less than 1 year of schooling. However, the origins of these differences are not quite clear. Here, we argue that differences in conditions faced by colonizers have a significant influence in educational policies in the Colony and in the beginning of the independence that persist to the present.

The theoretical setup of this relationship is strongly related with the hypotheses pointed out by Acemoglu et al. (2001, 2002) and Engerman and Sokoloff (1997 and 2002) regarding that colonial and historical factors had a significant influence in the main features of institutions of a country. Their basic insight, extended in this paper to the building of educational policies, is that institutions are the endogenous creation of individuals considering benefits and costs of alternative options. In this case we have shown that conditions faced by colonizers, as potential settler mortality, density of Native population, and the characteristics of factor endowments, have a significant influence in the characteristics of educational systems established in the past.

Moreover, differences in past educational institutions and in past levels of schooling persist to the present. This inertia is related to (i) some characteristics of institutions that

[45] Specifically, we use data on the earlier year close to 1870. For about 50% of the countries, we have some estimate of income from Madison for some year before 1920. For the other 50%, per-capita was imputed using data for similar countries for a similar period. Indeed, this methodology is not perfect, but at least allows us to use a rough control for the level of income and be sure that democracy is not picking up differences in income. In addition, we do not have a valid instrument for income and, therefore, this exercise should be taken as suggestive evidence.

make reforms very costly and (ii) the own nature of education making present and past levels of human capital being closely related.

In a sense, this is an important implication of this paper and in general of the literature studying the influence of historical factors on development. The fact that there is a lot of persistence in institutions implies that the creation of a particular kind of social structures remains in the time. This means that when someone with political power (the whole society, the elite, the politicians) decides to set up a particular institution is highly likely that it will last for several years because its reform is costly. However, it is important to emphasize that our findings do not imply that educational institutions can not change. There are examples of former colonies like some Asian countries (such as Hong-Kong and Malaysia) having very low levels of private enrollment in 1900 that today present very high levels of schooling (located in the upper 25% of the distribution of educational outcomes). Putting econometrically, these countries are outliers in our empirical analyses and, therefore, they create an interesting line of future research: trying to understand what is behind the experiences of countries having very poor educational systems in the colony and having very high levels of human capital in the present.

When trying to identify specific channels for the influence of colonial factors on current levels of schooling, this paper presents evidence that a key aspect seems to be related to the extent of democracy and decentralization as determinants of schooling. This fact confirms some theoretical and empirical results presented in the literature, but also qualifies the effect of traditionally stressed effect of franchisement on schooling. In particular, results suggest that while democracy is a significant determinant of primary or basic schooling, while the degree of decentralization of political power (and particularly, local democracy if take the results of the last table) are much more relavnt for higher levels of schooling. In any case, the evidence suggest that these institutional factors are closely related to colonial factors and that decentralization is *not only* strongly related to educational development, *but also* that this variable is able to integrate all the effects of colonial factors on schooling.

Interestingly, these findings can be related to the modern literature on the effects of decentralization and local voice on the provision of education and can show as historical analyses can shed light on modern controversies. In particular, our results suggest that the

exogenous variation of decentralization (local democracy or local voice) has an important causal effect on schooling results in a sample of former colonies. These findings are relevant because (i) they present evidence that is not contaminated by reverse causality,[46] and (ii) they present evidence of the *long run* effects of local voice on schooling, instead of results derived from short-run or very specific experiences of decentralization.

An additional contribution of this paper has to do with the search for specific channels of the effects of the cluster of institutions mentioned by Acemoglu et al. (2001) on the long-run development of the colonies. They relate colonial factors to a cluster of institutions affecting development. However, it remains studying (i) if different components of the cluster of institutions affect in different ways development and (ii) if specific channels accounting for these effects. This paper has showed evidence related to schooling. However, similar exercises could be developed regarding the effects of colonial factors in other factors such as financial development (as suggested by Engerman and Sokoloff, 2002) and judicial systems, only to mention two specific points.

[46] It is possible that schooling results cause local democracy: citizens from areas with poor educational outcomes have more incentives to press for increasing their local voice in order to improve the results.

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Table 1: Correlations of Various Dimensions of Schooling

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Primary Enrolment in 1900	**1.00**																			
2	Average years of education in 1985-1995	**0.79**	**1.00**																		
3	Average years of primary education in 1985-1995	**0.73**	**0.91**	**1.00**																	
4	Average years of secondary education in 1985-1995	**0.69**	**0.83**	**0.78**	**1.00**																
5	Average years of higher education in 1985-1995	**0.35**	**0.48**	0.15	**0.07**	**1.00**															
6	Primary attainment in 1985-1995	**0.67**	**0.87**	**0.91**	**0.71**	**0.60**	**1.00**														
7	Secondary attainment in 1985-1995	**0.79**	**0.97**	**0.87**	**0.96**	**0.84**	**0.79**	**1.00**													
8	Tertiary attainment in 1985-1995	**0.78**	**0.83**	**0.71**	**0.80**	**0.99**	**0.58**	**0.83**	**1.00**												
9	Primary enrollment in 1985-1995	**0.37**	**0.63**	**0.73**	**0.53**	0.11	**0.77**	**0.59**	**0.35**	**1.00**											
10	Secondary enrollment in 1985-1995	**0.74**	**0.90**	**0.83**	**0.83**	**0.36**	**0.81**	**0.92**	**0.68**	**0.65**	**1.00**										
11	Tertiary enrollment in 1985-1995	**0.24**	**0.53**	**0.45**	**0.36**	**0.33**	**0.51**	**0.43**	**0.38**	**0.44**	**0.70**	**1.00**									
12	Government educational expenditure per primary pupil, 1985-1995 (1985 PPP US$)	**0.80**	**0.69**	**0.56**	**0.77**	**0.26**	**0.46**	**0.78**	**0.88**	**0.21**	**0.61**	0.18	**1.00**								
13	Government educational expenditure per secondary pupil, 1985-1995 (1985 PPP US$)	**0.33**	0.16	0.09	**0.30**	0.12	0.12	**0.37**	**0.58**	-0.13	0.10	-0.09	**0.64**	**1.00**							
14	Pupil-teacher ratio at primary school, 1985-1995	**-0.50**	**-0.58**	**-0.55**	**-0.47**	**-0.22**	**-0.54**	**-0.54**	**-0.49**	**-0.31**	**-0.57**	**-0.36**	**-0.47**	-0.17	**1.00**						
15	Repetition rate at primary school, 1985-1995	**-0.45**	**-0.45**	**-0.50**	**-0.41**	**-0.33**	**-0.45**	**-0.41**	**-0.31**	-0.06	**-0.48**	**-0.30**	**-0.32**	-0.10	**0.63**	**1.00**					
16	Repetition rate at secondary school, 1985-1995	**-0.24**	**-0.23**	**-0.26**	-0.09	-0.10	**-0.31**	-0.11	-0.10	-0.11	**-0.23**	-0.18	-0.08	0.05	**0.46**	**0.68**	1.00				
17	Drop-out rate at primary school, 1985-1995	**-0.47**	**-0.46**	**-0.45**	**-0.54**	-0.12	**-0.41**	**-0.56**	**-0.31**	**-0.21**	**-0.60**	**-0.22**	**-0.45**	**-0.29**	**0.38**	**0.44**	**0.24**	**1.00**			
18	Number of school days per year at primary school. , 1985-1995	-0.11	-0.12	-0.05	-0.08	-0.09	0.01	-0.04	-0.11	-0.09	-0.09	-0.06	-0.12	-0.10	**0.28**	0.05	0.05	-0.03	**1.00**		
19	Test scores, 1969-1991	**0.46**	**0.67**	**0.59**	**0.57**	**0.27**	**0.65**	**0.65**	**0.36**	**0.49**	**0.69**	0.21	**0.41**	0.23	**-0.41**	**-0.26**	-0.05	**-0.67**	-0.14	**1.00**	
20	Gini of educational attainment, 1985-1995	**-0.76**	**-0.89**	**-0.88**	**-0.73**	**-0.29**	**-0.96**	**-0.85**	**-0.65**	**-0.69**	**-0.84**	**-0.31**	**-0.60**	**-0.42**	**0.72**	**0.52**	**0.32**	**0.55**	0.08	**-0.63**	**1.00**

Table 2: Descriptive Statistics

Variable	Whole Sample		By Settler Mortality		By Population Density in 1500		Good endowments		Bad endowments	
	Observations	Average	Above Median	Below Median	Above Median	Below Median	Belong to group	Do not belong	Belong to group	Do not belong
Schooling Variables										
Primary Enrolment in 1900	76	17.6	**10.7**	**25.8**	**7.1**	**24.9**	15.8	24.4	**16.6**	**38.6**
Average years of education in 1985-1995	69	4.6	**3.3**	**5.9**	**3.2**	**5.7**	**4.2**	**5.7**	**4.4**	**8.3**
Average years of primary education in 1985-1995	61	3.2	**2.3**	**4.1**	**2.5**	**3.8**	3.1	3.8	**3.2**	**5.0**
Average years of secondary education in 1985-1995	61	1.3	**0.7**	**1.7**	**0.9**	**1.5**	1.2	1.4	**1.1**	**2.8**
Average years of higher education in 1985-1995	61	0.3	0.4	0.3	0.1	0.5	0.2	0.6	0.3	0.5
Primary attainment in 1985-1995	58	66.5	**51.7**	**78.6**	**55.8**	**74.2**	**64.0**	**76.4**	66.3	83.2
Secondary attainment in 1985-1995	58	29.7	**17.7**	**39.0**	**22.3**	**35.3**	29.2	33.2	**27.9**	**56.4**
Tertiary attainment in 1985-1995	58	6.7	**2.3**	**10.1**	**3.1**	**9.9**	7.8	5.3	**5.7**	**20.0**
Primary enrollment in 1985-1995	76	89.8	**80.1**	**99.7**	**80.5**	**96.3**	**84.1**	**104.0**	88.8	105.3
Secondary enrollment in 1985-1995	76	42.4	**29.3**	**56.6**	**31.8**	**50.4**	**38.3**	**54.8**	**40.1**	**78.3**
Tertiary enrollment in 1985-1995	75	8.7	**5.3**	**12.7**	**5.6**	**11.5**	**7.5**	**12.7**	**8.5**	**14.9**
Government educational expenditure per primary pupil, 1985-1995 (1985 PPP US$)	68	326.0	**201.5**	**442.5**	**176.6**	**450.9**	330.2	345.7	**280.7**	**868.6**
Government educational expenditure per secondary pupil, 1985-1995 (1985 PPP US$)	68	711.8	826.8	646.5	679.9	716.4	778.1	612.2	**685.6**	**1134.2**
Pupil-teacher ratio at primary school, 1985-1995	74	37.1	**41.6**	**32.4**	39.6	36.0	37.5	35.0	**37.6**	**28.0**
Repetition rate at primary school, 1985-1995	70	14.0	**17.7**	**10.3**	13.9	15.4	14.9	11.0	**14.5**	**6.6**
Repetition rate at secondary school, 1985-1995	60	11.2	12.6	9.7	10.9	11.7	11.3	10.3	11.5	7.3
Drop-out rate at primary school, 1985-1995	71	32.6	37.0	28.2	31.4	34.9	34.7	37.2	**35.0**	**7.0**
Number of school days per year at primary school. , 1985-1995	74	197.7	199.3	196.6	198.4	197.7	197.1	200.0	197.9	197.7
Test scores, 1969-1991	47	38.0	35.2	39.9	**34.0**	**39.4**	**36.2**	**42.1**	**36.4**	**51.4**
Gini coefficient of educational attainment, 1985-1995	44	46.8	**53.3**	**43.3**	**56.0**	**41.4**	48.8	40.5	47.5	35.9

Continuation Table 2: Descriptive Statistics

Variable	Whole Sample		By Settler Mortality		By Population Density in 1500		Good endowments		Bad endowments	
	Observations	Average	Above Median	Below Median	Above Median	Below Median	Belong to group	Do not belong	Belong to group	Do not belong
Colonial Variables										
Log of Settler Mortality	76	4.7	-	-	**5.1**	**4.5**	4.8	4.3	**4.8**	**2.9**
Log of Population Density in 1500	72	0.5	**1.0**	**0.01**	-	-	0.6	0.1	**0.6**	**-1.5**
European Population in 1900	73	0.15	**0.05**	**0.26**	**0.03**	**0.25**	0.17	0.11	**0.13**	**0.41**
Good Endowments	72	0.7	0.6	0.8	**0.9**	**0.6**	-	-	0.7	0.7
Bad Endowments	72	0.8	0.8	0.8	0.8	0.8	0.8	0.9	-	-
Several Indigenous Ethnic groups	75	0.33	0.23	0.38	0.40	0.29	**0.39**	**0.14**	0.33	0.15
Catholic	72	40.1	33.4	46.4	**21.2**	**54.6**	38.6	46.3	41.0	29.2
Muslim	72	22.3	25.0	19.7	**42.9**	**7.8**	**28.7**	**7.7**	22.5	19.7
Other (Non-Protestant) Religion	72	25.9	26.8	25.1	29.9	22.7	23.9	30.5	24.8	38.1
British	76	0.37	0.34	0.41	0.42	0.26	0.34	0.45	0.34	0.67
French	76	0.28	**0.46**	**0.08**	0.36	0.23	0.32	0.14	0.27	0.17
Spanish	76	0.24	**0.09**	**0.41**	**0.09**	**0.38**	0.24	0.27	0.27	0.00
Institutional Variables										
Democracy in 1900	76	1.1	**0.1**	**2.2**	**0.3**	**1.9**	**1.6**	**0.2**	**1.0**	**3.3**
Democracy, 1985-1995	59	4.4	**2.8**	**6.1**	**2.6**	**5.9**	4.3	5.2	4.4	5.7
Gastil Index, 1985-1995	59	0.53	**0.39**	**0.64**	**0.38**	**0.64**	0.52	0.59	**0.51**	**0.73**
Decentralization, 1985-1995 (normalized index)	69	0.03	**-0.27**	**0.26**	-0.06	0.04	0.05	-0.05	0.06	-0.18
Decentralization, 1900	76	1.15	**1.00**	**1.31**	1.09	1.22	**1.23**	**1.00**	1.20	1.00
Protection against Government Expropriation	64	6.5	**6.0**	**7.1**	6.4	6.6	6.6	6.7	**6.4**	**8.4**
Middle Class Share in 1900	21	0.41	**0.46**	**0.40**	0.43	0.40	0.41	0.41	0.41	0.45
Middle Class Share	66	0.44	0.44	0.45	0.45	0.43	0.44	0.44	**0.44**	**0.49**
Log Per-Capita GDP 1985	75	7.57	**7.13**	**8.08**	**7.08**	**7.92**	**7.41**	**8.09**	**7.50**	**8.97**
Log Per-Capita GDP 1995	76	8.00	**7.50**	**8.57**	**7.46**	**8.40**	**7.86**	**8.49**	**7.90**	**9.64**

Table 3: Persistence of Schooling

Independent Variable	Primary Enrollment in 1900	R^2	Number of Observations
Dependent Variable			
Average years of education in 1985-1995	0.09 (0.01)	0.63	69
Secondary attainment in 1985-1995	0.64 (0.06)	0.62	58
Secondary enrollment in 1985-1995	0.84 (0.07)	0.54	76
Government educational expenditure per primary pupil, 1985-1995	14.61 (2.87)	0.64	68
Repetition rate at primary school, 1985-1995	-0.18 (0.03)	0.20	70
Drop-out rate at primary school, 1985-1995	-0.43 (0.06)	0.21	71
Test scores	0.18 (0.04)	0.21	47
Gini coefficient of educational attainment, 1985-1995	-0.51 (0.05)	0.58	44

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 4: Determinants of Schooling, Historical Variables

Panel A									
Dependent Variable	Average years of education in 1985-1995			Secondary enrollment in 1985-1995			Government educational expenditure per primary pupil, 1985-1995		
	Coeff.	R^2	N	Coeff.	R^2	N	Coeff.	R^2	N
European population in 1900	8.32 (0.55)	0.60	67	72.52 (5.44)	0.43	73	1320.23 (281.51)	0.57	65
Democracy in 1900	0.62 (0.09)	0.34	69	5.08 (0.89)	0.21	76	120.56 (29.55)	0.50	68
Decentralization in 1900	2.61 (0.56)	0.25	69	22.70 (5.80)	0.17	76	527.13 (80.77)	0.39	68
Middle Class Share in 1900	-2.97 (10.44)	0.00	21	-85.31 (100.65)	0.02	21	3896.53 (3102)	0.05	21

Note: White-robust standard errors are in parentheses. Constant is not reported.

Panel B				
Dependent Variable	European population in 1900	Democracy in 1900	Decentralization in 1900	Middle Class Share in 1900
Log of settler mortality	-0.07 (0.02)	-0.90 (0.25)	-0.11 (0.05)	-0.02 (0.01)
Log of population density in 1500	-0.09 (0.01)	-0.52 (0.19)	-0.13 (0.05)	0.00 (0.00)
"Good endowments"	0.76 (0.11)	6.87 (1.59)	0.89 (0.45)	0.02 (0.01)
"Bad endowments"	-0.26 (0.13)	-2.93 (1.84)	-0.13 (0.44)	-0.09 (0.04)
R^2	0.68	0.52	0.31	0.34
Number of Observations	71	68	68	21

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 5: Determinants of Schooling, Reduced Form Estimates

Panel A				
Dependent Variable	Primary Enrollment in 1900			
Log of settler mortality	-0.08 (0.02)	-0.05 (0.02)	-0.03 (0.02)	-0.02 (0.02)
Log of population density in 1500	-0.06 (0.01)	-0.07 (0.01)	-0.03 (0.01)	-0.05 (0.01)
"Good endowments"	0.66 (0.12)	0.66 (0.13)	0.30 (0.09)	0.44 (0.10)
"Bad endowments"	-0.22 (0.14)	-0.19 (0.10)	-0.13 (0.08)	-0.14 (0.07)
British colony	-	0.17 (0.06)	-	0.11 (0.06)
French colony	-	-0.04 (0.05)	-	-0.02 (0.05)
Spanish colony	-	-0.01 (0.06)	-	0.03 (0.09)
Catholic population in 1900	-	-	-0.005 (0.001)	-0.004 (0.001)
Muslim population in 1900	-	-	-0.005 (0.001)	-0.004 (0.001)
Other (Non-Protestant) religion population in 1900	-	-	-0.006 (0.001)	-0.005 (0.001)
R^2	0.55	0.67	0.84	0.79
Number of Observations	68	68	68	68

Note: White-robust standard errors are in parentheses. Constant is not reported.

Continuation Table 5: Determinants of Schooling, Reduced Form Estimates

Panel B									
Dependent Variable	Average years of education in 1985-1995			Secondary enrollment in 1985-1995			Government educational expenditure per primary pupil, 1985-1995		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log of settler mortality	-1.13 (0.20)	-0.78 (0.19)	-1.05 (0.19)	-12.66 (2.25)	-10.09 (2.15)	-12.02 (2.33)	-124.46 (48.93)	-122.55 (48.67)	-135.06 (44.49)
Log of population density in 1500	-0.64 (0.13)	-0.65 (0.13)	-0.45 (0.12)	-4.40 (1.64)	-4.76 (1.42)	-3.41 (1.69)	-110.80 (35.58)	-146.01 (35.53)	-116.20 (35.47)
"Good endowments"	2.48 (1.17)	2.30 (1.71)	2.19 (1.19)	18.19 (4.35)	12.43 (12.46)	17.73 (10.81)	962.01 (308.28)	998.35 (253.28)	783.98 (353.41)
"Bad endowments"	-1.47 (0.90)	-1.84 (0.76)	-1.69 (0.72)	-10.91 (4.90)	-10.70 (4.93)	-9.89 (6.01)	-618.98 (334.51)	-408.92 (272.58)	-420.06 (343.01)
British colony	-	1.59 (0.86)	-	-	23.02 (7.17)	-	-	152.57 (147.24)	-
French colony	-	-0.44 (0.77)	-	-	5.73 (6.86)	-	-	-18.45 (146.33)	-
Spanish colony	-	0.94 (0.87)	-	-	13.74 (6.60)	-	-	-316.21 (152.75)	-
Catholic population	-	-	-0.03 (0.02)	-	-	-0.35 (0.22)	-	-	-1.06 (5.32)
Muslim population	-	-	-0.04 (0.02)	-	-	-0.38 (0.21)	-	-	-7.94 (4.81)
Other (Non-protestant) religion population	-	-	-0.02 (0.03)	-	-	-0.23 (0.29)	-	-	-9.66 (6.09)
R^2	0.63	0.70	0.68	0.54	0.62	0.59	0.55	0.69	0.65
Number of Observations	63	63	63	68	68	68	61	61	61

Note: White-robust standard errors are in parentheses. Constant is not reported.

Continuation Table 5: Determinants of Schooling, Reduced Form Estimates

Panel C			
Dependent Variable	Average years of education in 1985-1995	Secondary enrollment in 1985-1995	Government educational expenditure per primary pupil, 1985-1995
Log of settler mortality	-0.41 (0.12)	-4.21 (1.93)	-49.64 (37.28)
Log of population density in 1500	-0.25 (0.10)	-0.30 (1.56)	-76.98 (31.11)
"Good endowments"	2.07 (1.10)	13.78 (3.79)	925.16 (309.82)
"Bad endowments"	-0.43 (0.86)	-0.20 (4.34)	-529.37 (340.23)
Log of Per-Capita GDP	1.95 (0.28)	21.45 (2.68)	181.29 (62.42)
R^2	0.81	0.79	0.61
Number of Observations	63	68	61

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 6: Determinants of Schooling in 1900, Structural Estimates

Dependent Variable	Primary Enrollment in 1900		
Democracy in 1900	5.66 (1.14)	-	-
Decentralization in 1900	-	33.97 (10.41)	-
Middle class share in 1900	-	-	1.28 (5.05)
British colony	10.02 (9.24)	5.31 (6.91)	1.60 (7.40)
French colony	1.23 (7.46)	1.80 (6.07)	-12.22 (12.04)
Spanish colony	-4.43 (9.22)	22.40 (12.920	3.38 (7.13)
Catholic population	-0.002 (0.001)	-0.007 (0.001)	-0.009 (0.002)
Muslim population	-0.004 (0.001)	-0.006 (0.001)	-0.011 (0.001)
Other (Non-protestant) religion population	-0.004 (0.001)	-0.006 (0.001)	-0.011 (0.001)
F-Test (p-value)	0.00	0.00	0.00
Number of Observations	68	68	21
Overidentification-Test (p-value)	0.50	0.92	0.98

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 7: Determinants of Schooling in 1985-1995, Structural Estimates

Panel A					
Dependent Variable	Democracy, 1985-1995	Civil Liberties, 1985-1995	Decentralization, 1985-1995	Middle Class Share, Easterly	Middle Class Share, Dollar-Kraay
Log of settler mortality	-1.39 (0.35)	-0.09 (0.02)	-0.21 (0.09)	-0.01 (0.01)	-0.01 (0.01)
Log of population density in 1500	-0.85 (0.18)	-0.07 (0.01)	-0.14 (0.06)	0.01 (0.01)	0.01 (0.01)
"Good endowments"	6.32 (0.98)	0.48 (0.07)	2.00 (0.32)	0.04 (0.04)	0.03 (0.04)
"Bad endowments"	0.87 (1.23)	0.01 (0.09)	-0.36 (0.35)	-0.06 (0.05)	-0.06 (0.05)
R^2	0.48	0.54	0.27	0.12	0.11
Number of Observations	62	57	61	55	61

Note: White-robust standard errors are in parentheses. Constant is not reported.

Panel B			
Dependent Variable	Average Years of Schooling, 1985-1995		
Democracy, 1985-1995	0.27 (0.16)	-	-
Civil Liberties, 1985-1995	-	5.40 (2.08)	-
Decentralization, 1985-1995	-	-	1.17 (0.27)
British colony	1.34 (1.06	0.95 (0.97)	1.19 (0.80)
French colony	0.46 (1.09)	-0.01 (1.01)	0.01 (0.82)
Spanish colony	0.16 (1.68)	0.14 (1.64)	2.38 (1.14)
Catholic population	0.00 (0.03)	-0.01 (0.03)	-0.07 (0.04)
Muslim population	-0.01 (0.02)	-0.01 (0.02)	-0.06 (0.03)
Other (Non-protestant) religion population	-0.00 (0.02)	-0.01 (0.02)	-0.06 (0.03)
Log of Per-Capita GDP	1.61 (0.38)	1.40 (0.30)	1.31 (0.21)
F-Test (p-value)	0.00	0.00	0.00
Number of Observations	55	54	53
Overidentification-Test (p-value)	0.00	0.00	0.26

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 8 Determinants of Schooling in 1900: Using Different Instruments

Panel A		
Dependent Variable	Decentralization	Democracy
"Several native cultures at colonization"	0.32 (0.14)	0.69 (0.52)
Log of settler mortality	-0.10 (0.05)	-0.87 (0.24)
Log of population density in 1500	-0.12 (0.04)	-0.50 (0.19)
"Good endowments"	0.77 (0.37)	6.61 (1.05)
"Bad endowments"	-0.15 (0.37)	-2.98 (1.82)
R^2	0.40	0.54
Number of Observations	68	68

Note: White-robust standard errors are in parentheses. Constant is not reported.

Panel B	
Dependent Variable	Primary Enrollment in 1900
Democracy	3.45 (0.98)
Decentralization, 1900	6.55 (5.21)
British colony	5.92 (7.43)
French colony	0.49 (6.47)
Spanish colony	3.14 (10.02)
Catholic population	-0.004 (0.001)
Muslim population	-0.005 (0.001)
Other (Non-protestant) religion population	-0.005 (0.001)
F-Test (p-value)	0.00
Number of Observations	68
Over identification test (p-value)	0.31

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 9: Determinants of Schooling in 1985-1995: Using Different Instruments

Panel A				
Dependent Variable	Decentralization	Democracy	Civil Liberties	Log of GDP
"Several native cultures at colonization"	0.59 (0.27)	0.49 (0.85)	0.49 (0.85)	-0.12 (0.21)
Log of settler mortality	-0.16 (0.09)	-1.36 (0.30)	-1.36 (0.30)	-0.39 (0.07)
Log of population density in 1500	-0.13 (0.06)	-0.84 (0.19)	-0.84 (0.19)	-0.26 (0.05)
"Good endowments"	1.78 (0.22)	6.18 (1.07)	6.18 (1.07)	-0.14 (0.16)
"Bad endowments"	-0.42 (0.27)	1.50 (1.10)	1.50 (1.10)	-0.55 (0.21)
Terms of trade shocks	0.06 (0.46)	-0.99 (1.45)	0.00 (0.10)	0.68 (0.28)
R^2	0.37	0.54	0.54	0.71
Number of Observations	54	56	56	61

Panel B		
Dependent Variable	Average Years of Schooling, 1985-1995	
Democracy, 1985-1995	0.05 (0.14)	-
Civil Liberties, 1985-1995	-	0.54 (2.39)
Decentralization, 1985-1995	0.89 (0.47)	0.92 (0.53)
British colony	1.58 (0.95)	1.34 (0.90)
French colony	0.57 (0.97)	0.25 (0.82)
Spanish colony	2.04 (1.64)	2.39 (1.71)
Catholic population	-0.04 (0.03)	-0.05 (0.03)
Muslim population	-0.04 (0.02)	-0.04 (0.02)
Other (Non-protestant) religion population	-0.03 (0.02)	-0.03 (0.02)
Log of Per-Capita GDP	1.47 (0.23)	1.47 (0.23)
F-Test (p-value)	0.00	0.00
Number of Observations	51	51
Over identification test (p-value)	0.51	0.51

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 10: Primary enrollment, 1960-1995

Dependent Variable	Primary Enrollment			
Democracy, 1985-1995	3.55 (0.85)	3.38 (1.59)	-	
Civil Liberties, 1985-1995	-	-	52.83 (10.68)	53.73 (25.12)
Decentralization, 1985-1995	-	-2.84 (7.18)	-	-3.32 (7.39)
Log of Per-Capita GDP	12.61 (2.41)	14.38 (8.31)	11.06 (2.73)	12.73 (3.65)
Number of Observations	47	44		43
Over-identification test (p-value)	0.20	0.29	0.19	0.34

Note: White-robust standard errors are in parentheses. Constant is not reported.

Table 11: Robustness Checks:

Panel A: Primary enrollment in 1900						
Democracy, 1900	12.30 (4.31)	17.10 (7.93)	8.18 (0.68)	11.21 (3.16)	10.18 (3.19)	8.99 (2.73)
Decentralization, 1900	-	-46.99 (43.13)	-	-18.88 (17.32)	-	-5.37 (10.64)
Log GDP, circa 1870	-	-	-	-	-5.55 (17.21)	1.82 (13.43)
Sample/ Number of Observations	Excluding Neo-Europes/ 64	Excluding Neo-Europes/ 64	Without imputing data/54	Without imputing data/54	68	68

Note: White-robust standard errors are in parentheses. Constant is not reported.

Panel B: Average Years of Schooling, 1985-1995				
Democracy, 1985-1995	-	-0.05 (0.63)	-	-0.01 (0.20)
Decentralization, 1985-1995	1.07 (0.41)	0.76 (0.41)	1.19 (0.29)	1.03 (0.61)
Log Per-Capita GDP	1.19 (0.25)	1.23 (0.20)	1.19 (0.23)	
Sample/ Number of Observations	Excluding Neo-Europes/46	Excluding Neo-Europes/46	Barro-Lee dataset/44	Barro-Lee dataset/44

Note: White-robust standard errors are in parentheses. Constant is not reported.

Panel C: Average Years of Schooling, 1985-1995				
Democracy, 1985-1995	-	-	0.16 (0.15)	0.05 (0.18)
Formal Decentralization, 1985-1995	1.86 (1.02)	-	0.59 (0.64)	-
Local Democracy, 1985-1995	-	2.06 (0.58)	-	1.83 (0.86)
Log Per-Capita GDP	1.96 (0.37)	1.82 (0.25)	1.93 (0.44)	1.71 (0.24)
Number of Observations	59	53	55	50

Note: White-robust standard errors are in parentheses. Constant is not reported.