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Colonisation, School and Development in Africa An empirical analysis

Denis COGNEAU

COLONISATION, SCHOOL AND DEVELOPMENT IN AFRICA AN EMPIRICAL ANALYSIS

Denis Cogneau
DIAL – UR CIPRÉ de l'IRD
cogneau@dial.prd.fr

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RESUME

En combinant des données macro-économiques sur 45 pays et des données micro-économiques sur 4 pays comparables, nous révélons l'existence de différences entre les niveaux d'éducation atteints en Afrique selon l'identité du colonisateur. En 1960, les ex-colonies britanniques affichaient une performance éducative supérieure. Ces différences sont robustes au contrôle de certains facteurs pré-coloniaux et ont persisté dans le temps jusqu'en 1990. Cependant, le différentiel d'éducation ne s'est pas transformé en différences de revenu ou d'espérance de vie. Les ex-colonies françaises se sont urbanisées plus rapidement. Les données micro-économiques sur les pays d'étude montrent bien que les rendements privés de l'éducation tendent à être moins élevés dans les ex-colonies britanniques.

ABSTRACT

Macroeconomic data on 45 countries are combined with microeconomic data on 4 case-study countries to reveal significant differences in the levels of education attained under the different colonial powers in Africa during the colonial period. In 1960, former British colonies exhibited higher educational performance. These differences are robust to the control of some pre-colonial factors and have persisted over time until 1990. However, the education differential did not give rise to either income per capita or life expectancy differentials. Urbanisation occurred at a faster rate in the former French colonies. Microeconomic data for the case-study countries show indeed that private returns to education tend to be lower in the former British colonies.

Key Words : Colonisation, Schooling, Development, Growth, Africa.

JEL Classification: N37, O40, P51

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1. Introduction¹

Recent economic papers highlight the influence that colonisation and its characteristics have had on national institutions and subsequently the countries' economic development paths following independence. However, they diverge as to the respective influence of the colonial power's identity and the colonised region's characteristics. One set of papers concludes that the colonial power's identity is the deciding factor, because of the strong effect it would have had on the efficiency of the countries' legal systems. It maintains that the British common-law system and the Protestant influence fostered the construction of a modest and efficient government, whereas French civil law² and the Catholic influence fostered a development-impeding interventionist government (La Porta et al., 1998 and 1999).³ A second series of papers places the emphasis on the colonies' initial characteristics, notwithstanding the colonial power's identity. In regions with poor health conditions where it was hard for Europeans to settle, the colonial powers would have favoured unstable private property rights (Acemoglu, Johnson and Robinson, 2001). In regions initially rich in profitable natural resources, they would have set up profit-extracting highly inequitable institutions (Sokoloff and Engerman, 2000). Both factors handicapped long-run human and physical capital accumulation, resulting in some "reversals of fortune" over the last four centuries (Acemoglu, Johnson and Robinson, 2002).

This paper also looks at the respective influences of the colonial power and initial conditions on development paths. It concentrates on Africa and on the differences between the former British colonies and the former French colonies. This intra-continental comparative analysis has a number of advantages. Firstly, it checks for common geographical, biological and anthropological features in the African countries. Secondly, the timing if not the reasons behind the European colonial takeover was pretty much the same for all countries, which means that the length and the historical period of colonial rule can be controlled for. Fol-

¹I would like to thank the DELTA-DIAL-ENSAE-INRA(LEA) and EDOCIF seminars participants, especially Jean-Pierre Cling, Sylvie Lambert and Thomas Piketty for their valuable comments. The usual disclaimer applies.

²The authors place the label French Origin on not only France and former French colonies, but also on the Latin-influenced countries (Spain, Portugal and Italy) and the Netherlands and its former colonies.

³We focus on the econometric work. Acemoglu et al (2000) trace the legal system argument back to von Hayek. Even though Weber (1978) is often cited in support of this type of argument, he actually emphasises capitalism's ability to adapt (pp. 891-892).

lowing the slave trade in the seventeenth and eighteenth centuries, Europeans quickly and completely invaded the African continent. The “Scramble for Africa” (Pakenham, 1991) was concentrated in the last quarter of the nineteenth century. The continent’s formal decolonisation again came about late and swiftly, mainly around 1960. Thirdly, bitter territorial competition between the European powers resulted in a more balanced sharing out of the continent, which was set in stone by a number of treaties in the last few years of the century and only changed for the former German colonies after the First World War (Brunschwig, 1972; Weseling, 1991; and Pakenham, 1991). The fact that the sharing of the continent among European countries was more balanced than in America or Asia facilitates a satisfactory econometric identification of the effect of the colonial power’s identity.

A comparison of situations in the former British and French colonies at the time of their independence in 1960 provides information on the differential impact of British and French colonial policies. A comparison of the same countries thirty years later, in 1990, identifies the extent to which the differences resulting from colonial rule persisted. This paper sets out to econometrically identify these cross-sectional differences, by taking into account a number of relevant factors that prevailed at the time of the colonial carve-up, such as the spread of Islam, ethnic fragmentation, health conditions and natural resources. This paper is also innovative in that it compares macroeconomic indicators with similar variables drawn from representative microeconomic surveys of large household samples. Given that processing and comparing microeconomic databases is such a long-winded task, we confine our study to four countries that appear to be sufficiently comparable and representative of British and French colonisation in Sub-Saharan Africa: Cote d’Ivoire, Ghana, Madagascar and Uganda. Cote d’Ivoire and Ghana (former Gold Coast) are of two neighbouring countries with a large number of similarities. We hence accord them special attention.

The former British and French colonies were fairly similar from the point of view of a large number of economic and institutional variables in 1960. For instance, they were equally poor and life expectancy was equally low. These similarities continued through to 1990. In contrast, we found that the populations in the British colonies had a higher average level of education in 1960, and we show that this advantage persisted if not increased through to 1990. This educational difference is important since, in most cases aside from North Africa, the European colonisers introduced reading and writing into societies using oral communication. However, this educational advantage did not result in higher growth in the former

British colonies. This finding adds to the questions about the role of education in growth raised by Pritchett (2001) and Bils and Klenow (2000), among others.

The second section of this paper presents the econometric methodology used and makes some comments about some related previous papers. Section 3 documents the former British colonies' educational advantage and proposes some historical explanations for it. Section 4 looks at income and standards of living and raises the question of returns to education in Africa.

2. Identifying the consequences of colonisation

Recent economic research on development gaps focuses on separating out the effects of (i) intangible geographic factors (distance to the equator, climate, access to the sea and soil quality), (ii) historically determined institutions (language, religion, legal and judicial systems, and political regimes), and (iii) economic policies (trade, monetary and fiscal policies). These three factors are obviously not independent. Location can influence institutions, with the institutions affecting policy implementation and success rates, and policy performance determining institutional change. Nevertheless, there is now a consensus that development gaps are due less to differences in capital accumulation and educational attainment than to the institutions that organize the use of economic resources (Hall and Jones, 1999), regardless of the emphasis placed on any of these three factors.

Empirical studies that endeavour to explain development differences come up against the central econometric question of the endogeneity of the explanatory variables. The problem generally⁴ consists in estimating the following equation:

$$Y_i = f(X_i, D_i) + u_i \quad (2.1)$$

where for each country i , Y is an outcome variable (like for instance the per capita GDP or the average level of education), X is a control variables vector, D a treatment variable (here the colonial power's identity) whose effect we want to evaluate, and u an unobserved variable containing the effect of all other factors determining Y but also possibly X or D . The absence of independence between (X, D) and u introduces a bias into the naive estimators of $E(Y|D, X)$.

If it can be assumed that African regions were relatively randomly shared among the colonial powers, then whatever the outcome variable Y , and for the

⁴In this formulation, the effects of the observables and unobservables are assumed to be additively separable. While this is a usual assumption in econometrics, it is not necessary in the case of the matching estimators considered hereafter.

coloniser's identity D , u is independent of D . The dividing up of Africa may be considered to be a "natural experiment" whereby different colonial policies were applied in statistically similar regions in terms of geography and anthropology. However, there is reason to believe that the matching of African regions to colonial powers was determined by the balance of power between the European nations and each of their objectives and/or by each African region's specific comparative advantages. For instance, a given colonial power might have succeeded in gaining the more profitable regions with the most natural resources, as asserted by Chamberlain and Lord Salisbury on the British side, or the regions with the most acceptable health conditions and climate for Europeans. Some colonial powers might have succeeded in avoiding the more resistant pre-colonial societies, settling in regions initially more open to trade or societies more likely to be converted to Christianity. All of these selection elements could have in turn influenced the African countries' educational attainments.

Consider, for instance, a dummy variable D which takes the value of 1 if the country was colonised by the British and the value of 0 if not.⁵ Then, assume that this colonial partition was based on a vector of observable variables S and unobservable variables v :

$$D_i = 1 \text{ if } S_i\gamma - v_i \geq 0 \quad (2.2)$$

$$D_i = 0 \text{ if not} \quad (2.3)$$

This vector S should hence include all the factors that could have governed the partition: health and climatic conditions, richness in natural resources, population density, existence of an organized government, access to the sea, the penetration of Islam and initial ethnic fragmentation. Those factors that directly influenced Y and can be observed can be included in X .

Correctly estimating the effect of D on Y calls for additional hypotheses concerning u and v .

A first, somewhat intuitive solution is found in the matching estimators introduced by Rubin. It consists in assuming that the colonial partition was based on the S variables alone. For instance, the colonial powers might not have had a larger information set than S for the different African regions. This assumption

⁵Hereinafter, we restrict our analyses to the case of a dichotomous treatment variable. This case is not perfectly suited to our subject, since the Scramble for Africa was made by more than two colonial powers. Lechner (2000) extends the matching estimators introduced by Rubin to more than two types of mutually exclusive treatments. His proposal has yet to be applied in later work, but we believe that it would have little effect on our findings.

produces the following ‘conditional independence’ hypothesis:

$$\Pr(D = 1|Y_0, Y_1, S) = \Pr(D = 1|S) = P(S) \quad (2.4)$$

where Y_0 (resp. Y_1) is the observed outcome in the absence (resp. presence) of treatment D .

The method then consists in comparing countries that are similar in terms of the S vector, but which were colonised by different European countries. Rosenbaum and Rubin (1983) show that it is sufficient to match countries with similar probabilities of being colonised by the same colonial power, i.e. countries with a similar ‘propensity score’ $P(S)$. The difference between outcomes Y_0 and Y_1 observed for countries with similar propensity scores $P(S)$ provides information on the effect of the colonial power’s identity.⁶ One of the main advantages of matching estimators lies in the fact that they do not call for supplementary hypotheses regarding the functional form of f or the distribution of u and v . Their main drawback is that they disallow the possibility of selection by unobservables.

A second solution is then provided by the parametric selection models introduced by Heckman. Nevertheless, the method calls for a specification of the functional form of f and the distribution of unobservables u and v .⁷ Usual specifications are a linear model for Y ⁸, and a bidimensional normal distribution for (u, v) :

$$Y_i = X_i\beta + \alpha D_i + u_i \quad (2.5)$$

$$(u, v) \rightsquigarrow N(0, \Sigma) \quad (2.6)$$

Here again, S and X may be either identical or different⁹.

⁶The S and X vectors may be identical or different. Heckman, Ichimura and Todd (1998) propose a matching procedure for the case of an exogenous X , drawing on the relation between Y and X using local non-parametric regressions as well as the differences between S and X . Where X is endogenous, some instruments Z have to be found for X . Subsequently, either all these instruments can be introduced into S or the Heckman, Ichimura and Todd estimator can be used for the reduced model relating Y and Z . For the sake of simplicity, the first solution was chosen (all instruments Z included in S).

⁷Lewbel (2002) proposes a semi-parametric estimator of this kind of model, which uses a continuous large support auxiliary variable V influencing D without influencing Y . This estimator could be used in later work.

⁸In this case, the relation between Y and X no longer depends on D . This hypothesis could be relaxed by writing a Roy-type shifting model. However, this would give rise to a fairly large number of parameters to be estimated compared with the size of the sample.

⁹However, in order to limit the weight of the parametric identification hypothesis, we dictate

None of the recent studies of the role of the colonial power's identity considers the non-random nature of the matching between colonial powers and colonised regions or the potential endogeneity of the control variables. In La Porta et al. (1999), Y is an indicator of the quality of government services and X contains the spread of the major religions, latitude and even per capita GNP, which is clearly endogenous. When such highly different colonies as the USA, Peru, India and Cote d'Ivoire are compared, the list of potentially relevant characteristics explaining development differences is extremely long: available natural resources, organisation of the pre-colonial societies and economies, length and type of colonial rule, etc. For instance, the former colonies that have caught up with Western Europe are all former British colonies (USA, Canada, New Zealand, Australia, Hong Kong and Singapore). Is this fact indicative of the quality of British colonial rule or of the dynamism of Protestants as entrepreneurs? Or does it mean that England, as the dominant European political and economic power in the eighteenth and nineteenth centuries, occupied the regions with the best conditions for capitalist development?¹⁰ Acemoglu et al. (2000) explain the contemporary level of per capita GDP (Y) by the contemporary rating of expropriation risks (X), and instrument the latter variable using the mortality rate for European settlers at the beginning of the nineteenth century. They then add dummy variables for the colonial power's identity to this basic equation. Once the fact that the British more frequently colonised low mortality regions is taken into account, the colonial power's identity no longer appears to be a determinant of national income. Their findings should, however, be more qualified by explicitly modelling the colonial partition of the world. A paper by Brown (2000) is even closer to our subject of study. Brown uses pooled panel data on 33 countries in Sub-Saharan Africa from 1960 to 1985 to run four separate regressions relating the gross rates of primary and secondary enrolment to per capita GDP for the two sub-samples of former French colonies and former British colonies. For each level of per capita GDP, he finds that the former British colonies have higher primary enrolment rates and lower secondary enrolment rates than the former French colonies. However, the obvious endogeneity of GDP to schooling and other features of his econometric

that S contains one or more variables excluded from X . Where X is endogenous, it may be replaced by its instruments Z (reduced model).

¹⁰Besides, the sample bias may sometimes be drastic. In La Porta et al. (1998), Kenya, Zimbabwe and South Africa are the only African countries included in the "English [legal] origin" countries, while the "French [legal] origin" countries include no African country except for Egypt (!). This latter group is mainly made up of former Spanish colonies in Latin America.

method raise many doubts about his findings. A paper by Bertocchi and Canova (2002) also focuses on Africa and correlates an indicator of the colonial power's identity with growth of GDP per capita and other variables like the investment-output ratio in 1960 and the percentage of working age population in secondary school in 1960. Their results give an advantage to former British colonies on those three variables. Like Brown, they however do not control for pre-colonial conditions or settlement colonisation. In particular, they make no special case for such colonies as South Africa, or for the South African dependencies (and former British dominions) Lesotho and Swaziland they put at the same level than other countries, which tends to overestimate the former British colony advantage.

This paper uses the two methods described above, i.e. matching estimators and selection models, to obtain robust findings concerning the influence of the colonial power's identity on the development paths of African countries. It shows that the corrections made, especially by incorporating some exogenous control variables such as the spread of Islam and European settlement conditions, considerably alter the naive estimation of this influence.

2.1. Pre-colonial conditions, colonial partition and education

We put together a sample of 45 Sub-Saharan African countries, comprising 15 former British colonies, 18 former French colonies, 10 other former colonies (Belgian, Spanish, Italian and Portuguese), Liberia and Ethiopia. The sample excludes Lesotho, Swaziland and Djibouti as well as small islands such as Cape Verde, Comoros, Mauritius, Mayotte and Seychelles. Among the countries first colonised by the Germans, Cameroon and Togo were divided between Britain and France, the smaller British parts having been incorporated respectively into Nigeria and Gold Coast (Ghana). In 1961, the southern part of formerly British Cameroon voted in a referendum to unite with French Cameroon, and these two parts were definitively united as a republic in 1972. German Eastern Africa was also split between British Tanganyika, merged on independence with Zanzibar (former British protectorate) to form Tanzania, and the much smaller Portuguese Mozambique. Somalia remained split between Italy and Britain until 1961 and was therefore not classified as a former British colony. Namibia, former German South Western Africa, passed in 1921 under the control of the South African Union which was a British dominion, and as such we classified it as former British. Classification variations for these seven countries do not affect our findings.

In addition to the colonial power's identity, three control variables are consid-

ered that could have directly influenced the effect of colonial policies on education. The first two concern the initial anthropological conditions found by the different colonial powers: the penetration of Islam and the extent of ethnic fragmentation. The third covers the conditions of colonial rule and differentiates settlement colonies from pure extractive colonies: the proportion of Europeans living in the countries in 1900. Table 1 shows how a satisfactory instrumentation strategy identifies these pre-colonial conditions. It also shows the differences between former British, French and other colonies with respect to our set of exogenous instrumental variables.

From the tenth to the nineteenth century, Islam gradually spread through North Africa to the West and South of the Sahara and then along the Red Sea and the northern coast of the Indian Ocean (Curtin et al., 1995, pp. 76-81). Islam probably had a huge effect on the colonial mark made on education. Firstly, Koranic schools offered an alternative to the schooling provided by missionaries and the colonial administrations. Secondly, the missions were more reluctant to set up in regions with a majority of Muslims (see Gifford and Weiskel, 1971, pp. 689-690). Even today, majority Muslim regions often lag behind in school infrastructures. Last but not least, Muslim cultures tended to place restrictions on the education of girls. Obviously, the current proportion of Muslims in each country has in turn been influenced by the spread of Christian-based education, with this reverse causality raising an endogeneity problem. Yet, as shown in the first column of Table 1, the distance to North Pole correlated with the pre-colonial spread of Islam forms a good instrument for the current proportion of Muslims.

A high level of ethnic fragmentation is potentially indicative of the absence of a strong pre-colonial government (with its own educational policy), and initial linguistic dispersion¹¹ may have handicapped indigenous language teaching. At the same time, the colonial powers often used the ‘Divide and Rule’ strategy, and today’s ethnic fragmentation is at least partly due to colonial classifications (Horowitz, 2000, pp. 147-166). The second column of Table 1 shows that today’s ethnic fragmentation index is negatively correlated to the distance to the equator, and positively correlated to the distance to the North pole and the country’s arable land area. Three factors could explain the non-linear effect of latitude. First, Neolithic Bantu migrations from the north to the south of the intertropical

¹¹The variable we use (from Parker, 1997) is available without missing values for the 45 countries in our sample. It estimates the proportion of the majority ethnic group in the population. For a sub-sample of 40 countries, this variable is negatively correlated to the 1960 Atlas Narodov Mira variable used by Easterly and Levine (1997), with a correlation coefficient of 0.827.

zone (Curtin et al., 1995, pp. 15-27; Diamond, 1997) may have intensified this fragmentation. Second, the thick forests of the inter-tropical zone also probably prevented populations from mixing and kept ethnic groups isolated. Third, the early integrating power of Islam and Arab colonisation in North Africa may have curbed ethnic fractionalisation. As regards the effect of the arable land area, the larger the country the higher the probability of finding a large number of diverse human groups. Herbst (2000) stresses the impact of this variable on the governments' ability to exercise their authority and control in sparsely settled regions.

European settlement colonisation was keenly shaped by prevailing pre-colonial mortality and health conditions, as shown by Acemoglu et al. (2001) for a world-wide sample of former colonies. Table 1, column 3 confirms their finding for African countries. Moreover, the proportion of European settlers in 1900 is closely correlated with the current listed number of mineral resources in the country. However, the direction of the causality between these two variables is hard to interpret. This factor also had a strong influence on the length of railway lines built through to 1925 and 1960 (see Table 10).¹² Among other investments, European settlement probably generated more investment in school infrastructures, either for the settlers' children or to upgrade African manpower.

The last two columns in Table 1 show that France more frequently colonised Islamised regions, as may be deduced from the strong influence of the distance to the North Pole. However, all the colonial powers seem to have come across societies with similar degrees of ethnic fragmentation.¹³ Britain colonised countries with less humidity than other countries and especially France, setting up living conditions more conducive to European settlement. Last but not least, France more frequently ruled regions with both a slightly lower pre-colonial¹⁴ population density and a slightly lower arable land size.

Other unobservable factors could obviously have escaped our notice. For in-

¹²The proportion of European settlers in the 1900 population is taken from Acemoglu et al. (2001), and originates from Mac Evedy and Jones (1978). The current listed number of minerals is taken from Parker (1997). Its correlation with European settlement in 1900 is +0.698. Railway line lengths in 1925 are provided by Mitchell (2001). Their correlation with European settlement in 1900 is even stronger at +0.843.

¹³Moreover, there is no mention of any difference of this kind in the histories of colonisation that we have read (Wesseling, 1991; Pakenham, 1991; Newbury, 1999).

¹⁴Like Acemoglu et al. (2002), we used the population estimates for the year 1500 given by Mac Evedy and Jones (1978). In some countries, the slave trade which began after 1500 had a very strong impact on demographic growth.

stance, given their Indirect Rule principle, the regions colonised by the British could have had more structured governments, such as in the examples of Ghana (Asante kingdom) and Uganda (Ganda kingdom). Conversely, given their assimilationist ideal, the French could have avoided such structured administrations, with Madagascar (Merina kingdom) and Benin (Dahomey kingdom) being exceptions to the rule. Here again, the histories of colonisation do not mention any difference of this kind. The British in Gold Coast, like the French in Madagascar, had to fight to impose their domination. We nevertheless use Heckman estimators to endeavour to purge the data from unknown selection factors.

3. The colonial mark on education

3.1. The quantity of education received by the population during the colonial period

The closest indicator we have found for the quantity of education received by the population during the colonial period is the average number of years of schooling for the population aged 15-60 in 1960. Two databases contain this variable, the first in Barro and Lee (1996) and the second in Cohen and Soto (2001) for a smaller sample of countries. As Cohen and Soto's work uses population census findings to limit extrapolations of missing data, we give preference to their estimates, rounding them out with Barro and Lee's data for countries not in their sample. When direct census information is not available,¹⁵ the variable is constructed based on time series of pupils by level, demographic series by age and estimates of dropout and repeated year rates (see Cohen and Soto, *op. cit.*, pp.11-18). For the years from 1950 to 1960, enrolment figures are taken from UNESCO Statistical Yearbooks. For the years before 1950, some enrolment figures are taken from Mitchell (2001). Where data is missing for the period before 1950, the assumption is that net intakes were the same as in 1950 (Cohen and Soto, p. 26). In the case of Africa, some extremely large measurement errors obviously result from the available data and the extrapolations made, especially for the years before 1950. Furthermore, 13 countries in our sample have no data at all available for this variable. It would hence be risky to draw a conclusion about colonial educational policies from such an imperfect statistical indicator. We therefore use three other variables in the form of the literacy rate in 1970 and the gross primary

¹⁵Cohen and Soto use census data for less than one third of the African countries after 1960 (see pp. 28-29).

and secondary enrolment rates in 1960. As with the average years of schooling, the literacy rate is a stock variable that applies to the adult population. Yet it represents as much the quantity as the quality of the education provided. The other two variables are flow variables, constructed as the ratio of the number of enrolled pupils at a given level to the size of the theoretical age bracket. They do not take into account the length of curricula variations and they ignore repeated year and dropout rate differentials.

The first column of Table 2 hence shows that, in 1960, the population aged 15 to 60 in the former British colonies received on average one and a half year's more schooling than their counterparts in the former French colonies and other countries. Given the low level of these human capital indicators, this also means that the average number of years of schooling was approximately twice as high in the former British colonies. Based on a slightly broader sample, Table 2 also shows that the former British colonies had a literacy advantage of 10 to 20 points in 1970. The differences are much fuzzier for the primary and secondary enrolment rates, where the effect of British colonisation still appears to be positive, but fairly insignificant.¹⁶

This observation could mean that certain non-British colonies had caught up part of their enrolment lag for the 1960 school-age generations. Nevertheless, bear in mind that these indicators do not measure the number of years of actual schooling for individuals in each level and even less the quality of the education. We will subsequently show that it could be said that the educational systems in the former British colonies prompted a greater number of pupils to complete full schooling with fewer repeated years (see also Mingat and Suchaut, 2000).

For each of these four variables, the second columns of each panel show the GMM estimate for a model introducing the three colonial partition variables discussed in the previous section next to the colonial power's identity. In keeping with the developments in this section, these variables are instrumented by the distance to the North Pole, the distance to the equator, the arable land area and colonial settlers' mortality (see Table 1). Table 2 shows that these three variables have a significant influence on the schooling indicators. In all cases, the penetration of Islam and ethnic fragmentation have a negative effect¹⁷ on the quantity of education received, while the presence of European settlers in 1900 has a positive

¹⁶Even if gross enrollment rates may be higher than 100% due to out of age school attendance it is not the case in our sample, and rate variables lie between 0 and 100%. Transformation by a $\ln(x) - \ln(100 - x)$ type of function alters none of the findings for the rate variables.

¹⁷Except in the case of the secondary enrolment rate, where Islam has a positive effect.

effect. The introduction of these three variables narrows the differences between the former British and former French colonies. For example, the difference between these two types of colonies falls from 1.3 to 0.8 for the number of years of education and from 20 points to 12 points for literacy. These decreases are explained in the main by the fact that the French more frequently colonised already Islamised regions. A secondary explanation is the fact that the British more often set up settlement colonies. This finding underscores the importance of checking the differences observed between colonisers against the conditions prevailing at the start of colonisation.

The estimators presented in tables 3 and 4 take a step further in this regard by setting out to directly control for the endogeneity of the colonial partition. They first use a reduced model in which the three control variables in Table 2 are replaced by their instruments, i.e. by variables representing the pre-colonial conditions. Model (2.1) is hence rewritten as follows:

$$Y_i = g(Z_i, D_i) + u_i \quad (3.1)$$

Estimator (OLS) and estimator (SEL) each consider a linear version of this model:

$$Y_i = Z_i\delta + \alpha D_i + u_i \quad (3.2)$$

Columns (OLS) represent the ordinary least squares estimate of the linear reduced model. As the colonial power's identity is always assumed to be exogenous, the estimator is relatively close to the structural estimator in Table 2. Estimator (SEL) makes a Heckman correction to the selection biases, whereby the British colonisation dummy variable is considered to follow the probit model in Table 1. Lastly, the (MB) and (MnB) estimators are Rubin matching estimators, here again using the probit model in Table 1 as the propensity score. Estimator (MB) corresponds to the effect of British colonisation on the countries actually colonised by the United Kingdom (treatment effect on the treated). Estimator (MnB), on the other hand, corresponds to the effect of British colonisation on the non-colonised countries (treatment effect on the non-treated). Each of these four estimators is calculated for the entire sample (British vs. All) and for a sample limited to just the British and French colonies (British vs. French).

As regards the point estimation, all the estimators indicate that British colonisation had a positive effect on the average number of years in education in 1960 and on literacy in 1970 (Table 3). This effect is generally significantly different to

zero, even though the confidence intervals are fairly large. The estimator based on a selection-by-unobservables model provides the least accurate estimates and finds a very small difference in the number of years of education between the former British colonies and the other countries. British colonisation most often appears to have a positive effect on the rates of primary and secondary enrolment in 1960,¹⁸ but again less significant than for stock variables. The ratio of the two rates is indicative of the graduation flows from primary to secondary education. A high ratio indicates a more open secondary system and also greater selectivity within the primary system. Contrary to Brown (2000), we hence find that the secondary system is more open in the former British colonies (last panel of Table 4).

Microeconomic data on a few countries provide a striking illustration of this section’s general finding (Table 5). We used the surveys available to us to class non-migrant men by their age when their country gained independence.¹⁹ The two former British colonies, Ghana and Uganda, differ markedly from the two former French colonies, Cote d’Ivoire and Madagascar, especially as regards the oldest generations born in or before the 1940s. Madagascar developed occasional primary schooling the earliest, and the Merina kingdom is known to have had a schooling policy before French colonisation in the late nineteenth century. Yet this advantage does give rise to a high proportion of individuals completing primary school and disappears completely at the secondary level compared with the two former British colonies. Ghana and Uganda had higher completion of primary education rates and higher rates of graduation from primary to secondary school. Ghana is by far the most well-equipped country as regards secondary education. These historical microeconomic statistics are in perfect keeping with the number of pupils recorded by Mitchell’s historical statistics (2001), reproduced in Table 6, for both Ghana’s overwhelming advantage and Uganda and Madagascar’s intermediate positions.

3.2. Colonial education policies

Colonial policies hence seem to explain a large part of the schooling differences observed between the former British colonies and the other countries. The British

¹⁸Excepting for the selection estimators which give negative albeit insignificant effects.

¹⁹As the surveys were conducted from 1985 to 1994, the enrolment estimates we obtain are admittedly affected by differential mortality at the oldest ages. However, this bias should affect all the countries in the same way.

distinctiveness seems able to be linked to its attitude as regards Protestant missions and the principles behind its settlement and Indirect Rule policies. In settlement colonies such as South Africa and Zimbabwe (formerly South Rhodesia), we have already seen that the proportion of European settlers in 1900 directly and positively influenced the quantity of education observed in 1960. In the other colonies, the Indirect Rule doctrine also entailed certain forms of segregation, e.g. in terms of land rights (Le Bris et al. 1982, pp. 76-80). However, the British set up a large number of primary schools even in colonies that were not settlement colonies, especially between the two wars and despite the 1930s depression, using the Education Department's grant-in-aid system to subsidise Protestant missions (Gifford and Weiskel, op. cit., pp. 701-703). Secondary education was then propelled forward as of 1945, driven by the growth in primary education and popular African demand and despite the settlers' reserves. Contrary to Brown's findings (2000), the data on the British colonies does not suggest a particular bias against secondary education, any more than an elitist bias on the French side, since the secondary enrolment rates were higher in the former British colonies in 1960 (and in 1990). Even before 1945, the British side had a larger number of secondary schools and universities: "*British West Africa was a special case. Primary education, left up to the missionaries, was taught in the vernacular language in keeping with the principles of Indirect Rule (hence the importance of the language work by the Protestant missionaries).*"²⁰ *Each territory had several secondary schools and there were three higher education establishments in West Africa alone: Fourah Bay in Sierra Leone (established in 1877)*²¹, *Achimota College in Gold Coast and Yaba Higher College in Lagos (established in 1934). This density was remarkable, especially since the only other teacher training establishments in Black Africa were Liberia College in Monrovia (1833), the William Ponty School in French West Africa*²², *Makerere College in Uganda (1933, formerly a technical college, established as a university in 1939), the Kenya Teacher Training College (1939) and the Overtown Institution in Khondove founded by the Livingstonia*

²⁰Gifford and Weiskel (op. cit., p. 699) note that the promotion of vernacular languages by the British missionaries often consisted of combating the spread of Arabic.

²¹Sierra Leone's society of educated Creoles had a considerable effect on the spread of the press and education in Gold Coast and Nigeria. See T. C. McCaskie (1999) pp. 670-672 and Gifford and Weiskel (1971) p. 681.

²²Name taken in 1916 by the *Ecole Nationale d'Instituteurs* established in West French Africa in 1903, successor to the *Collège des Fils des Chefs et des Interprètes* set up in Saint-Louis in 1893 on the premises of the former *Ecole Spéciale pour les Otages* (1861).

*Mission in 1894*²³ (Coquery-Vidrovitch and Moniot, 1974, pp. 199-200, my own translation). This generated the emergence of an educated class of junior technicians, primary school teachers and self-employed professionals who were, at the same time, excluded from attaining the power retained by the traditional leaders. The Indirect Rule doctrine did not generate political autonomy any faster than elsewhere (Cell, 1999), since self-government was viewed merely as an extremely remote prospect.²⁴ The question could be asked as to whether this more generous education policy was not sanctioned precisely because education provided no rights to power. This policy also included its own inherent contradiction, which started to appear between the two wars (Gifford and Weiskel, op. cit.). The new educated elite excluded from the colonial power launched a dynamic press in the nineteenth century and was behind the nationalist movements that took power following independence.

Historians consider that the French initially relied more on the military for colonisation, whereas British colonisation relied more on missionaries and traders (Wesseling, op. cit.). These different methods suggest that the French colonial power tended more frequently to challenge the pre-colonial government structures and possibly the positive influence they might have had on the demand for schooling. More importantly, however, the Dreyfus affair and the separation of the Church from the State had direct repercussions on French educational policy in the colonies from the beginning of the twentieth century (Gifford and Weiskel, op. cit., pp. 674-675). Gifford and Weiskel list four basic features of this policy: (i) uniformity of language, (ii) free of charge, (iii) secularity, and (iv) the connection with the demand for staff for the administration. The obligation to provide education in the French language is mentioned by many authors, such as Brown (2000), as one of the main reasons for the lag in the development of teaching in the colonial period. Nevertheless, vernacular language schooling by Catholic missionaries in the Belgian colonies (Manning, p. 165) does not appear to have generated much better results. Moreover, although schooling in the French language might

²³Contrary to what is suggested by Coquery-Vidrovitch, British West Africa (Gambia, Ghana, Nigeria and Sierra Leone) does not appear to have a particular advantage over East Africa (Uganda, Kenya, Tanzania, Malawi and Zambia). Both the Cohen and Soto indicator and Mitchell's statistics find that Kenya, for example, was at the same level as Ghana in both 1960 and 1990.

²⁴In this regard, Young draws on Churchill's opinion of Kenya in 1922 and on the vision of Indirect Rule put forward by one of its main theorists and practitioners, Lugard, proconsul of Nigeria. See Young, 1994, p. 170. Herbst moreover considers that Indirect Rule was only really applied in Nigeria from the point of view of common land rights. See Herbst, op. cit., p. 196.

have hindered the development of primary education, it should have made it easier to graduate from primary to secondary education, where the colonial power's language was the rule in all cases. Yet nothing of the sort happened (see the above analysis of the secondary and primary enrolment rates ratio). More generally, Gifford and Weiskel point out that English-speaking historians tend to espouse the caricature of a French assimilation doctrine summed up by the expression, "Our ancestors the Gauls ...",²⁵ whereas the question of adapting textbooks and courses to local realities was raised repeatedly in the National Education system (Gifford and Weiskel, op. cit., pp. 666-669).²⁶ However, on both the French and British side, this concern to adapt textbooks and courses was quite often in keeping with racist ideologies and broke with some initial enthusiasm for assimilation (Gifford and Weiskel, op. cit., p. 690). In addition to the language issue, the French secular state primary schools almost certainly grew less in number than the subsidised Protestant missions in the British colonies. Providing education free of charge called for high budgetary costs. The lack of expatriate primary school teachers and the small contingent of locally trained primary school teachers (the only teacher training college was in Dakar) doubtless limited the development of education and helped maintain the gap between the former French and former British colonies. "*The separation of the Church from the State meant that the missionary schools played a much smaller role (5,000 pupils in French West Africa and barely over 1,000 in French East Africa as opposed to 20,000 in the Gold Coast alone in 1920) on French-occupied soil (except in the mandates with a strong German missionary tradition). There were eight middle schools (1,000 pupils) and only two secondary establishments, both in Senegal. This colony, or the four communes to be more precise, benefited from the efforts in the nineteenth century and remained extremely advantaged with one-quarter of the school population for only 12% of the total French West African population in 1938*"²⁷ (Coquery-Vidrovitch and Moniot, op. cit. p. 200). The lack of primary school teachers and administrative staff was particularly acute during and after the First World War and during the 1930s depression and the Second World War.

²⁵Taken from a famous book published in 1937: W.B. Mumford and Major G. St. J. Orde-Brown, *Africans Learn to be French: A Review of Educational Activities in the Seven Federated Colonies of French West Africa, Based Upon A Tour of French West Africa and Algiers Undertaken in 1935*.

²⁶Manning (1988) mentions the case of the reading book "Mamadou et Beneta" developed in Dakar, p. 166.

²⁷Yet at the end of the day, in 1960, Senegal was no different from the other French colonies such as Cote d'Ivoire and Benin.

The French assimilation policy was ultimately reserved for a small “advanced” elite integrated into the colonial system and to whom the French subsequently passed on the power (Bancel, 2002). For similar reasons to the British model, the fact that French education provided better prospects could also have resulted in a less generous state education policy.

In the other colonies, especially the Belgian and Portuguese colonies, the investment in education was even lower than under the French colonial administration, even though missionaries partially offset the shortfall in State action. These colonial powers were the ones that converted the populations under their control the most to Christianity,²⁸ as shown by Table 7. Enrolment rate differences hence strikingly reflect the colonial power’s identity and policy choices. British policy was long content to develop education that provided no prospects for power, satisfying a goal to “civilise” without breaking with segregation and combining missionary action with government action. French policy observed slower “educational assimilation” and was highly reticent about missionary action. This policy satisfied a “modernisation” goal without breaking with paternalism. The other colonial powers merely left the bulk of the educational load up to the missionaries, fulfilling primarily an evangelisation goal.

3.3. Persistent differences in 1990

The persistence of a difference over time, from 1960 or 1970 through to 1990, forms a second piece of evidence of the effect of the colonial power’s identity. Tables 8 and 9 apply the table 3 and 4 estimates to 1990 data. They show that the former British colonies do indeed continue to hold the advantage. Over the thirty years following independence, the former French colonies did not catch up in human capital terms at all.²⁹ This observation is upheld when the literacy rate and the gross primary enrolment rate are considered, even though, as with 1960, greater uncertainty affects the estimators for this latter variable for reasons already mentioned. The gross secondary enrolment rate differentials widened, as did the primary to secondary graduation rate differences (ratio of the two rates),

²⁸“*In the Belgian Congo, for instance, the predominance of the Catholic Church in primary education was one of the main reasons why that country became overwhelmingly Catholic.*” (Manning, op. cit., p. 166).

²⁹The current econometric practice is to measure a country’s human capital as the exponential of the number of years of schooling, in keeping with microeconomic theory (e.g. see Bils and Klenow, 2000). One year’s difference hence always represents a 100% deviation in human capital, regardless of the levels concerned.

which were higher in 1990 than in 1960. The two groups of colonies hence tend to diverge in terms of total human capital, mainly on the secondary education side. These average observations obviously do not mean that all the former non-British colonies were less successful with their education policies than all the former British colonies. For example, the post-independence educational effort made by Cote d'Ivoire during its major period of economic growth is clearly in evidence in the microeconomic data (Table 5). At the secondary school level, this country managed to catch up with and then largely outstrip Uganda, but still remained far behind neighbouring Ghana. The difference between the two leading countries occupied by the two colonial powers in West Africa is more than one year of schooling, as it is for the average of the countries in the sub region.

Mingat and Suchaut (2000) dedicate a large part of their book to studying the deviations existing between English-speaking countries and French-speaking countries in terms of the primary system's coverage rate. They attribute these deviations to one main cause: the level of unit costs. In the data they gather for 1970 to 1990, teachers' wages do indeed appear to be much higher as a percentage of GDP in the former French colonies than in the former English colonies. Consequently, for a given level of government investment, the additional cost prompts a rationing of the number of primary school teachers and schools and the number of pupils per class is hence also higher in the French-speaking countries. We are obviously unable to check whether this explanation was applied during the colonial period, but briefly, it is probable that the budgetary cost of a primary school teacher sent from France or even trained in Dakar was higher than the cost of the subsidy paid by the British government to the missionary schools under the grant-in-aid system and higher than that of a primary school teacher trained in the local colleges.³⁰ As found by Mingat and Suchaut, the wage level for primary school teachers is nonetheless determined by the general level of wages in the modern sector and by the returns to education in this sector. We will come back to this point in the last section of this paper. The weight of the French assimilation policy probably contributed to establishing a long-term nominal wage standard set in relation to French wages rather than proportional to the country's own financing capacities.³¹ In the French franc zone countries, this standard was

³⁰Gifford and Weiskel (op. cit., p. 707) find a large deviation between the wages paid to primary school teachers and those paid to secondary school teachers and university professors in the former British colonies for the 1950-1960 decade. It would be interesting to check whether the deviations were smaller on the French side.

³¹La Porta et al. (1999) show that the level of public wages (as a percentage of per capita

fostered by the currency's fixed parity with the French franc. In the countries outside the French franc zone, however, recurring currency devaluations starting in the late 1970s prompted a wage adjustment regardless of the countries' colonial origin.³² Moreover, the principle of equal pay also came into play as regards the skilled African managerial class (the French “*évolués*” elite) who worked with many European expatriates in the administrations and companies. Hence Gifford and Weiskel attribute the high level of wages for African teachers in the 1960s to the presence of a large number of European expatriates in the universities (p. 708). The wage and modern-job setting and distribution methods, much like the relations between the public and private sectors, were at the heart of the African countries' political economy and helped define a particular style of development and management of distribution conflicts for each group of countries. This is probably where a large part of the explanation is to be found for the persistence of colonial differences in the thirty years following independence. As we will see, the educational differences found are not reflected by significant development deviations (level of per capita GDP and life expectancy), but primarily by different returns to this education.

4. The colonial mark on development and returns to education

4.1. The colonial investment and the populations standard of living

In addition to schooling, the colonial power's “modernisation” was also at work in another important area: transport infrastructures. The top part of Table 10 shows that, here again, the British colonial power had the advantage over the French. In 1960, the French colonial power had built fewer kilometres of railways and roads. The road difference persisted in 1990. However, as pointed out by Herbst (2000, pp. 159-170), these differences are small albeit significant. A more general, albeit less accurate, indicator of the total stock of capital per worker³³ also gives an average advantage to the former British colonies, but the phenomenon's variance

GDP) does actually tend to be higher in the “French legal origin” countries. Nevertheless, the authors do not explore the causes and repercussions of this observation in enough detail (see the following section).

³²On this point, see, for example, Cogneau (2000), pp. 111-114.

³³We do not present the stock estimated in 1960, which depends too much on the assumptions made to construct it. Nevertheless, the finding is similar.

totally outweighs the average difference. The estimates made by Frankel (1969) for 1936 do not appear to suggest that the British colonies (excluding the South African Union) had a higher stock of capital per capita than the average found in the other regions.³⁴

Nevertheless, the fact remains that we could have expected the cumulative educational and infrastructure advantages in the former British colonies to result in a labour productivity gap or in a total factor productivity gap. The bottom part of Table 10 shows that this is not the case at all. In 1960, GDP per worker was actually some 25% higher in the former French colonies than in all the other colonies, especially the former British colonies. The nature of this initial difference remains to be seen, given the measurement errors that affect this type of indicator such as different national accounting methods inherited from the colonial period and/or a higher level of administrative and tax registration on the French side. In 1990, the former British colonies appeared to have caught up with the former French colonies in terms of labour productivity. A study of an even smaller sample suggests that the colonial power's identity did not influence overall factor productivity at all in 1990.

Table 11 presents the same sort of comparisons, this time using two direct indicators of the populations' standards of living in the form of per capita GDP and life expectancy at birth. Using the same database (Summers and Heston, 1991), the observable per capita GDP differences expressed in terms of purchasing power parities are the same as those observed for labour productivity. In 1960, the former French colonies held on to their positive advantage, but its significance was low. The life expectancy at birth variable was measured using a larger sample calling for less cautiousness. This variable gives a slight advantage to the former British colonies in 1960, with an average difference of 1.5 years compared with the former French colonies. Nevertheless, here again the variable's variance outweighs the average difference. We found a deviation of the same magnitude, albeit statistically fairly insignificant, between the two groups of countries for 1990 once we had controlled for the prevalence of the HIV epidemic, which was greater in the former British colonies.³⁵ From 1960 to 1990, the two groups of countries posted similar

³⁴See Coquery-Vidrovith and Moniot, *op. cit.*, p. 206. The data available for the French colonies are underestimated, since they are limited to companies listed on the stock exchange.

³⁵This difference in the prevalence of the AIDS epidemic takes in a large number of hitherto fairly unclear factors regarding the geographic origin of the epidemic and its propagation vehicles. Cogneau and Grimm (2002) show that the risk of infection in Ivory Coast is positively correlated to the level of education.

growth and gained four additional years of life expectancy on average compared with the other types of colonies. Hence in 1990, as with the monetary standard of living, the main observable difference was between the former British and French colonies on the one side and the other countries on the other.

Last but not least, Table 12 presents a comparative analysis of the urbanisation rates in 1960 and 1990. Certain economists consider this variable to be a basic indicator of the level of development. For example, it is used by Acemoglu et al. (2002) to identify the “major reversal” in worldwide development following European colonisation. The regions that were the least urbanised in 1500 saw their urbanisation rate shoot up while the most urbanised regions entered periods of decline or stagnation. Nevertheless, their analysis excludes the African continent, for which historical urbanisation data are particularly hard to reconstitute. The analysis made here shows that the level of urbanisation in 1960 varied positively with the number of European settlers in 1900, the age of oldest town³⁶ and the existence of a coastline (access to the sea). However, it was independent of the colonial power’s identity, in the same way as per capita GDP and life expectancy. In keeping with the trends of these other variables over the 1960-1990 period, the former British and French colonies were also more urbanised than the other African countries in 1990. This said, the former French colonies were significantly more urbanised than their British counterparts. The ten-point average urbanisation deviation between these two groups is considerable and greater than that which separates the former British colonies from the other countries. The magnitude and significance of this deviation is confirmed by estimating a first difference model, which purges the estimate of the existence of unobservable set effects.³⁷ The former French colonies hence had both the lowest population density (Table 1) and a population more concentrated in the towns. Administrative centralisation inspired by the French government system was behind the concentration of business, wealth and infrastructures (including education) in the towns and especially in the capitals. In the French franc zone, the high level of wages also helped stimulate the urban economy, attracting many migrants to settle in the

³⁶These two variables are instrumented respectively by settlers’ mortality rates in the 19th century and by the distance to the North Pole (Mediterranean and the Red Sea) and the distance to the equator.

³⁷The estimation of parametric and non-parametric treatment models, as in the last section, also confirms the existence of this difference. Moreover, the finding is not altered by excluding the control variables (proportion of European settlers, access to the sea, age of the oldest town and oil reserves).

towns.³⁸ We can actually check that income dualism between agriculture and the other sectors, as measured by the Bourguignon and Morrison indicator (1998), was greater in the former French colonies in 1990 (Table 12, last column). The devaluation of the CFA franc partially changed this state of affairs. Moreover, there was no difference between the two types of colonies in terms of the proportion of the employed labour force working in the agricultural sector. This means that the non-agricultural activities were more often situated in rural areas in the former British colonies and linked to the urban markets by slightly denser road infrastructures.

4.2. Returns to education

Modern growth econometrics typically calculate the macroeconomic returns to education in keeping with the microeconomic estimates derived from human capital theory (see, for example, Cohen and Soto, 2001). We hence usually estimate the effect of an additional year of education on labour productivity at 10% to 20% for less developed countries, with the marginal return tending to decrease with the population's average level of education (Bils and Klenow, 2000). In the case of the African countries, however, it is hard to reconcile this postulate with the observation. This is because we would expect to observe this same deviation of 10% to 20% between the former British and former French colonies in terms of GDP per worker. Following the example of Pritchett (2001), we wondered, in this case, "Where did the returns to education go in the former British colonies?"

Table 13 uses the case of Cote d'Ivoire, Ghana, Madagascar and Uganda to illustrate the differences in microeconomic returns to education between former French and former British colonies. We considered the level of education variable in Table 5 to have a linear effect, by assigning each individual three years of schooling for each level attained. This was to be able to present findings comparable with other studies (in particular, Schultz, 1999). We then constructed a work experience variable in the same way by subtracting six years and the number of years of schooling calculated from the individual's age. We then used the ordinary least squares method to estimate a Mincer standard gain equation for declared monthly wages³⁹ and for the population of male non-foreign heads of household

³⁸Madagascar and Guinea are hence atypical of the former French non-landlocked colonies, with urbanisation rates of just 25% in 1990.

³⁹I would like to thank Constance Torelli for helping me to construct these data. They include cash bonuses, but exclude bonuses in kind and housing and transport perks for comparability reasons. In those countries where all the bonuses were available (Ivory Coast and Ghana), the

aged 25 and over (top part of Table 13). We then estimated the same type of gain equation for per capita consumer expenditure in those households with designated heads. The returns to education hence estimated are much higher in the two former French colonies than in the two former British colonies, regardless of the variable considered. The two wage extremes are Cote d'Ivoire and Ghana, already analysed by Schultz. We find the same result as Schultz, with wage returns to education being three times lower in Ghana. One additional year of education secured a 20% higher wage on average in Cote d'Ivoire in the late 1980s as opposed to just 7% in Ghana in the early 1990s. It also pushed up per capita expenditure by 9% in Cote d'Ivoire as opposed to just 4% in Ghana.⁴⁰ The proportions of wage earners were virtually identical in the two countries,⁴¹ meaning that a larger number of educated individuals were excluded from this type of employment in Ghana. Hence the average number of years of education for wage earners was 2.6 times higher than the overall average in Cote d'Ivoire as opposed to only 1.5 times higher in Ghana (and in the other two countries). Combined with the high level of returns, this more selective access to the wage earning class resulted in an average wage level that was six times higher than per capita GDP in Cote d'Ivoire as opposed to only twice as high in Ghana (and also in the other two countries). This explains why Cote d'Ivoire was known as the “republic of good students”, based on the French “republic of teachers” model. This high level of average wages appears to be characteristic of the French franc zone (see Cogneau, 2000, *op. cit.*). For example, Madagascar came out of the French franc zone in 1975 and does not share this property.

Pritchett (2001) puts forward three factors liable to influence the observed productive returns to education: (i) the quality of the education, (ii) the existence of rent-seeking behaviour, and (iii) the demand for skilled labour. A quantitative growth in education could hence be accompanied by: (i) a drop in the average quality of learning (either by means of a drop in the quality of the supply or less selection of pupils), (ii) a spread of rent-seeking behaviour by the most educated players at the cost of creating productive activities, or (iii) skilled job supply stagnation resulting in a drop in the relative price of education on the labour market. Unfortunately, it is beyond our means to identify the weight of these three factors in the explanation of the differences in returns to education. For

definition of the wage variable did not change the finding in the slightest.

⁴⁰Quantile regressions on the median and the first and last deciles produce the same finding.

⁴¹27% of non-foreign men aged 25 and over, as shown by the comparison between staff numbers in the two gain equations.

example, we observed that the primary enrolment differences did indeed result in literacy differences. This observation shows the limits of the first argument (quality differences), which needs to be better specified with the construction of a real indicator of the effectiveness of primary schooling from the point of view of learning reading and writing. The rent-seeking argument entails viewing the effect of growth in education as the increase in the number of people sharing a set-sized pie. This argument could be applied especially to secondary and higher education. In the former British colonies in the 1965-1980 period, it could be said that the adoption of trade closedness policies and maintaining an overvalued exchange rate was in keeping with the desire to keep making profits on the access to imports and currencies. Similarly, the payment of high wages in the former French colonies was financed by taxing foreign trade and, in the case of the French franc zone, by the financing of large tax and external deficits by the French Treasury. As regards Pritchett's third argument, the absence of a significant capital stock difference (Table 9) and the identical weight of wage-earning employment in the four cases analysed (Table 13) suggests that the demand for skilled labour did not follow the rise in the number of educated workers, especially in the former British colonies. Here again, it would nonetheless be necessary to specify how the macroeconomic policies applied might have limited the increase in capital and how the colonial mark and initial quantity of education might have played their role in determining these policies.⁴² Last but not least, Pritchett's three arguments are not necessarily disconnected. In the absence of job creations, competition for access to modern wage-earning employment could actually be likened to sharing a set-sized pie. Murphy, Shleifer and Vishny (1991) propose a model in which a graduate has the choice between a productive activity and a rent-seeking activity. However, the existence of productive wage-earning jobs is itself conditioned by the creation of companies, to the extent that the crucial choice is definitely between company start-ups and rent seeking. This is also why the above-mentioned research on the legal and judicial systems focuses on the administrative obstacles to starting up a company and on capital funding.⁴³ Murphy, Shleifer and Vishny furthermore

⁴²The Barro, Mankiw and Sala-I-Martin model (1995) shows that the economies more open to international capital flows, such as the former French colonies belonging to the French franc zone, should have enjoyed a faster accumulation of physical capital (k) and an even faster accumulation of human capital (h). Yet the higher adjustment costs associated with the investment in human capital could have offset this advantage, resulting in a path parallel to the path of the former British colonies (a practically constant k/h ratio).

⁴³See La Porta et al., 1998, in particular. The civil law systems are said to hamper the development of the financial markets. This argument is challenged by Rajan and Zingales

posit that the quality of the education provided also plays a role, by comparing technical and scientific training, more conducive to company start-ups, with legal and literary training, more likely to prompt rent seeking.

Regardless of the colonial power's identity, independent Africa as a whole has hitherto lacked an investment and growth dynamic. It consequently seems inevitable that the growth in education would have prompted a sharp rise in competition between graduates for jobs and incomes. This extremely fierce competition could have taken a number of forms, more or less fair and more or less legal and transparent, in both the economic and political fields. Here again, regardless of the colonial power's identity, the national governments were seriously lacking in their ability to regulate either this competition or the competition for arable land (Herbst, 2000).

5. Conclusion

This empirical analysis shows that the colonial power's identity left its mark on the way schools were run in African societies, and that this mark was still there thirty years after independence. As regards the quantitative growth in primary education, the French free and secular education system set up right at the beginning of the twentieth century seems to have been less of a success than the British system based on a partnership between the missionaries and government. The Belgian and Portuguese systems relying completely on missionary work were no more of a success than the French system, save from the point of view of converting greater numbers of people to Christianity. The British were also more successful at satisfying the African demand for secondary education, whether in their settlement colonies, and despite the racial segregation associated with this settlement, or in their extractive colonies. French policy only allowed for a small elite to enter secondary and higher education and subsequently public service positions. The main reason for the failure of the French system is probably a shortfall in human and financial resources: a free-of-charge system doing without the missionary contribution was necessarily more expensive and hence limited in terms of its growth, especially after the First World War and during the 1930s depression and the Second World War. Moreover, the payment of high wages to primary and secondary school teachers and professors in the name of a principle

(2001), who show that market capitalisation was higher in France than in the United States in 1914 and that it was the shocks of 1914-1945 that had a lasting effect on the financial markets of continental Europe.

of equality and assimilation (equal work for equal pay) pushed these costs up further. It remains to be seen whether these higher wages resulted in better quality education. A comparison of the literacy rates suggests not, but more detailed analyses are called for in this regard. At any rate, the educational advantage in the former British colonies was not reflected in these countries' economic performances or in the populations' average standard of living. In both 1960 and 1990, the inhabitants of the former British colonies were no richer and had no longer life expectancy than their counterparts in the former French colonies. A study of the situation in four countries shows that the returns to education were significantly lower in the former British colonies in the early 1990s. Also of note is that the development paths of the other countries – former Belgian, Portuguese and Italian colonies and independent countries such as Ethiopia and Liberia – were less favourable than those of the former French colonies even though they had comparable education performances in 1960 and equally developed transport infrastructures. The wage and infrastructure policy of the former French colonies moreover gave rise to much faster urbanisation than in the two other groups of countries. However neo-colonial it may be, it is possible that the French franc zone institution could have offset the former French colonies' labour cost and educational distribution handicaps by providing macroeconomic stability.⁴⁴

There is nowhere in Africa that is actually anywhere close to having the conditions for education to be a source of growth and marked improvement in standards of living. As argued by Herbst (2000), one of the keys to the question is probably to be found in the governments' weakness and lack of legitimacy. The question as to whether the current democratisation processes can absorb this handicap remains to be answered (Robinson, 2002). Like La Porta et al. (1998 and 1999, *op. cit.*), we find that the colonial power's identity and own political philosophy do have an influence. This influence is to the British colonial power's advantage in terms of schooling, but we find that this advantage does not give rise to other indicators of welfare, in contrast with the results obtained by Bertocchi and Canova (2002). Moreover, like Acemoglu et al. (2001 and 2002, *op. cit.*), we confirm the decisive influence of European settlement colonisation on the development of schooling and economic performances, not forgetting the disastrous ethical consequences of this colonisation in all cases. Racism was the dominant ideology among the European colonisers despite any moderating effect that liberal, egalitarian or Christian philosophies may have had.

⁴⁴Herbst defends this point of view, see Herbst, *op. cit.* pp. 220-223.

References

- [1] Acemoglu D., S. Johnson, J.A. Robinson, 2001, The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*, 91(5), 1369-1401
- [2] Acemoglu D., S. Johnson, J.A. Robinson, 2002, Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution, *Quarterly Journal of Economics*, 117(4), 1231-1294.
- [3] Brown D.S., 2000, Democracy, Colonization, and Human Capital in Sub-Saharan Africa, *Studies in Comparative International Development*, 35(1), 20-40.
- [4] Bancel N., 2002, La voie étroite: la sélection des dirigeants africains lors de la transition vers la décolonisation, *Mouvements*, n°21-22, 28-40.
- [5] Barro R. J., N. G. Mankiw, X. Sala-I-Martin, 1995, Capital Mobility in Neoclassical Models of Growth, *American Economic Review*, 85(1), 103-115.
- [6] Barro R.J., J.W. Lee, 1996, International Measures of Schooling Years and Schooling Quality, *American Economic Review (Papers and Proceedings)*, 86(2), 218-23
- [7] Bertocchi G., F. Canova, 2002, Did colonization matter for growth? An empirical exploration into the historical causes of Africa's underdevelopment, *European Economic Review*, 46(10), 1851-1871.
- [8] Bils M., P. J. Klenow, 2000, Does Schooling Cause Growth?, *American Economic Review*, 90(5), 1160-1183.
- [9] Bouche D., 1991, *Histoire de la colonisation française, tome second: ux et re ux*, Fayard.
- [10] Bourguignon F., C. Morrisson C., 1998, Inequality and Development: The Role of Dualism, *Journal of Development Economics*, 57(2), 233-258.
- [11] Brunschwig H., 1972, *Le partage de l'Afrique noire*, Flammarion.
- [12] Cell J.W., 1999, Colonial Rule, chap. 10 of Brown J.A. and WM. Roger Louis (ed.), *The Oxford History of the British Empire, Volume IV: The Twentieth Century*, Oxford University Press, pp. 232-254.

- [13] Cogneau D., 2000, Contrainte de compétitivité, marché du travail et changement structurel, in Cogneau D., S. Marniesse, J.-Y. Moisseron, *Marché du travail et compétitivité en Afrique Sub-Saharienne*, Economica.
- [14] Cogneau D., M. Grimm, 2002, *The distribution of AIDS over the population in Africa. Hypothesis building from individual answers to a Demographic and Health Survey with an application to Côte d Ivoire*, DIAL DT2002/02.
- [15] Cohen D., M. Soto, 2001, *Growth and Human Capital: Good Data, Good Results*, Technical Paper 179, OECD Development Centre.
- [16] Collier P., J.W. Gunning, 1999, Explaining African Economic Performance, *Journal of Economic Literature*, vol. XXXVII, n°1, 64-111.
- [17] Coquery-Vidrovitch C., H. Moniot, 1974, *L Afrique Noire de 1800 à nos jours*, Presses Universitaires de France.
- [18] Curtin Ph., S. Feierman, L. Thomson, J. Vansina, 1977, African History, from earliest times to independence, 2nd edition 1995, Longman.
- [19] Easterly W., R. Levine, 1997, Africa's Growth Tragedy: Policies and Ethnic Divisions, *Quarterly Journal of Economics*, vol 112(4), 1203-1250.
- [20] Diamond J., 1997, *Guns, Germs and Steel: The Fate of Human Societies*, W.W. Norton & Cie.
- [21] Frankel H.S., 1969, *Capital Investment in Africa*, New-York, Howard Fertig, 487 pp. (1st edition 1938)
- [22] Gifford P., T. C. Weiskel, 1971, *African Education in a Colonial Context: French and British Styles*, in Gifford P., W.R. Louis, *France and Britain in Africa, Imperial Rivalry and Colonial Rule*, Yale University Press, 985 pp.
- [23] Gurr T.D., K. Jagers, W.H. Moore, 1990, The Transformation of the Western State: The Growth of Democracy, Autocracy and State Power Since 1800, *Studies in Comparative International Development*, 25(1), 73-108.
- [24] Hall R.E., C.I. Jones, Why Do Some Countries Produce So Much More Output per Worker than Others, *Quarterly Journal of Economics*, 114(1), 83-116.
- [25] Heckman J., H. Ichimura, P. Todd, 1998, Matching As An Econometric Evaluation Estimator, *Review of Economic Studies*, 65, 261-294.

- [26] Herbst J.I., 2000, *States and Power in Africa: Comparative Lessons in Authority and Control*, Princeton University Press.
- [27] Horowitz D. L., 2000, *Ethnic Groups in Conflict*, University of California Press (1st edition 1985).
- [28] La Porta R., F. Lopez-de-Silanes, A. Shleifer, R. Vishny, 1998, Law and Finance, *Journal of Political Economy*, 106(6), 1113-1155.
- [29] La Porta R., F. Lopez-de-Silanes, A. Shleifer, R. Vishny, 1999, The Quality of Government, *Journal of Law, Economics and Organization*, 15(1), 222-279.
- [30] Le Bris E., E. Le Roy, F. Leimdorfer, 1982, *Enjeux fonciers en Afrique subsaharienne*, ORSTOM - Karthala.
- [31] Lechner M., 2000, Identification and estimation of causal effects of multiple treatments under the conditional independence assumption, in M. Lechner (ed.), *Econometric Evaluation of Labour Market Policies*, Springer Verlag.
- [32] Lewbel A., 2002, *Selection Model and Conditional Treatment Effects, Including Endogenous Regressors*, mimeo, Boston College.
- [33] Mac Evedy C., R. Jones, 1978, *Atlas of World Population History*, Facts on File.
- [34] Manning D., 1998, *Francophone Sub-Saharan Africa 1880-1995*, Cambridge University Press.
- [35] Mccaskie T.C., 1999, Cultural Encounters: Britain and Africa in the Nineteenth Century, chap. 29 of Porter A. (ed.), *The Oxford History of the British Empire, Volume III: The Nineteenth Century*, Oxford University Press, pp. 670-672.
- [36] Mingat A., N. Suchaut, 2000, *Les systèmes éducatifs africains, une analyse économique comparative*, De Boeck Université.
- [37] Mitchell B.R., 2001, *International Historical Statistics, 1750-1993*, Mac Millan Reference Ltd.
- [38] Murphy K.M., A. Shleifer, R.M. Vishny, 1991, The Allocation of Talent: Implications for Growth, *Quarterly Journal of Economics*, 106(2), 503-530.

- [39] Newbury C., 1999, Great Britain and the Partition of Africa, 1870-1914, chap. 27 of Porter A. (ed.), *The Oxford History of the British Empire, Volume III: The Nineteenth Century*, Oxford University Press, pp. 624-650.
- [40] Pakenham Th., 1991, *The Scramble for Africa, 1876-1912*, Jonathan Ball Publishers.
- [41] Parker P., 1997, *National Cultures of the World: A Statistical Reference, Cross-Cultural Statistical Encyclopedia of the World*, vol.4, Greenwood Press.
- [42] Pritchett L., 2001, *Where has all the Education Gone?* *World Bank Economic Review*, 15(3), 367-391.
- [43] Rajan R.G., L. Zingales, 2001, *The Great Reversals: The Politics of Financial Development in the twentieth Century*, NBER WP 9178
- [44] Robinson J. A., 2002, States and Power in Africa by Jeffrey I. Herbst: A Review Essay, *Journal of Economic Literature*, 40(1), 510-519.
- [45] Rosenbaum P. and Rubin D. B., 1983, The Central Role of the Propensity Score in Observational Studies for Causal Effects, *Biometrika*, 70, 41-55.
- [46] Sachs J., A. Warner, 1997, Sources of Slow Growth in African Economies, *Journal of African Economies*, 6(3), 335-376
- [47] Schultz T.P., 1999, Health and Schooling Investments in Africa, *Journal of Economic Perspectives*, 13(3), 67-88.
- [48] Sokoloff K.L., S.L. Engerman, 2000, Institutions, Factor Endowments, and Paths of Development in the New World, *Journal of Economic Perspectives*, 14(3).
- [49] Summers R., A. Heston, 1991, The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988, *Quarterly Journal of Economics*, 106(2), 327-368
- [50] UNESCO Institute of Statistics, 2001, *Sub-Saharan Africa, Regional Report*.
- [51] Weber M., 1978, *Economy and Society, an outline of interpretative sociology*, volume 2, translated from the 4th German Edition of 1956, University of California Press.

- [52] Wesseling , H.L., 1991, *Divide and Rule: The Partition of Africa, 1880-1914*, translated from Dutch by Arnold J. Pomerans. Westport, C.T.: Praeger, 1996
- [53] Young C., 1994, *The African Colonial State in Comparative Perspective*, Yale University Press.

Table 1 : Explaining islam extension, ethnic fractionalisation, settlement conditions, and the coloniser's selection

	Muslims	Ethnic F.	E. Settlers	F. British	F. French
Dist. to Nth Pole	-1.857* (0.231)	+0.329* (0.196)		+0.042* (0.018)	-0.054* (0.026)
Dist. to Equator		-1.199* (0.324)		-0.011 (0.033)	+0.044 (0.041)
Land area		+1.557* (0.599)		+0.039 (0.063)	-0.314* (0.177)
Settlers mortality			-2.093* (0.566)	+0.276 (0.281)	-0.583 (0.500)
S. mort. unknown			-31.33* (8.286)	+2.767 (4.046)	-9.834 (7.705)
Pop. Density in 1500 (log.)				-0.167 (0.371)	-0.739* (0.436)
Morning Humidity				-0.085* (0.042)	+0.149* (0.065)
Intercept	+29.69*	+37.42*	+13.38*	+6.538*	-7.088*
R ²	0.599	0.364	0.256		
Pseudo R ²				0.300	0.427
N			45		

Method : The first three columns are OLS estimates. The last two columns are probit estimates. *: significantly different from zero at the 10-percent level.

Table 2 : Differences in education between colonial origins, GMM estimators

	Average years of schooling 1960		Literacy 1970	
	(1)	(2)	(3)	(4)
F. British	+1.465*	+1.470*	+15.14*	+13.48*
	(0.322)	(0.300)	(6.049)	(4.304)
F. French	+0.205	+0.704*	-4.510	+1.491
	(0.211)	(0.332)	(4.178)	(4.800)
Muslims (I)		-0.012*		-0.229*
		(0.004)		(0.064)
Settlers (I)		+0.142*		+1.516*
		(0.030)		(0.441)
Ethnic F. (I)		-0.006		-0.335*
		(0.005)		(0.094)
p-value Br.=Fr.	0.001	0.002	0.000	0.005
R ²	0.421		0.340	
p-value Sargan		0.917		0.533
N		33		40
	Gross Primary Enr. 1960		Gross Secondary Enroll. 1960	
	(5)	(6)	(7)	(8)
F. British	+7.930	+9.603	+1.943	+0.613
	(10.10)	(10.35)	(1.480)	(1.305)
F. French	-1.690	+4.922	+0.800	-0.011
	(9.145)	(10.78)	(1.103)	(1.259)
Muslims (I)		-0.140		+0.050*
		(0.132)		(0.020)
Settlers (I)		+2.422*		+0.642*
		(0.992)		(0.146)
Ethnic F. (I)		-0.296		-0.012
		(0.212)		(0.026)
p-value Br.=Fr.	0.282	0.524	0.462	0.603
R ²	0.033		0.046	
p-value Sargan		0.772		0.544
N		41		38

Method and Sources: (I) denotes an instrumented variable. Column (2) is a GMM estimation with distance to the North Pole, latitude, settlers' mortality and arable land area as instruments for the proportion of Muslims, ethnic fragmentation and the proportion of European settlers in 1900. The test "F. Br.=F. Fr." is a Fisher test of equality of the first two coefficients of regressions, with the p-value reported.

Table 3 : Differences in education in 1960, comparing selection-corrected treatment estimators and matching estimators of colonial origins

	Average years of schooling 1960			
	Reduced linear (OLS)	parametric (SEL)	Reduced non-parametric (MB)	(MnB)
F.British vs All	1.0	♠	1.3	-0.9
95% conf. interval	[0.5;1.6]		[0.4;2.0]	[-1.5;0.1]
Matched / Control			13/9	19/8
F.British vs F.French	0.6	0.2	1.1	-1.1
95% conf. interval	[-.0;1.2]	[-0.4;0.9]	[-0.6;1.9]	[-3.4;-0.1]
Matched / Control			9/4	11/4
N (n)	33 (27)			
	Literacy 1970			
	Reduced linear (OLS)	parametric (SEL)	Reduced non-parametric (MB)	(MnB)
F.British vs All	15.4	9.5	19.4	-17.2
95% conf. interval	[7.1;23.7]	[-5.9;25.0]	[3.8;31.7]	[-37.3;-9.4]
Matched / Control			12/8	24/7
F.British vs F.French	11.4	11.7	15.9	-13.2
95% conf. interval	[3.7;19.1]	[2.4;21.1]	[-1.8;35.3]	[-28.5;1.1]
Matched / Control			8/6	13/3
N (n)	39 (28)			

Method : The effect of the colonial power's identity is estimated using either the selection correction method or the matching nearest neighbour method. Column (OLS) corresponds to a reduced form of the Table 2 column (2) models where the outcome variable is regressed on the distance to the North Pole, the distance to the equator, the arable land area, settlers' mortality and a dummy variable indicating whether the country was a British colony. (SEL) adds a selection correction to (OLS) based on the probit model of the last column in Table 1, and estimated by a two-step method; the ♠ sign means that the correlation parameter between unobservables was estimated outside the [-1;+1] interval, making identification questionable. (MB) and (MnB) are matching estimators again based on the probit models of table 1 which gives the propensity score P(S). (MB) corresponds to the counterfactual effect on former British colonies, while (MnB) corresponds to the counterfactual effect on former non-British colonies. A common support condition is introduced for the matching estimators, using only treated observations for which a P(S)-based match is close enough (20 percentage points). The number of matched units based on this condition are shown in the table, followed by the size of the control group. The confidence intervals are estimated with one thousand bootstrap replications. N is the number of available observations for the variable across the entire sample, while n is the number of observations for the sample restricted to former British and former French colonies.

Table 4 : Enrolment differences in 1960, comparing selection-corrected treatment estimators and matching estimators of colonial origins

Gross primary enrolment 1960				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	8.0	-13.7	8.2	-14.1
95% conf. interval	[-10.7;26.8]	[-54.5;27.1]	[-40.0;29.8]	[-66.7;-0.1]
Matched / Control			12/9	26/7
F.British vs F.French	1.2	4.5	9.6	-2.5
95% conf. interval	[-19.1;21.6]	[-20.9;29.8]	[-27.0;45.8]	[-35.6;20.8]
Matched / Control			8/6	14/3
N (n)	40 (29)			
Gross Secondary Enrolment 1960				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	1.4	-1.3	2.7	-3.3
95% conf. interval	[-0.6;3.3]	[-6.3;3.8]	[0.3;7.5]	[-8.1;2.1]
Matched / Control			13/9	23/8
F.British vs F.French	1.5	0.9	2.1	-0.3
95% conf. interval	[-1.1;4.2]	[-2.5;4.4]	[-2.0;7.1]	[-4.2;4.1]
Matched / Control			9/4	11/4
N (n)	37 (27)			
Ratio Secondary/Primary 1960				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	0.02	0.04	0.03	-0.04
95% conf. interval	[-.00;.05]	[-.02;.10]	[-.05;.10]	[-.16;.00]
Matched / Control			12/9	23/7
F.British vs F.French	0.03	0.03	0.02	-0.02
95% conf. interval	[-.00;.07]	[-.02;.07]	[-.06;.09]	[-.07;.06]
Matched / Control			8/4	11/3
N (n)	36 (26)			

Method : See table 3.

Table 5 : Some schooling indicators for four countries sorted by cohort

	Age of the individual at the country's independence					
	40 & +	30-39	20-29	10-19	0-9	Born later
Some primary						
Uganda	36.0	47.9	66.8	77.0	83.4	83.5
Ghana	13.0	31.7	39.7	58.3	73.3	81.9
Côte d'Ivoire	5.2	11.1	21.3	42.5	64.6	67.2
Madagascar	44.6	52.5	57.7	73.2	78.4	84.2
Completed Primary						
Uganda	4.1	6.2	19.4	33.2	41.8	42.5
Ghana	9.8	25.7	35.2	50.3	67.1	75.9
Côte d'Ivoire	2.3	6.1	13.0	32.3	54.8	56.6
Madagascar	4.6	6.8	10.8	24.8	31.5	48.9
Completed Middle						
Uganda	2.8	1.8	7.8	12.4	16.6	18.3
Ghana	4.1	15.9	26.9	40.8	56.9	64.5
Côte d'Ivoire	0.1	0.5	2.8	14.9	32.1	34.8
Madagascar	1.9	1.7	6.0	14.8	16.9	19.5
Completed Secondary						
Uganda	0.3	0.1	2.8	5.9	6.6	6.7
Ghana	0.0	3.1	4.5	8.9	11.0	15.6
Côte d'Ivoire	0.1	0.2	0.8	6.1	13.3	(7.8)
Madagascar	0.0	0.7	1.8	4.7	6.9	5.7

Source: Household surveys described in Appendix B. Coverage: Men over 25 years old, born in the country.

Table 6 : Some schooling indicators for four countries for 1910-1960

	Number of Children in schools					
	1910	1920	1930	1940	1950	Indep.
Primary schools						
Uganda	17	[82]	224	(435)
Ghana	17	41	53	(62)	234	471
Côte d'Ivoire	1.0	14	32	239
Madagascar	[182]	238	450
Secondary Schools						
Uganda	0.2 \top	1.6 \top	11	(7.8)
Ghana	...	0.7	1.3	[3.1]	73	153
Côte d'Ivoire	1.3	11
Madagascar	[7.8]	11	25
Higher Education						
Uganda
Ghana	208	960
Côte d'Ivoire
Madagascar	197	1130

(): government-aided schools only; []: year is not accurate ; \top : boy's schools only. Source: B.R. Mitchell, International Historical Statistics, 1750-1993

Table 7 : Differences in evangelisation between colonial origins, GMM estimators

	Christians (%)	
	1960	1990
F. British	-3.383 (12.64)	-12.31* (7.057)
F. French	-23.42* (12.74)	-16.88* (7.539)
Muslims (I)		-0.611* (0.093)
Ethnic F. (I)		+0.256* (0.156)
Settlers 1900 (I)		+1.088 (0.773)
p-value Br.=Fr.	0.056	0.492
p-value Sargan		0.350
N		45

Method and Sources: see table 2.

Table 8 : Differences in education in 1990, comparing IV estimators and matching estimators of colonial origins

Average years of schooling 1990				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	1.8	0.5	2.0	-1.8
95% conf. interval	[0.7;2.8]	[-2.4;3.3]	[0.4;3.5]	[-3.4;-0.4]
Matched / Control			13/9	22/8
F.British vs F.French	1.1	0.9	1.7	-1.8
95% conf. interval	[-0.2;2.5]	[-0.8;2.7]	[-1.3;3.8]	[-3.3;0.1]
Matched / Control			9/5	13/4
N (n)	37 (29)			
Literacy 1990				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	18.6	12.8	22.5	-17.6
95% conf. interval	[5.8;31.4]	[-10.6;36.2]	[2.4;40.7]	[-34.0;-6.2]
Matched / Control			12/8	24/7
F.British vs F.French	15.1	16.4	18.3	-21.0
95% conf. interval	[1.1;29.0]	[-0.6;33.4]	[-6.0;45.6]	[-41.5;-5.6]
Matched / Control			8/6	13/3
N (n)	39 (28)			

Method : See table 3.

Table 9 : Enrolment differences in 1990, comparing selection-corrected treatment estimators and matching estimators of colonial origins

Gross primary enrollment 1990				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	11.0	19.0	11.7	-7.9
95% conf. interval	[-10.3;32.2]	[-27.9;65.9]	[-21.0;42.9]	[-40.3;15.6]
Matched / Control			13/9	23/8
F.British vs F.French	1.6	12.3	4.0	-5.1
95% conf. interval	[-24.3;27.5]	[-20.9;78.0]	[-48.0;54.5]	[-37.5;37.5]
Matched / Control			9/6	14/4
N	38 (31)			
Gross Secondary Enrollment 1990				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	14.5	14.2	18.7	-15.1
95% conf. interval	[1.3;27.8]	[-15.7;44.2]	[2.1;37.2]	[-52.3;-1.2]
Matched / Control			13/8	22/8
F.British vs F.French	8.6	10.5	13.8	-7.6
95% conf. interval	[-5.5;22.8]	[-7.4;28.5]	[-19.1;37.0]	[-29.3;-19.7]
Matched / Control			9/6	14/4
N	37 (31)			
Ratio Secondary/Primary 1990				
	Reduced linear parametric (OLS)	Reduced linear parametric (SEL)	Reduced non-parametric (MB)	Reduced non-parametric (MnB)
F.British vs All	0.13	0.10	0.18	-0.14
95% conf. interval	[.03;.23]	[-.13;.32]	[.06;.40]	[-.47;.00]
Matched / Control			13/8	22/8
F.British vs F.French	0.11	0.08	0.13	-0.10
95% conf. interval	[.03;.22]	[-.06;.22]	[-.04;.34]	[-.27;.18]
Matched / Control			9/6	14/4
N	37 (31)			

Method : See table 3.

Table 10 : Investment and productivity differences between colonial origins

	Railway lines length		Roads Density		Capital per worker
	1925	1960	1960	1990	1990
F. British	+0.883 (0.592)	+0.805 (0.583)	-0.019 (0.026)	-0.006 (0.040)	+0.623 (0.648)
F. French	+0.025 (0.485)	-0.380 (0.577)	-0.049* (0.025)	-0.044 (0.040)	+0.390 (0.569)
Settlers 1900	+0.586* (0.150)	+0.622* (0.159)			+0.090* (0.021)
Land area	+0.181* (0.106)	+0.210* (0.121)	-0.011* (0.003)	-0.018* (0.006)	
(Land area) ² /100	-0.845* (0.569)	-0.837 (0.743)	+0.032* (0.014)	+0.052* (0.020)	
Oil reserves					+3.8e-6* (6.2e-7)
p-value Br.=Fr.	0.072	0.025	0.012	0.043	0.584
R ²	0.780	0.779	0.489	0.346	0.419
N		45	33	44	34
		GDP per worker (log.)			FGP (log.)
	1960	1990	Growth 60-90		1990
F. British	-0.012 (0.158)	+0.368* (0.139)	+0.124 (0.196)		-0.068 (0.408)
F. French	+0.251* (0.123)	+0.420* (0.149)	+0.115 (0.202)		+0.164 (0.353)
Settlers 1900 (I)	+0.062* (0.018)	+0.081* (0.019)	+0.009 (0.011)		+0.075* (0.030)
Ethnic F. (I)	-0.001 (0.003)	-0.009 (0.004)	-0.003 (0.003)		-0.001 (0.006)
Oil reserves		+2.3e-6* (5.6e-7)	+1.5e-6* (3.5e-7)		+1.9e-6* (5.9e-7)
p-value Br.=Fr.	0.073	0.647	0.946		0.283
p-value Sargan	0.501	0.180	0.020		0.155
N	40	34	32		34

Method : Initial (1960) capital stock is computed as $K/Y = I/Y/(g + \delta + n)$, where the investment rate is I/Y , the growth rate is Y/L (g), and the population growth rate (n) equal to the country's averages over the 1960-70 period, and where $\delta = 0.07$, as in Bils and Klenow (2000). The log. of FGP is computed as $\text{Log}(Y/L) - 0.5(K/Y)$, without taking into account any difference in average schooling (unlike Hall and Jones, 1999).

Table 11 : Differences in per capita GDP and life expectancy at birth between colonial origins, GMM estimators

	GDP per capita		Life expectancy		
	1960	1990	1960	1990	Var. 60-90
F. British	-0.091 (0.175)	+0.412* (0.154)	+2.758 (2.030)	+8.737* (2.787)	+5.056* (1.571)
F. French	+0.147 (0.138)	+0.413* (0.169)	+1.131 (1.556)	+6.675* (2.378)	+4.508* (1.501)
Settlers 1900 (I)	+0.058* (0.020)	+0.082* (0.144)	+0.694* (0.253)	+1.411* (0.546)	+0.750* (0.305)
Ethnic F. (I)	-0.002 (0.003)	-0.010* (0.003)	-0.077* (0.033)	-0.115* (0.056)	-0.036 (0.029)
Oil reserves		+2.1e-6* (5.6e-7)		+4.1e-6* (6.5e-7)	+2.5e-6* (4.2e-7)
HIV prev. 1999 (I)				-0.354 (0.227)	-0.363* (0.137)
p-value Br.=Fr.	0.108	0.990	0.329	0.296	0.673
N	40	34		45	
p-value Sargan	0.196	0.183	0.748	0.969	0.438

Method : The instruments used for the proportion of European settlers in 1900, ethnic fractionalisation and HIV prevalence (circa 1999) are settlers' mortality in the 19th century, distance to the North Pole and the equator and the arable land area.

Table 12 : Differences in urbanisation between colonial origins, GMM estimators

	Urbanisation rate		Var. of urb. rate	Rel. Labor Prod.
	1960	1990	1960-1990	1990
F. British	+1.399 (2.982)	+7.878* (3.203)	+5.800* (2.546)	+0.001 (0.069)
F. French	+4.517 (2.997)	+18.77* (3.613)	+10.58* (2.822)	-0.133* (0.067)
Settlers (I)	+0.345 (0.507)	+0.933* (0.330)	-0.295 (0.500)	-0.025 (0.019)
Landlocked	-7.879* (2.828)	-16.37* (3.392)	-6.053* (3.005)	-0.002 (0.002)
Age 1 st city (I)	+0.496* (0.129)	+0.040 (0.234)	-0.443* (0.180)	
Oil reserves		+1.4e-5* (1.9e-6)	+1.4e-5* (1.5e-6)	-2.1e-7 (3.5e-7)
p-value Br.=Fr.	0.260	0.001	0.081	0.047
p-value Sargan	0.442	0.059	0.105	0.160
N		45		41

Method and sources: The instruments used for the proportion of European settlers in 1900 and the age of the first city are settlers' mortality in the 19th century and distance to the North Pole and the equator.

Table 13 : Differences in returns to education in four case-study countries

	C.d'Ivoire	Madagascar	Ghana	Uganda
	Monthly wages (log.)			
Education	+0.200 (0.006)	+0.151 (0.006)	+0.070 (0.007)	+0.100 (0.006)
Experience	+0.071 (0.009)	+0.069 (0.008)	+0.044 (0.008)	+0.030 (0.007)
Exp. sq. / 100	-0.063 (0.015)	-0.081 (0.012)	-0.050 (0.011)	-0.058 (0.010)
R ²	0.488	0.381	0.139	0.221
N	1401	1048	768	1830
Mean wage in % per cap. GNP	618	265	232	228
per capita GNP in current \$	760	220	420	200
Average years of education	6.34	6.10	7.88	5.73
	Consumer expenditures per head (log.)			
Education	+0.093 (0.003)	+0.131 (0.004)	+0.041 (0.004)	+0.072 (0.003)
Experience	-0.006 (0.003)	-0.006 (0.004)	-0.023 (0.004)	-0.010 (0.003)
Exp. sq. / 100	+0.006 (0.003)	+0.015 (0.005)	+0.026 (0.005)	+0.012 (0.003)
R ²	0.280	0.245	0.077	0.132
N	5101	3305	2834	6232
Average cons.exp. in PPA	1368	434	1748	528
Average years of education	2.47	3.42	5.23	3.75

Field: Male heads of household aged 25 and over; Method: Ordinary least squares.

A. Micro-variables and Micro-surveys

A.1. Variables

A.1.1. Education

Primary education is defined in Ghana as grades P1 to P6. Middle school covers the M1 to M4 levels. Secondary is S1 to S5, LS and US, and T1 to T4 (technical schools). The Ghanaian system was reformed in 1987, reducing the length of the pre-university education from "6-4-5-2" to "6-3-3", i.e. from 17 years to 12 years, but our sample aged 25 and over in 1992 did not experience the new system. Primary education is defined in Uganda as P1 to P7. Middle school covers the S1 to S4 levels, or J1 to J3. Secondary covers S5, S6 and specialised training. The Ugandan system is "7-4-2". Primary education in Cote d'Ivoire and Madagascar covers CP1, CP2,⁴⁵ CE1, CE2, CM1 and CM2 grades. Middle School concerns the 6th, 5th, 4th and 3rd levels. Secondary school covers the 2nd and 1st grades and the last year in school (called Terminale). The Ivorian system is a "7-4-3" and the Malagasy system is a "6-4-3".

A.1.2. Income

The monthly wage is defined as basic wages plus cash bonuses. It excludes bonuses in kind and transport and housing perks (see footnote 41). Consumer expenditures per head is the survey's estimate of total expenditure divided by the number of people in the household.

A.2. Surveys

A.2.1. Ghana

The third round of the Ghana Living Standards Survey (GLSS3), which started in 1991 and ended in 1992. The sample consisted of 4,552 households, spread throughout the country in 407 enumeration areas.

A.2.2. Côte d Ivoire

The data comes from the four Enquêtes Permanentes auprès des Ménages (EPAM) conducted in 1985, 1986, 1987 and 1988. We pooled the four surveys to obtain a database of 9,564 households and 50,697 individuals.

⁴⁵CP only in Madagascar.

A.2.3. Madagascar

The Enquête Intégrale auprès des Ménages (EPM93) was carried out from April 1993 to April 1994. It consists of a sample of 4,508 households and 22,714 individuals with a three-stage stratified sampling method.

A.2.4. Uganda

The Uganda National Integrated Household Survey (IHS) was conducted from March 1992 to March 1993. It covered 9,924 households, 48,484 individuals, 9,501 men aged 20 and over and 10,325 women aged 20 and over. A two-stage sampling method was used, except in a few districts where a three-stage sampling method was applied.

Appendix B: Macro-variables construction and sources

VARIABLES	DEFINITION	SOURCE
Average years of schooling 1960, 1990	age 15-60 pop., C&S completed by B&L when missing	Cohen & Soto (2001), Barro & Lee (1996)
Literacy 1970, 1990	age 15 & above pop. who cannot read and write	World Development Indicators (2001)
Primary & Secondary 1960, 1990	Gross primary and secondary enrolment rates	World Development Indicators (2001)
Railway lines length 1925, 1960	in thousand of kilometers	Mitchell (2001)
Roads density 1960	# of kilometers of roads per km ² of land area	Herbst (2000)
Roads density 1990	# of kilometers of roads per km ² of land area	Parker (1997)
GDP per worker 1960, 1990	Real GDP in int. dollars divided by labor force (RGDPW)	Summers and Heston (1991)
GDP per capita 1960, 1990	GDP in int. dollars divided by population (CGDP)	Summers and Heston (1991)
Capital per worker 1960, 1990	Computed from GDP and Investment (see table 10)	Summers and Heston (1991)
Factor Global Productivity 1960, 1990	Computed from GDP and Capital per worker (see table 10)	Summers and Heston (1991)
Life expectancy 1960, 1990	Life expectancy at birth	World Development Indicators (2001)
Urbanization rate 1960, 1990	% of urban population in total population	World Development Indicators (2001)
Muslims proportion	% of muslims in population	Parker (1997)
Ethnic Fractionalization	% of the most num. ethnic group in the pop. with (-) sign	Parker (1997)
European settlers proportion 1900	% of european settlers in the pop. in 1900	Acemoglu et al.(2000), Mac Evedy & Jones (1975)
Settlers mortality XIX th century	Log. of mortality estimate for european settlers	Acemoglu et al.(2000)
Age of 1 st city	Date of creation of the first city with (-) sign	Parker (1997)
HIV prevalence 1999	% of 15-49 years old pop. infected by HIV	UNAIDS (2001)
Distance to north pole, equator		Parker (1997)
Morning Humidity	% max. of humidity in the morning	Parker (1997)
Arable land area, Land area	in square kilometers	World Development Indicators (2001)
Population density in 1500	Total population in 1500 divided by arable land area in 1970	Mac Evedy and Jones (1978), WDI (2001)
Oil reserves	Estimate at the beginning of the 1990s	Parker (1997)
Number of minerals	Estimate at the beginning of the 1990s	Parker (1997)
Landlocked	Non-existence of an acces to an open sea	Parker (1997)
Relative Labor Productivity	Ratio of productivities of labor: agriculture vs. other sectors	World Development Indicators (2001)