Did Colonization Matter for Growth?
An Empirical Exploration into the Historical Causes of Africa's Underdevelopment [*]

Graziella Bertocchi
Dipartimento di Economia Politica, Universita' di Modena
Viale Berengario 51, I-41100 Modena, Italy;
and CEPR, London
and

Fabio Canova
Department of Economics, Universitat Pompeu Fabra
Trias Fargas 25-27, E-08035, Barcelona, Spain;
Dipartimento di Economia, Universita' di Modena
Viale Berengario 51, I-41100 Modena, Italy;
and CEPR, London

This Draft, December 1996

Abstract

We investigate the impact of 20th-century European colonization on growth in Africa. We find that growth was faster for dependencies than for colonies; for British and French colonies than for Portuguese, Belgian and Italian colonies; and for countries with less economic penetration during the colonial period. On average, African growth accelerates after decolonization. Proxies for colonial heritage add explanatory power to growth regressions, while indicators for human capital, political and ethnic instability lose significance. Colonial variables capture the same effects of a sub-Saharan dummy and reduce its significance when jointly included in a cross sectional regression with 98 countries.

JEL Classification nos: E00, O40, Q32, N10.

Key Words: Colonization, Growth, Africa.

1 Introduction

The main goal of an expanding branch of economics has been to find the empirical determinants of growth in the long run [1]. However, little attention has been devoted so far to the historical causes of growth and development and, in particular, to the fact that many of today's growth "losers" happen to be former colonies. For example, of the 23 countries belonging to the lowest quintile of the cross country distribution of growth rates of per-capita GDP (according to Summers and Heston's mark 5 data), 19 were colonies for a prolonged period of time during the 20th century and averaged a mean growth rate of -1.3% over the 1960-1988 sample.

In this paper we empirically assess the economic impact of colonial rule on growth. We focus attention on Africa. There are several reasons for our choice. First, historically, nowhere else was colonization so far-reaching and homogeneous in nature as in the African experience that began at the end of the last century [2]. Second, it is among African countries that we have witnessed the most disastrous growth performances in the post-WWII period. The growth rate of per-capita income of African nations has been below world average throughout the last fifty years: over the 1961-73 period the average growth rate of per-capita GDP of African countries has only been 2.0% as compared with a 3.0% average for the world and a 4.2% for OECD countries; over the 1982-90 period the picture is even bleaker, with African countries displaying a negative average growth rate (-0.2) as compared to a 2.8% for OECD countries. Moreover, 16 of the 23 countries in the lowest quintile of the cross country distribution of growth rates of per-capita GDP belong to Africa and all were colonies [3]. Third, even though the question of Africa's poor performance has received some attention in recent work, its growth disaster has largely been left unexplained. Barro (1991) shows that a dummy for sub-Saharan Africa exerts a significant and negative effect on the average growth of per-capita GDP for the 1960-85 period, suggesting that the empirical model does not adequately explain the performance of these countries. A number of recent country studies confirm Barro's conclusions [4]. Some progress towards a deeper understanding of Africa's specific problems has been made by Easterly and Levine (1994), who introduce additional region-specific variables - infrastructure development, ethnic diversity, and neighbor spillover - in the standard cross-country regressions, and by Schmidt-Hebbel (1995), who focuses on fiscal indicators.

Our basic conjecture is that colonization may be the reason for the low growth rates of per-capita GDP in African countries. Colonial rule may in fact have created the conditions for a permanent reduction in the growth rates of these countries. Bertocchi (1994) provides a theoretical model of an underdeveloped country before and after colonization takes place. In the model, colonial domination is captured by the presence of restrictions on foreign investments in the colony, unilaterally imposed by the metropolitan country, and of direct exploitation activities, exercised through fiscal and tariff policies, forced labor, and a variety of other distortions [5]. Here we are interested, on the one hand, in verifying some of the hypotheses put forward in that paper and, on the other, in providing some stylized facts on the effects of colonial rule on the growth rate of African countries.

The empirical literature has found the causes of slow growth in a number of variables ranging from literacy and fertility rates to macroeconomic and sociopolitical indicators. However, it is well known from the work of Levine and Renelt (1992) that most of these variables have a tenuous

---

[1] For a systematic description of recent developments in growth theory, see Barro and Sala-i-Martin (1995).

[2] See Oliver and Fage (1962) and Boahen (1990) for a history of Africa.

[3] Only 5 of the 23 countries in the upper quintile are from the African continent, of which 3 were colonies.

[4] See also Romer (1989), Chhibber and Fischer (1991), Barro and Lee (1994a), Husain and Faruquee (1994) and Elbadawi and Ndulu (1994) on the significance of African continent dummies.

[5] See also Lucas (1990) and Grossman and Iyigun (1995) on the economics of colonialism.

explanatory power, in the sense that their sign and significance change with the variables included in the empirical model. In other words, these variables may be proxying for a variety of effects not captured in the empirical specification. Our second working assumption is that colonial inheritance may be the third factor causing cross sectional comovements of some of these variables with the growth rate of GDP. Through forced labor and distortive educational policies, for example, colonization may have affected human capital accumulation and been responsible for the currently low level of literacy rates. The high degree of political instability and ethnic conflict [6] which characterizes African countries can also be viewed as a legacy of colonization. When colonial domination ended, Africa found herself divided into a number of centralized states whose borders, having being defined by the European powers, had nothing to do with the frontiers that delimited the tribal territories of the pre-colonial times. The lack of credibility of the post-independence governments may also have its roots in the destruction of the pre-colonial political institutions by the colonizers.

The empirical analysis is organized in four parts. In the first part, we report basic statistics on selected variables once heterogeneities having to do with the countries' colonial history are taken into account. Then, we try to measure the effects of decolonization by focusing on the growth pattern in the years immediately preceding and following political independence. In the third part we run standard cross-sectional growth regressions for Africa adding to the standard set of variables used in the literature indicators for colonial inheritance. Finally, we go back to Barro's (1991) growth regressions and examine whether proxies for colonial heritage drive the importance of the sub-Sahara African dummy away.

Our results show that there are economically significant differences in the growth rates and in other macroeconomic and sociopolitical once we group African countries according to political status, metropolitan ruler and the degree of economic penetration. Countries that were dependencies perform better than former colonies, and former British and French colonies perform better than colonies of other countries, while a higher degree of economic penetration during the colonial period tends to be associated with slower growth.

For a subset of African countries, we also find that the average growth rate of GDP after political independence was substantially higher than before independence and that actual growth rates exceeded forecasted ones by 1-2%, where forecasts are based on the information available before independence.

The regression analysis demonstrates that our proxies for colonial heritage are important in explaining the African growth experience in almost all samples. In particular, being either a colony of France, a dependency of the UK, or a country with a low level of economic penetration, had some beneficial growth effects. We also find that proxy measures for human capital, political and ethnic stability, which are typically used in growth regressions, are correlated with our colonial variables and lose some of their explanatory power when they are jointly included in the regressions. Hence, what has been interpreted as the effect of, e.g., political stability, may have in fact proxied for a deeper phenomenon which we identify with colonial inheritance.

Finally, we show that over a world sample of 98 countries our colonial variables capture the same effects of a sub-Saharan Africa dummy and considerably reduce its significance in the regression. Therefore, our results suggest that colonial history can indeed play a crucial role in explaining the poor performance of African nations relative to other continents.

The rest of the paper is organized as follows: Section 2 briefly discusses a theoretical framework which helps us to motivate the empirical investigation and interpret the results; Section 3 presents

---

[6] See Davidson (1992) on the effects of colonial rule on institutions in Africa. Using a variable constructed by Mauro (1995), Easterly and Levine (1994) find that ethnic diversity is negatively associated with growth in sub-Saharan Africa. Indeed, fourteen out of the fifteen most ethnically diverse societies in the world in 1960 were in Africa.

the data and the criteria used to classify and group countries; Section 4 describes the results; and Section 5 draws some conclusions.

2   A theoretical framework

A theoretical analysis of the economic impact of colonization within a standard growth model with overlapping generations and one capital good is provided in Bertocchi (1994). The model identifies two main features of colonial economic domination: (i) the stock of local capital is augmented by an exogenous flow of foreign direct investment (possibly in the form of infrastructure) controlled by the metropolitan country and restricted so as to keep local returns to capital higher than in the metropolis [7]; (ii) the metropolitan country exerts direct exploitation on the colony, in the form of taxes, tariffs, forced labor and so on.

The model shows that, under realistic preference parameters values, foreign investment tends to increase the colony's GDP, thus creating a "modernization" impulse, even after taking into account the fact that foreign investment can affect local capital formation by decreasing the returnt to saving. Still, because of the drain represented by repatriated profits, an increase in GDP is accompanied by a fall in GNP, which can be taken as a more accurate measure of a country's living standards. The latter implication, together with the observation that the impact of direct exploitation on GDP is unambiguously negative, supports the view of colonization as a "drain of wealth".

At independence, foreign direct investment from the metropolis is withdrawn and the positive impulse terminates. However, the damages produced by exploitation activities to the country's economic and political institutions may permanently remain [8]. The combined effect on growth of investment withdrawals and permanent mysfunctions is negative.

Empirically, the implications of the model can be tested by examining the growth performance of colonies relative to that of independent countries. If the conclusions are correct, one should expect worse growth performances for former colonies than for countries that were not subject to colonial rule. Moreover, among different colonial regimes, those which were characterized by more intense penetration and exploitation should produce slower growth in the colonies. Finally, a low value of the GNP/GDP ratio during colonial times provides evidence of intense economic penetration and should lead to worse growth performance in the post-colonial phase.

An important extension of the model explicitly recognizes the role of human capital in the development process [9], and shows how the rapid process of industrialization induced by foreign investment may create a chronic relative shortage of human capital which will hamper growth even after decolonization. This represents an additional channel through which colonization can exert permanent, and negative, growth effects. Its testable implication is that, if colonization is important for growth, then there should be a correlation between variables proxying for the level of human capital and variables which account for a country's colonial past.

---

[7]Svedberg (1981) documents that colonial domination was indeed characterized by restrictions on direct foreign investment, which were achieved through monopolistic practices and discrimination against third countries.

[8]Chari, Kehoe and McGrattan (1996) introduce a similarly-interpreted process of distortions into a growth model in order to explain income disparities across countries. However, they do not offer for this process an interpretation in terms of colonial heritage.

[9]See Lucas (1988) and Azariadis and Drazen (1990) on the relationship between human capital and growth.

3   History, geography and empirical quibbles

The assessment of the economic effects of colonization is intrinsically a long-term issue. Only a data set covering the whole "new" colonial era (roughly speaking, from 1880 to 1975) could tell us how important colonialism has been for growth. Unfortunately, however, such data for Africa is not available. Maddison (1995) provides estimates of GDP and population for a selected number countries back to the past century, but no African nation is included in his sample. Mitchell (1982) is equally silent on output data for colonial Africa. Therefore, in order to investigate the questions of interest, we are forced to take an indirect approach and measure the impact of colonial inheritance using a number of indicators constructed from the partly "ex-post" Summers and Heston (1991) data for the sample 1960-1988.

The quality of the data in the sample is poor and somewhat dubious, since for some of these countries national accounts were not available until later in the 60's and, in some cases, missing data were reconstructed by interpolation, taking countries at similar stages of development as benchmark. This should be kept in mind when discussing the statistical significance of the results, as this data construction procedure biases the statistics of interest toward uniformity. We attempted to take the poor quality of the data into consideration using Summers and Heston ratings as heteroskedasticity weights. However, since all the African countries have ratings between C (poor) and D (insufficient), the results we present are invariant to this data refinement.

While our analysis could also take into account the experience of colonies of other continents, it should be noticed that the process of colonization in South and Central America, for instance, dates back to the 17th century and was essentially terminated at the beginning of the current century when no reliable statistics on national accounts existed. Asian colonization was historically substantially different and showed much less uniformity, along several dimensions, than the African case. The timing of the colonization of Asian countries has been less homogeneous, with the unique experience of India, and the US as influential newcomers. In addition, Japanese colonization of Taiwan and Korea had a very peculiar character since the gap between the level of development of Japan and of its colonies was relatively small; also, the geographical proximity of Japan to its colonies brought to centerstage strategic and military considerations that shaped Japanese colonial policy towards a more developmental direction. Finally, Japanese migration to Taiwan and Korea was substantial, as in the case of the British empire and its white colonies. All of these considerations led us to concentrate attention on African countries only.

Our investigation also does not consider the potential impact of colonization on the metropolitan countries. Economic historians agree that colonization did not significantly affect growth in the colonial powers [10]. Economic interests were not the only factor justifying colonial expansion, and political and even humanitarian considerations played a significant role [11]. The most interesting effects on the metropolitan countries have to do with the redistribution of wealth among different social classes operated by colonial enterprises [12].

It is not clear, in a study which tries to assess the impact of colonialism on growth, what is the relevant measure of income that should be used. The existing literature on growth has used income (or GDP) per-capita, per-worker or per-equivalent-adult almost indistinctively on the assumption that the sign and the magnitude of the average growth rates of these aggregates do not vary greatly across countries. However, for a study based on African countries, this issue may be of importance as population growth has been accelerating over the last decades and the decision problem of females

---

[10]See, for example, Bairoch (1993).

[11]See Gallagher and Robinson (1953) for a discussion.

[12]This thesis is put forward by Davis and Huttenback (1988).

in African families is very different from that of western females. This suggests that a measure of income per-worker is probably more appropriate. However, just because population is growing, a wider measure of income such as income per-capita may give a more complete overview of the phenomena. To understand how important these factors are for the issues of interest we performed calculations using both GDP per-capita and GDP per-worker, with the expectation that lower average growth rates would be displayed by the former and a tighter relationship with colonialism (if it affected means of production and distribution) would be shown by the latter. This turned out not to be the case, probably because of the large component of measurement error present in both series. Consequently, we present only results obtained using GDP per capita.

While the available data covers the 1960-1988 period [13], it is useful to study growth patterns over three subsamples - 1960-73, 1974-80, 1981-88 - to examine how quickly the effects of colonization died out and whether there is a more uniform growth behavior in the last subsample, when the influences we are interested in examining could have vanished. For the same reason, we also decided to study a sample which, for each country, ranges from the date of independence (or the beginning of the data if independence occurred before the data started), up to 1988. Ideally, to study the effects of colonization, we would have liked to have had a sample that went from the beginning of the sample up to independence. However, this sample for many countries includes only a few years and sampling error is likely to be very large. Moreover, income data for the first few years in the 1960s is unlikely to be precisely measured, and this may induce substantial measurement error in the growth rates for this short sample. Therefore, to study the period when colonization still existed, we compare the results obtained for the 1960-1988 and the independence-1988 samples.

Table 1 presents some summary information about the history of the 46 African countries included in the panel: for each country, we report the political status and, for each colony, we indicate the corresponding metropolitan country and the year of independence. The classification in terms of the political status distinguishes between colonies, dependencies and independent countries. There are only two countries which we classify as independent: Ethiopia and Liberia, which were indeed free during most of the relevant period. Ethiopia was conquered by Italy in 1935-36, but liberated in 1941. However, it should be noted that as of 1988, the final year of the sample, it still included Eritrea, which was an Italian colony from 1890 to 1950. Liberia was initially colonized by former slaves sent over by North American philantrophists, but became a sovereign country in 1847. Among dependencies, we include six countries that were not subject to explicit colonial rule, but still had close political and/or economic ties with a metropolitan country (in all cases, the UK). This group includes South Africa, which was a British dominion [14], the Southafrican enclaves of Lesotho and Swaziland, as well as neighboring Botswana (former Rhodesia), because their economies had very tight connections with that of South Africa for the period under examination [15]. Zimbabwe is in the same category, since after 1923 it was essentially subject to the same political rules as South Africa. Finally, Egypt is viwed as a dependency even if it became politically independent in 1922, both because of its long colonial history and because of the heavy economic influence exerted by the UK even after political independence was obtained. It is important to note that the UK decision not to colonize South Africa and to grant Egypt independence early on was based not on economic, but military and strategic considerations, and linked to the fact that both

---

[13]Data are available from the beginning of the 1950's only for a few countries (Egypt, Ethiopia, Kenya, Nigeria, Morocco, Mauritania, South Africa, Uganda and Zaire).

[14]The political condition of dominion, which essentially meant self-governance, was obtained by those British colonies which had attracted a large flow of migration from the mother country. South Africa was one of them (from 1919 to 1961), together with Canada, Australia and New Zealand.

[15]Sizable spillover effects among these countries are also found by Easterly and Levine (1994) and Barro and Sala-i-Martin (1995).

countries had experienced large British immigration. This rules out potential problems of reverse causation between the political status of dependency and growth, which may distort the results of our analysis. The remaining 38 countries are classified as colonies.

We assigned metropolitan countries by selecting the colonial power that managed to rule for a longer period of time. We divided the former German colonies - Burundi, Cameroon, Rwanda, Tanzania, and Togo - among the countries that took them over after WWI. Burundi and Rwanda appear under Belgium and Tanzania under the UK. Cameroon and Togo were subject to a joint French and British mandate. However, Togo is listed under France only, because currently the country consists of the French portion, while the British part was annexed to Ghana. Cameroon currently includes the portion which went under French mandate and the southern portion of the British mandate (the northern part was annexed to Nigeria). Here we list it under France since it is currently part of the CFA-franc area. We also consider the former German colonies as a separate group in an attempt to see if there was anything peculiar about these countries. Finally, Morocco was under the joint protectorate of France and Spain, but we have placed it under France, and Somalia appears under Italy, even if there were (smaller) British and French portions. Libya was also an Italian colony for an extended period (1912-1943) but it does not appear in our data set.

We compiled independence dates using the Encyclopedia Britannica as a source. When trying to distinguish between colonial and post-colonial regimes, one should be aware that political independence does not necessarily coincide with economic independence. For some countries, the process of economic decolonization predates the end of political control. For others, features of colonial dependence persisted and were detectable well past the end of colonial times

4   A summary of the results

4.1   Tabulations and tests

To begin with we present statistics describing the cross sectional pattern of the average growth rates of GDP($\overline{\Delta Y}$) once we condition on a set of variables describing colonial status, i.e., the political status, the metropolitan ruler and the degree of economic penetration. For each tabulation, we test for the equality of the mean growth rate across groups using a t-test for a statistic of the form $X = \frac{(m_i - m_j)}{\sqrt{(var_i + var_j - 2*cov_{ij})}}$, where m_i and m_j are the cross sectional means of the average growth rate of GDP per-capita of groups i and j, var_i and var_j their variance and $cov_{i,j}$ their covariance, and compute the cross sectional correlation between mean growth rates and the log of GDP per capita at the beginning of each sample.

We also study the impact of political status and of metropolitan rulers on a set of macroeconomic and sociopolitical variables typically thought to affect the growth rate of GDP. The variables we consider are the investment-output ratio (I/Y), the percentage of working age population in secondary school (School), the index of political instability (Polinst), the index of ethnic fractionalization (Fract) and the price of investment in deviation from the world mean (Pidev), all measured in 1960, and the index of political rights (Pright), which is measured over the period 60-64 All measures are from Barro and Lee (1994b), with the exception of the schooling measure, employed by Mankiw, Romer and Weil (1992), which is from UNESCO, and the ethnic instability index, employed by Mauro (1995), which was calculated by Taylor and Hudson (1972). Results obtained substituting measures of coups, assassinations and revolutions to the index of political instability and other measures of human capital to the school attainment rates are very similar and not reported.

4.1.1   Political status

In Table 2 we present the mean and standard deviation of the growth rate of GDP once we separate countries according to their political status (colonies, dependencies, and independent countries).

The most interesting feature in the table is that the average growth rate of dependencies for the 1960-88 sample is about three or four times larger than the one of former colonies or independent countries and this pattern is present in all other samples [16]. The growth pattern of countries that were independent for the entire period - i.e., Ethiopia and Liberia - is the worst over most subsamples. However, it should be kept in mind that since there are only two independent countries, small sample biases are substantial. The differences we detect are economically significant, especially for some of the very poor former colonies. To get a rough estimate of such differences, note that, for example, a 3% average growth rate over the 1960-88 period implied at the end of the sample an average per capita income 3.5 times larger than the one of 1960, as opposed to an average per capita income 1.6 times larger than the one of 1960 had the average growth rate been 1% per year. In most cases these differences are not statistically significant at the 10% level, because of the large standard errors associated with the cross sectional mean growth rate.

The relationship between the log of the initial GDP and the average growth rate, which amounts to a crude test of the unconditional convergence hypothesis, is quite strong when all countries are pooled together. However, when we separate countries according to the political status, we see that the rate of convergence is fast for dependencies, while for colonies we even find evidence of divergence.

In an attempt to measure colonial heritage in the broadest possible manner, in Table 3 we analyze the impact of the same classification on the macroeconomic and sociopolitical variables previously described. The results indicate that colonial history had a marked effect on all variables: on average, dependencies had higher investment-output ratios, human capital and political rights, and lower political instability, ethnic fractionalization and market distortions than colonies. Hence colonization may have had an indirect effect on growth as well

4.1.2   Metropolitan ruler

It is well documented that colonial policies of the various metropolitan powers differed considerably in terms of the degree of economic penetration, the intensity of the exploitation of natural resources and indigenous labor, local educational policies, and the kind of political institutions established in the colonies. For example, Portuguese domination is believed to have been particularly detrimental for growth because of the extreme forms of exploitation employed. The same can be said of the early King Leopold's regime in Congo. On the other hand, the "indirect ruling" which characterized British domination in Africa is thought to have favored the creation of a stronger local ruling class with beneficial consequences for post-independence political stability. Also, France probably contributed more than any other colonizer to the development of infrastructure. Educational policies were also subject to very different guidelines. Finally, when Britain's colonies became independent the British simply left, while in similar circumstances the French remained.

Despite the existence of a large body of historically-oriented descriptive literature [17], previous work has been unable to detect any differential pattern along the metropolitan dimension. For

---

[16] Alam (1994) also studied whether growth tends to be positively related to the degrees of political independence and found some evidence of a discrepancy in the growth rate of sovereign countries and colonies for the period 1900-50. However, his sample is very small (only 12 countries are included), no African nation is present and the tests he performs are different than ours.

[17] See, for example, Carocci (1979).

example, von der Mehden (1969) claims that there is no significant evidence that a country's economic performance depends on which metropolis colonized it. More recently, Barro (1996) finds that different colonial rulers had no significant impact on the level of democracy.

Our results, however, offer some support for the belief that economic performances in Africa were affected by the kind of colonial regime that was in place. Table 4 shows that former French and British colonies had the highest average growth of GDP per-capita for the 1960-1988 period. Despite the presence of some heterogeneity within subsamples, it therefore appears that having the UK or France as the colonizer did make a difference for growth. Not surprisingly, given the small sample size of each subgroup, standard errors associated with the mean growth rates are large and differences are often not statistically significant at the 10% level. We have also separately studied the performance of those countries that were originally German colonies and were acquired by the UK, France and Belgium after WWI. The fact that this subgroup did definitively better than average up to 1980 should however be attributed to the fact that most of these countries are oil producers, rather than to the characteristics of the early colonial regime.

The relationship between initial conditions and cross sectional growth rates varies within each subgroup, and there are several subsamples where income differences of former colonies of the same metropolis persisted or even increased.

The results so far are only suggestive of the differential economic impact of alternative colonial regimes, unless we can provide some evidence that different metropolitan rulers did in fact exercise different degrees of economic penetration. Unfortunately, data on direct foreign investment, disaggregated by country of origin and recipient, are not available for the period under examination [18]. At the bottom of Table 4, we report data on enforcement ratios for foreign direct investment and trade in Africa for 1938, the year that marks the peak of the colonial epoch. These ratios, taken from Svedberg (1981) [19], reflect the metropolitan country shares of foreign direct investment and trade in African colonies relative to the metropolitan country shares in the continent and take into account the fact that larger economies tends to have larger shares of overall foreign investment and international trade. The foreign investment enforcement ratio for Britain, for example, is slightly above 2, indicating that in the average British colony in Africa the share of the UK in total foreign direct investment is about double that of the entire continent. Consistent with our previous findings, UK and France ratios are substantially lower than for the other metropolitan countries, suggesting that the stronger growth performance of former British and French colonies may indeed be linked to limited enforcement. This conclusion does not deny the potential relevance of other economic mechanisms or of purely institutional channels, but common wisdom suggests that these features would tend to be highly correlated with the degree of enforcement.

The pattern of the other macroeconomic and sociopolitical variables along the metropolitan ruler dimension is illustrated in Table 5. Our conclusions are strenghtened by the fact that British and French colonies display higher levels of the investment-output ratio, human capital and political rights than other colonies.

4.1.3   Economic penetration

In Table 6, we analyze growth rates once we group colonies according to the degre of economic penetration which we measure by the discrepancy between GDP and GNP in 1960. Such discrepancy reflects repatriated profits on foreign investment, royalties and direct exploitation activities

---

[18] The OECD provides information about investment by the country of origin, but only from 1970. A longer series for foreign direct investments is available from the IMF, but does not distinguish by the country of origin.

[19] See also related work by Kleiman (1976).

that the metropolis exerted at, roughly, the end of the colonial period. We chose the ratio in 1960 because for many countries this is the first year for which data is available and because it does not vary in any substantial way for any of the years between 1960 and independence for most countries. We construct four "penetration" classes: in the first class, the ratio of GNP to GDP is up to 0.94; the last class comprises countries for which the ratio is 0.99 or above. The table provides evidence supporting the conjecture that the higher the degree of economic penetration was at the beginning of the sample, the lower the growth rate of GDP was over the period. For the sample 1960-88, colonies with low or no penetration had an average growth rate which was up to four times larger than the average growth rate of countries with higher level of penetration. Also, consistent with the results of Table 2, dependencies experienced a lower average level of penetration than colonies (2% vs. 4.5%). The pattern is substantially confirmed for the last three subsamples, while in the subsample 1960-73 the relationship is unclear. Two warnings are in order. First, it was during the period 1960-73 that most countries changed their political status and, in some cases, entered phases of political and economic turmoil. Second, the fact that oil-producing countries such as Gabon and Cameroon belong to the highest-penetration class, because of the large outflow of royalties, may partially explain why the results for this subsample are mixed.

As before, even though the economic significance of these differences is substantial, growth rates of GDP per-capita do not statistically differ across classes in all of the samples. Finally, the cross sectional correlation between average growth and the log of initial conditions is weak as is the relationship between level of penetration and other macroeconomic and sociopolitical variables of interest.

4.1.4   Summary

There are interesting heterogeneities in the growth pattern of GDP per-capita along the dimensions we examine, and economically significant differences emerge when considering all three "colonial" classifications. However, since standard deviations tend to be large, formal tests are unable to detect statistically significant differences.

There appear to be minor differences between the results obtained in the full sample and in the post-independence sample, suggesting that, if colonial rule had an impact, it may have not immediately vanished with the gain of political independence. Also, the mean growth rate of GDP per-capita by classes show time instabilities which could be associated with the end of the colonization era. In particular, over the last subsample, GDP per-capita growth rates are much more uniform across subgroups then in the first subsample.

Macroeconomic and sociopolitical indicators thought to be associated with growth are also clearly linked to our classifications. For example, the investment-output ratio and school attainment were higher for dependencies and for British and French colonies. Therefore, the association between these variables and GDP growth may in fact be due to the colonial status of the African continent [20].

4.2   Measuring the gains from decolonization

The process of economic decolonization in many British colonies began as early as in the aftermath of WWI and was almost completed by the end of WWII. However, it is only in 1957 with the independence of Ghana that we can officially mark the beginning of the era of political independence.

---

[20] In an attempt to examine whether there was a link between the length of colonial rule and growth we have also tabulated growth rates on the basis of the length of the colonial rule and the date of independence. We found no significant link because all countries were colonized and become independent approximately at the same time.

By 1960, 22 of the 38 colonies of our sample were politically independent. With the collapse of the Portuguese empire in the mid-Seventies the process reached its end.

The economic consequences of decolonization are difficult to measure. First, political and economic independence rarely coincided. For some countries, the process of economic decolonization started long before the end of political domination. For others, the high degree of enforcement of direct investment and trade persisted long after political domination ended. Second, according to historians there appeared to be little economic rationality on the part of the colonizers behind the decision to liberate Africa [21]. Most colonies were set free when they were economically more dynamic that in any period since 1920, hinting that the motive for decolonization was mainly political. The relative violence of the liberation process also has to be taken into account when trying to evaluate its economic consequences. Despite these difficulties, we attempt to measure the gains from decolonization by examining the growth pattern experienced by colonies in the years before and after political independence.

Since data on GDP per-capita for many countries only starts in 1960, we are forced to drop almost all countries which acquired independence before 1960 from the sample. Moreover, to make comparisons meaningful, we require data to exist for six years before independence, so that the sample is reduced even more. In the end we were left with 18 countries (Angola, Botswana, Capo Verde, Gambia, Guinea Bissau, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Nigeria, Swaziland, South Africa, Uganda, Zaire, Zambia, Zimbabwe) 5 of which were dependencies.

To quantify the effects of decolonization, we begin by computing the average growth rates for six years before and after independence for each country; then we calculate the cross sectional average growth rate in the 12 years surrounding independence; and finally, we assess the presence of a structural break in the mean growth pattern after independence using the cross-sectional information in the years before independence. The forecasting model has the form

$$y_0^i = \alpha_0^i + \sum_{t=1}^{4} \alpha_t y_{-t}^i + e_t^i \quad i = 1, 2, \ldots, 18 \tag{1}$$

where $t = 0$ is independence time. We construct estimates of α_0^i and α_t and forecasts $\hat{y}_t^i$, $t = 0, 1, \ldots, 4$ using simple recursive prediction formulas based on the information variable at $t = 0$. We allow the intercept to be country-specific, since forcing homogeneity creates heteroskedasticity in the residuals. With this set-up residuals do not display any significant deviation from the white noise assumption.

Table 7 first presents the six countries of the sample for which statistically significant growth differences between the pre-independence and post-independence samples exist. Notice that in all cases there is at least a 4% difference in the growth rate across subperiods. Also, four out of six countries were actually dependencies suggesting that dependencies were capable of taking maximum advantage of the new political order.

Over the cross section, the average growth rates for the 12 years surrounding independence display interesting features. First, in the three years before independence the average growth rate of GDP per-capita was negative, indicating that conflicts for political independence may have temporarily hampered growth. Second, after independence, growth rates were all positive and increasing, peaking at about 6% in the sixth year after independence. Third, there is a declining cross sectional variability of growth rates after independence, with a trough in the third year.

Figure 1 presents the mean forecasts at $t = 0, 1 \ldots, 4$ together with the actual cross sectional averages at each point in time. It is clear that the model fails out-of-sample despite the fact that the

---

[21] See, for example, Fieldhouse (1986).

in-sample fit of is satisfactory (adjusted R^2 is of the order of 0.95). Statistical forecasting measures - such as the mean square error and the mean absolute deviation - confirm the presence of a structural break in the growth pattern of these countries at independence, as they are large relative to the cross sectional variability. Figure 1 clearly shows that, on average, the actual mean growth rate exceeded forecasted one by 1-2% percentage points, uniformly over the four forecasting horizons, a percentage which is large in economic terms, given the average GDP per-capita of these countries at independence. On the other hand, these results have to be taken with care, because the model's forecasts reflect, in part, the negative growth reported in the three years before independence.

In conclusion, at least for the countries in this restricted subsample, there is a significant structural break in the growth pattern at independence, with post-independence growth rates exceeding pre-independence and forecasted post-independence growth rates, an acceleration of the growth rate with a peak 4-6 years after independence and a relative decline of the cross sectional variability of the distribution of growth rates of GDP per-capita.

4.3   Regressions

The analysis of section 4.1 suggested that colonial history may have been important in determining the growth rate of GDP and the level of the variables typically used to explain the cross-sectional distribution of average growth rates across countries. However, the results were based on a bivariate analysis. To verify the hypothesis that colonial history is indeed a candidate third factor responsible for the comovements of these variables, we run simple growth regressions adding proxies for colonial heritage to standard variables, and examine (i) whether they have significant explanatory power for the average growth rate of GDP per-capita, and (ii) whether they affect the explanatory power of some of the standard variables. To this end, in Table 9 we present 3 regressions for each sample under consideration (labelled R1 to R3) of the form

$$\bar{y}_i = \beta x_i + \gamma D_i + u_i \tag{2}$$

where $\bar{y}_i$ is the average growth rate of GDP per-capita of country i in the sample, x_i is a set of "core" variables and D_i are dummies capturing colonial heritage.

We experimented with many combinations of the core variables, leading to a total of more than 100 regressions. For reasons of space, we selected the combination of economic, political and ethnic variables which has the best explanatory power for the average growth of GDP per-capita of African nations for the entire period. For this regression, x_i includes a constant, the log of GDP per-capita at the beginning of the sample $(\log Y_0)$, the squared log GDP per-capita at the beginning of the sample $(\log Y_0^2)$, the investment-output ratio (I/Y), the percentage of working age population in secondary school (School), the index of ethnic fractionalization (Fract), the index of political rights (Pright) and a dummy for oil producing countries (Oil) (regression R1). All regressors are measured in 1960 except for Pright which is an average over the 1960-64 period.

The square of the initial condition is used here to account for non-linearities in the relationship and may help to detect the presence of a polarization phenomenon which clearly appears in African data (see also Easterly and Levine (1994)). The oil dummy is used to account for the likely differential growth patterns of oil vs. non-oil countries. We do not directly consider the index of political instability here because, for the countries of our sample, it is highly collinear with included variables (see Table 8 for simple pairwise correlations). Regressions substituting the index of political rights with the proxy for market distortions (Pidev) gave substantially similar results, which we do not report. To this "best" regression we add a number of indicators for colonial heritage. Once again we have experimented with several combination of colonial variables, given

the set of core variables. We report only two additional regressions. In regression R2 D_i captures differences in the political status and in the metropolitan ruler: DDEP is a dummy for dependencies and DFR is a dummy for colonies which had France as metropolitan ruler [22]. In regression R3 we add to previous regressors two other dummies measuring classes of GNP/GDP ratio in 1960: DR1 (highest penetration) has the value of the GNP/GDP ratio if it is less then or equal to 0.94 and zero otherwise, while DR4 (lowest penetration) has the value of the GNP/GDP ratio if it is greater than 0.99 and zero otherwise. We use dummies for the level of penetration (as opposed to the level itself) because of the potential nonlinear effects that the size of the GNP/GDP ratio may have had on growth, effects which would have been neglected had we used the GNP/GDP ratio directly. Since we use explanatory variables dated in 1960 or calculated as averages over the 1960-64 period, endogeneity problems are likely to be minor. In fact, in a regression of the average growth rate of GDP per-capita from 1965 to 1988 (as opposed to 1960) on these variables, no qualitative changes occurred.

4.3.1 The 1960-88 sample

For the 1960-88 sample standard variables are significant at the 10% level and with the right sign in R1, except for the human capital proxy which is insignificant (as it is in all regressions that include the investment ratio). All other things being equal, average growth is higher the lower are initial conditions and the index of ethnic fractionalization, and the higher are the investment-output ratio, the human capital level and the index of political rights. Conditional convergence is fast (at a rate of 19%). The oil dummy is also significantly positive as is the square of the initial conditions, indicating the presence of polarization in the income distribution in African countries. The dummies for dependencies and for French colonies is positive and significant in R2 and R3 suggesting, other things being equal, that being a dependency of the UK or a colony of France provided a growth edge over other countries in Africa. These two dummies are somewhat correlated with I/Y, the schooling variable and the index of ethnic fractionalization, which are less significant in R2 than in R1. Also, the size of the coefficients of the initial condition is robust to the inclusion of dummies for political status confirming that political status is predetermined with respect to GDP growth. The two penetration dummies are not significant in R3, but their presence raises the explanatory power of the regression (the adjusted R^2 is 0.62 against the 0.49 of the basic regression). Since the coefficient of both dummies is positive, African countries which had either a very high or a very low GNP/GDP ratio did comparatively better in the continent, strenghtening the idea that there may be a nonlinear relationship between economic penetration and growth.

4.3.2 The Independence-1988 sample

For the sample that goes from independence to 1988 the results are similar. Therefore, we only highlight the most important features. In the basic regression, the investment-output ratio becomes more significant, indicating that there may have been a delayed effect of this variable on growth, while the initial condition and the initial condition squared loses significance.

The dummies for dependencies and for France as metropolitan ruler are still significant while the investment-output ratio, the human capital variable and the index of ethnic fractionalization are less significant in R2 than in R1. The two dummies for penetration classes are not significant and they tend to be correlated with the index of ethnic fractionalization. The adjusted R^2 of

---

[22]A dummy for British colonies was not used since most of its impact is already captured by DDEP, with which it is highly correlated.

the last regression is smaller to that of R2, suggesting that the effects of the penetration variable were likely to be important, if ever, only in the years preceding political independence. However, the beneficial effects of having been a French colony or a British dependency did not vanish with political independence.

4.3.3 The 1960-73 subsample

The subsample 1960-73 can be viewed as the one that more closely capture the last phase of the colonial era and the associated economic and political turmoil. Two main features emerge from the basic regression. First, only the investment-output ratio is significant among the core variables. Second, and as a consequence of the above, the explanatory power of the cross sectional regressions is very low, much lower than in the previous two samples.

The dummy for dependencies is still significant when added to the core variables, while the dummy for French colonies is not probably because in these countries the political unrest and the destructions caused by the difficult process of political independence may have temporarily wiped out the beneficial growth effects of being a French colony. In R2 the significance of the investment-output ratio drops relative to the baseline case, as a consequence of the high correlation with the dependency dummy.

Adding the penetration dummies increases the explanatory power, but the improvement is relative: for this subsample having a low GNP/GDP ratio was good for growth, so that the modernization effect of colonial investment outweighted the negative effect.

4.3.4 The 1974-80 subsample

For the 74-80 subsample the core regression is again disappointing, at least from the vantage point of neoclassical growth theory, with insignificant coefficients for the initial condition and all the other standard variables, except for the index of ethnic fractionalization.

The dummies for dependencies and for France as metropolitan ruler are positive and significant in R2, but appear to be uncorrelated with other variables in the equation. Adding the penetration dummies does not change the overall picture; all the variables which were previously significant are still so and the adjusted R^2 is unchanged.

4.3.5 The 1981-88 subsample

In this subsample the initial conditions and the initial conditions squared are the variables with the largest explanatory power and the index of political rights is the only other significant variable in R1. None of the colonial dummies is significant, indicating that the influence of colonial rule may have faded in the last decade on the sample. On the other hand, because standard variables have little explanatory power further research into the causes of the negative growth performance of this period of African history in needed [23]. Notice also that the two penetration dummies are somewhat correlated with the human capital variable for this sample.

4.3.6 Summary

There are several interesting results which emerge from our regression analysis. First, our proxies for colonial heritage are significant and add substantial explanatory power in cross-sectional growth regressions for the relevant samples: their influence is stronger in the first subsample and slowly

---

[23]Ghura and Hadjimichael (1995) provide an investigation of sub-Sahara growth experience in 1981-92.

fades as time progresses. Second, variables proxying for colonial heritage appear to be correlated with the investment-output ratio, ethnic fractionalization and human capital accumulation, and drive the significance of these variables down when they are jointly included in the regressions. Third, variables proxying for colonial heritage are less significant and less correlated with core variables in the post independence sample. These three facts taken together suggest that colonial heritage may indeed have been an important (exogenous) third factor causing cross-sectional comovements of growth rates and of variables typically used to explain them and that colonial influence faded somewhat slowly after African countries reached political independence.

At the same time, our analysis demonstrates that, at least for Africa, there is significant instability in the factors affecting growth over time. The investment-output ratio is significant in the 1960-73 subsample, the index of ethnic fractionalization is significant in the 1974-80 subsample and the index of political rights is significant in the 1981-88 subsample. This instability denies the existence of a single "cause" for Africa's poor growth performance over the last thirty years and suggests that different variables matter for different stages of development. In the initial stage investment in physical capital appears to be the most important factor, while later on human capital accumulation and political rights become crucial for growth. In general, these findings open interesting avenues for research attempting to account for this sequential process, both at the empirical and the theoretical levels.

4.4   Can we explain the significance of the Africa dummy?

Having identified those colonial variables which appear to be important in explaining Africa's cross sectional growth pattern, we would like to know if they are also important in explaining Africa's growth performance relative to that of other continents. In other words, we would like to know whether the inclusion of variables describing the metropolitan ruler, the political status or the economic penetration experienced by African countries is sufficient to drive away the importance of a sub-Saharan dummy in regressions including countries from the entire world.

To check whether this is the case, we first replicate Barro's (1991) results (regressions 29) using our data set, and then show the effects of including our proxies for colonial heritage in the regressions. Notice that out of the 98 countries in the sample, 30 belong to the African continent. The additional variables appearing in these regressions are from Barro and Lee (1994b). Since the relationship between the penetration variable and growth appear to be linear, we present results entering directly the GDP/GNP ratio into the regressions. Also, to capture the unusual features of the African colonial experience, the dummy for France as metropolitan ruler and the one for British dependencies are selected to have nonzero values only if the country belonged to the African continent. In other words, we do not assign any special status to French colonies, say, in Asia, since, as we argued in Section 3, they may have been subjected to different guidelines than African ones. The results are presented in Table 10. In the first regression (called Basic), and consistent with Barro's evidence, we find very slow convergence (1.4% a year). The size of the government sector relative to GDP, the investment-output ratio and the fertility rate are significant and with the right sign, while human capital, the magnitude of market price distortions and political variables are insignificant. Both the Latin America and the Africa dummies are negative, even though the size of the coefficient on the Latin America dummy is smaller and less significant.

Adding colonial dummies makes the coefficient of the Africa dummy less negative and less significant, while the coefficient of the Latin America dummy remains stable (Variant 1). The behavior of all other variables is unchanged: those which were significant and those which were not remain so. In Variant 2 we maintain our colonial dummies and exclude the Africa dummy from

the regressions. We would like to know whether the explanatory power of the regressions and the coefficient on other variables are changed. Although one of the colonial dummies is not significant, we do find that the adjusted R^2 and the coefficients on other variables are unaltered. Hence, colonial past and the peculiarities of Africa's underdevelopment appear to be highly correlated.

5   Conclusion

In this paper we have provided a set of stylized facts concerning the impact of colonial rule on the growth rate of GDP per-capita in African countries and attempted to verify some of the hypotheses put forward in Bertocchi (1994). We argued that the choice of Africa as the focus of our analysis is dictated by important historical considerations, but that at the same time the lack of adequate data imposed severe constraints on the type of investigation we were able to undertake. We also argued that some of the variables used in standard growth regressions are endogenous and that their cross sectional properties may indeed be the result of economic colonization.

Our investigation shows that the impact of colonization on growth in Africa was, on average, negative. We find economically significant differences in the average growth rates once we group countries according to the political status, the metropolitan ruler and the degree of economic penetration experienced under colonial rule: dependencies do better than colonies, British and French colonies do better than Portuguese and Italian ones, and low-penetration countries do better than high-penetration ones. Moreover, we show that important macroeconomic and sociopolitical variables commonly used to explain cross-sectional differences in growth rates display important heterogeneities associated with colonial history. We also detect time instabilities across subsamples which could be related, to some extent, with the end of the colonization era. The regression analysis demonstrates that variables proxying for colonial heritage are significant in explaining the cross-sectional distribution of average growth rates. Moreover, standard variables typically included in growth regression (e.g., proxy measures for human capital, ethnic diversity, etc.) are correlated with our measures of colonial heritage and lose their explanatory power when they are jointly included in the regression. Finally, we show that variables capturing colonial heritage account for the differential and negative performance of Africa relative to other continents and are highly correlated with the Sub-Sahara dummy that other studies have used.

REFERENCES

Alam, M.S., 1994, Colonialism, Decolonization and Growth Rates: Theory and Empirical Evidence, *Cambridge Journal of Economics* 18, 235-257.

Azariadis, C. and Drazen A., 1990, Threshold Externalities in Economic Development, *Quarterly Journal of Economics* 105, 501-526.

Bairoch, P., 1993, *Economics and World History. Myths and Paradoxes*, Harvester Wheatsheaf, Hemel Hempstead.

Barro, R.J., 1991, Economic Growth in a Cross Section of Countries, *Quarterly Journal of Economics* 106, 407-444.

Barro, R.J., 1996, Democracy and Growth, *Journal of Economic Growth* 1, 1-24.

Barro, R.J. and Lee, J., 1994a, Sources of Economic Growth, *Carnegie-Rochester Conference Series on Public Policy* 40, 1-46.

Barro, R.J. and Lee, J., 1994b, Data Set for a Panel of 138 Countries, manuscript.

Barro, R.J., and Sala-i-Martin, X., 1995, *Economic Growth*, McGraw-Hill, New York.

Bertocchi, G., 1994, Colonialism in the Theory of Growth, Brown University Working Paper No. 94-14.

Boahen A. (ed.), 1990, *General History of Africa, VII. Africa under Colonial Domination 1880-1935*, abridged edition, UNESCO, Paris.

Carocci, G., 1979, *L'Eta' dell'Imperialismo*, il Mulino, Bologna.

Chari, V.V., Kehoe, P.J. and McGrattan, E.R., 1996, The Poverty of Nations: A Quantitative Exploration, Federal Reserve Bank of Minneapolis, Research Department Staff Report 204.

Chhibber, A. and Fischer, S.(eds.), 1991, *Economic Reform in Sub-Saharan Africa*, World Bank, Washington.

Davidson, B., 1992, *The Black Man's Burden. Africa and the Curse of the Nation-State*, Random House, New York.

Davis, L.E. and Huttenback, R.A., 1988, *Mammon and the Pursuit of Empire*, Cambridge University Press, New York.

Easterly, W. and Levine, R., 1994, Africa's Growth Tragedy, mimeo, World Bank.

Elbadawi, I. and Ndulu, B., 1994, Long-Term Development and Sustainable Growth in Sub-Saharan Africa, mimeo, AERC.

Fieldhouse, D.K., 1986, *Black Africa 1945-80. Economic Decolonization and Arrested Development*, Allen and Unwin, London.

Gallagher, J. and Robinson, R.E., 1953, The Imperialism of Free Trade, *Economic History Review* 6, 1-15.

Gastil, R.D., 1987, *Freedom in the World*, Greenwood Press, Westport.

Ghura, D. and Hadjimichael, M.T., 1995, Growth in Sub-Saharan Africa, mimeo, International Monetary Fund.

Grossman, H.I. and Iyigun M., 1995, The Profitability of Colonial Investment, *Economics and Politics* 7, 229-242.

Husain, I. and Faruqee, R. (eds.), 1994, *Adjustment in Africa: Lessons from Case Studies*, World Bank, Washington.

Kleiman, E., 1976, Trade and the Decline of Colonialism, *Economic Journal* 86, 459-480.

Levine, R. and Renelt, D., 1992, A Sensitivity Analysis of Cross-Country Growth Regressions, *American Economic Review* 82, 942- 963.

Lucas, R.E. Jr., 1988, On the Mechanics of Economic Development, *Journal of Monetary Economics* 22, 3-42.

Lucas, R.E. Jr., 1990, Why Doesn't Capital Flow from Rich to Poor Countries?, *American Economic Review Papers and Proceedings* 80, 92-96.

Maddison, A., 1995, *Monitoring the World Economy*, OECD, Paris.

Mankiw, N.G., Romer, D. and Weil, D.N., 1992, A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics* 107, 407-437.

Mauro, P., 1995, Corruption and Growth, *Quarterly Journal of Economics* 110, 681-712.

Mitchell, B.R., 1982, *International Historical, Statistics. Africa and Asia*, Macmillan, London.

Oliver, R. and Fage, J.D., 1962, *A Short History of Africa*, Penguin Books, Harmondsworth.

Romer, P.M., 1989, Human Capital and Growth: Theory and Evidence, NBER Working paper No. 3173.

Schmidt-Hebbel, K., 1995, Fiscal Adjustment and Growth: In and Out of Africa, mimeo, The World Bank.

Summers, R. and Heston, A., 1991, The Penn World Table (Mark 5): An Expanded Set of International Comparison. 1950-1988, *Quarterly Journal of Economics* 106, 327-368.

Svedberg, P., 1981, Colonial Enforcement of Foreign Direct Investment, *The Manchester School* 49, 21-38.

Taylor, C.L. and Hudson, M.C.. 1972, *World Handbook of Political and Social Indicators*, ICSPR, Ann Harbor.

von der Mehden, F.R., 1969, *Politics of the Developing Nations*, Prentice-Hall, Englewood Cliffs.

Table 1: Status of the Countries in the Sample

Country	Political Status	Metropolitan Country	Independence
Algeria	C	France	1962
Angola	C	Portugal	1974
Benin	C	France	1960
Botswana	D	UK	1966
Burkina Faso	C	France	1960
Burundi	C	Belgium	1962
Cameroon	C	France	1960
Cape Verde	C	Portugal	1975
Central African R.	C	France	1960
Chad	C	France	1960
Congo	C	France	1960
Egypt	D	UK	1922
Ethiopia	I		
Gabon	C	France	1960
Gambia	C	UK	1965
Ghana	C	UK	1957
Guinea	C	France	1958
Guinea-Bissau	C	Portugal	1975
Ivory Coast	C	France	1960
Kenya	C	UK	1963
Lesotho	D	UK	1966
Liberia	I		
Madagascar	C	France	1960
Malawi	C	UK	1964
Mali	C	France	1959
Mauritania	C	France	1960
Mauritius	C	UK	1968
Morocco	C	France	1956
Mozambique	C	Portugal	1975
Niger	C	France	1960
Nigeria	C	UK	1960
Rwanda	C	Belgium	1962
Senegal	C	France	1959
Seychelles	C	UK	1976
Sierra Leone	C	UK	1961
Somalia	C	Italy	1960
South Africa	D	UK	1961
Sudan	C	UK	1956
Swaziland	D	UK	1968
Tanzania	C	UK	1964
Togo	C	France	1960
Tunisia	C	France	1956
Uganda	C	UK	1962
Zaire	C	Belgium	1960
Zambia	C	UK	1964
Zimbabwe	D	UK	1965

Notes: C stands for colony, D for dependencies and I for independent.

Table 2: Growth Rates by Political Status

Sample	Variable	Overall	Colonies	Dependencies	Independent
60-88	$\overline{\Delta Y}$	1.120	0.846	3.280	-0.139
		(1.905)	(1.649)	(2.355)	(1.430)
Indep-88	$\overline{\Delta Y}$	1.360	1.089	3.526	0.010
		(2.730)	(2.660)	(2.747)	(1.242)
60-73	$\overline{\Delta Y}$	1.965	1.624	4.351	1.075
		(2.203)	(2.031)	(2.103)	(0.790)
74-80	$\overline{\Delta Y}$	0.532	0.013	3.933	0.193
		(4.519)	(4.609)	(2.985)	(1.217)
81-88	$\overline{\Delta Y}$	-0.547	-0.333	-1.327	-2.268
		(4.274)	(4.315)	(4.778)	(2.959)
Cross Sectional Correlation Average Growth- Log Initial Conditions					
Sample		Overall	Colonies	Dependencies	Independent
60-88		-0.14	0.01	-0.18	-0.26
Indep-88		-0.05	0.00	-0.07	-0.29
60-73		-0.02	0.06	-0.06	-0.23
74-80		0.03	0.03	-0.05	-0.24
81-88		-0.40	-0.34	-0.23	0.00

Notes: $\overline{\Delta Y}$ is the average growth rate of income over the sample.

Table 3: Statistics of Other Variables by Political Status

Variable	Overall	Colonies	Dependencies	Independent
I/Y	13.979	13.045	19.600	13.450
School	2.302	2.061	3.833	1.800
Polinst	0.080	0.085	0.038	0.159
Pright	5.415	5.523	4.638	5.694
Fract	61.690	63.428	43.800	76.000
Pidev	0.269	0.308	0.099	0.068

Notes: I/Y is the investment-output ratio in 1960; *School* is the percentage of the working population in secondary school in 1960; *Polinst* is an index of political instability in 1960; *Pright* is an index of political rights over the period 1960-64 and *Fract* is an index of ethnic fractionalization in 1960.

Table 4: Growth Rates by Metropolitan Ruler

Sample	Variable	France	U.K.	Portugal	Belgium	Italy	Former German
60-88	$\overline{\Delta Y}$	1.061	1.097	-0.156	0.227	-0.216	1.362
		(1.836)	(1.534)	(1.514)	(0.869)		(0.698)
Indep-88	$\overline{\Delta Y}$	1.474	1.385	-1.209	1.026	0.038	2.006
		(2.317)	(1.828)	(5.906)	(1.544)		(0.772)
60-73	$\overline{\Delta Y}$	1.661	1.872	1.657	1.347	-0.950	1.998
		(2.358)	(1.247)	(2.852)	(1.872)		(2.353)
74-80	$\overline{\Delta Y}$	1.018	-0.716	-3.039	-0.863	5.452	2.827
		(2.979)	(5.132)	(7.779)	(5.936)		(0.937)
81-88	$\overline{\Delta Y}$	-1.119	1.080	0.021	-0.962	-2.737	-1.283
		(2.457)	(6.493)	(4.984)	(1.431)		(1.622)

Cross Sectional Correlation: Average Growth- Log Initial Conditions

Sample	France	U.K.	Portugal	Belgium	Former German
			Colonies of		
60-88	0.10	-0.05	-0.13	0.01	-0.20
Indep-88	0.11	0.05	-0.09	-0.18	-0.25
60-73	0.17	-0.12	0.05	-0.16	-0.24
74-80	-0.00	0.17	-0.11	0.00	-0.19
81-88	-0.28	-0.28	-0.02	0.13	0.03

Enforcement Ratios in 1938

	France	U.K.	Portugal	Belgium	Italy
Foreign Direct Investment	4.2	2.1	9.6	6.7	9.1
Trade	2.7	2.2	29.8	10.4	N A

Notes: $\overline{\Delta Y}$ is the average growth rate of income over the sample. Enforcement ratios are from Svedberg (1981).

Table 5: Statistics of Other Variables by Metropolitan Ruler

Variable	France	U.K.	Portugal	Belgium	Italy	Former German
I/Y	13.701	14.980	5.950	6.506	13.800	11.860
$School$	2.094	2.400	1.259	1.466	1.100	1.520
$Polinst$	0.058	0.107	N A	0.109	0.200	0.087
$Pright$	5.669	4.782	6.361	6.074	6.777	5.866
$Fract$	61.777	77.181	71.500	36.000	8.000	54.200
$Pidev$	0.339	0.022	0.255	1.355	-0.293	0.271

Notes: I/Y is the investment-output ratio in 1960; $School$ is the percentage of working age population in secondary school in 1960; $Polinst$ is an index of political instability in 1960; $Pright$ is an index of political rights over the period 1960-64 and $Fract$ is an index of ethnic fractionalization in 1960. per woman, $Pidev$ the price of investment in 1960 in deviation

Table 6: Growth Rates by Degree of Economic Penetration in 1960

Sample	Variable	GNP/GDP ratio			
		Less 0.94	0.94-0.96	0.97-0.99	Greater 0.99
60-88	$\overline{\Delta Y}$	0.697	0.387	0.677	1.266
		(2.023)	(1.772)	(1.363)	(1.513)
Indep-88	$\overline{\Delta Y}$	0.409	0.516	1.053	1.900
		(3.971)	(1.702)	(1.797)	(2.083)
60-73	$\overline{\Delta Y}$	2.104	2.505	1.522	0.906
		(2.720)	(1.701)	(1.913)	(1.389)
74-80	$\overline{\Delta Y}$	-1.268	-2.589	-0.185	2.239
		(6.083)	(3.650)	(2.792)	(3.908)
81-88	$\overline{\Delta Y}$	-1.347	-0.265	-0.062	0.304
		(3.308)	(4.758)	(2.076)	(6.030)

Cross Sectional Correlation Average Growth Rate - Log Initial Conditions				
Sample	Less 0.94	0.95-0.97	0.98-1.00	Greater 1.00
60-88	0.06	-0.12	-0.17	0.14
Indep-88	-0.01	-0.06	-0.18	0.13
60-73	0.25	-0.12	-0.22	0.08
74-80	-0.22	0.17	-0.05	0.27
81-88	-0.19	-0.10	-0.04	-0.26

Notes: $\overline{\Delta Y}$ is the average growth rate of income over the sample. Classes are constructed using GNP/GDP ratio in 1960.

Table 7: Statistics Before and After Independence
a) Test of Equality of Average Growth Rates

Country	Growth Rate Before Independence	Growth Rate After Independence	Significance
South Africa	0.23	4.46	0.00
Botswana	2.20	11.51	0.05
Capo Verde	-5.98	8.11	0.06
Zimbabwe	-1.41	3.16	0.09
Lesotho	8.61	2.36	0.10
Malawi	-0.27	4.99	0.10

b) Cross Sectional Mean Growth Rate Around Independence

Year	Mean	Standard Deviation
-6	1.89	7.78
-5	4.32	6.43
-4	0.86	5.94
-3	-0.14	5.69
-2	-2.42	10.41
-1	-0.43	8.05
Independence	1.11	8.39
1	1.28	13.64
2	2.82	8.82
3	2.69	3.55
4	3.66	6.34
5	1.03	8.13
6	6.24	9.85

Notes: The "Significance" column reports the significance level of a t-test for a statistic of the form $X = \frac{(m_i - m_j)}{\sqrt{(var_i + var_j - 2*cov_{ij})}}$, where m_i and m_j are the means growth rate before and after independence, var_i and var_j their variance and cov_{ij} their covariance.

Table 8: Correlation Matrix

Variables	School	I/Y	Polinst	Pright	Fract	Pidev	DFR	DDEP
I/Y	0.23							
Polinst	0.00	-0.14						
Pright	-0.40	0.10	0.37					
Fract	-0.24	-0.13	-0.30	-0.13				
Pidev	0.54	0.27	-0.05	-0.18	-0.46			
DFR	-0.32	0.02	-0.24	0.14	0.21	-0.03		
DDEP	0.54	0.24	-0.10	-0.16	-0.27	0.36	-0.44	
Drain	-0.18	-0.29	0.36	-0.15	-0.31	-0.05	-0.21	-0.01

Notes: I/Y represents the investment-output ratio, School the percentage of working age population in secondary school, Polinst an index of political instability, Fract an index of ethnic fractionalization, all in 1960. Pright an index of political rights for the 1960-64 period. DFR is a dummy for colonies with France as metropolitan ruler and DDEP a dummy for British dependencies. Drain is the GNP/GDP ratio in 1960.

Table 9: Growth Regressions

	Constant	$\log Y_0$	$(\log Y_0)^2$	I/Y	School	Fract	Pright	DFR	DDEP	Oil	DR1	DR4	$\bar{R}^2$
					Sample 1960-1988								
R1	70.74	-19.00	1.33	0.09	0.17	-0.02	-0.58			1.93			0.49
	(3.04)	(-2.68)	(2.46)	(2.69)	(1.00)	(-2.82)	(-2.39)			(2.62)			
R2	82.20	-22.52	1.59	0.07	0.10	-0.02	-0.63	1.35	1.56	1.97			0.60
	(3.66)	(-3.31)	(3.08)	(2.35)	(0.70)	(-2.54)	(-2.94)	(2.99)	(2.10)	(3.02)			
R3	77.03	-20.91	1.45	0.07	0.09	-0.02	-0.59	1.15	1.84	1.87	0.69	0.99	0.62
	(3.41)	(-3.06)	(2.81)	(2.48)	(0.59)	(-2.55)	(-2.71)	(2.41)	(2.44)	(2.71)	(1.20)	(1.42)	
					Sample Independence-1988								
R1	70.12	-18.06	1.20	0.16	0.29	-0.02	-0.68			1.28			0.42
	(1.94)	(-1.67)	(1.48)	(3.37)	(1.26)	(-2.30)	(-1.98)			(1.23)			
R2	88.94	-23.63	1.60	0.15	0.25	-0.02	-0.79	1.94	1.72	1.27			0.54
	(2.59)	(-2.30)	(2.08)	(3.22)	(1.16)	(-2.02)	(-2.52)	(3.03)	(1.63)	(1.36)			
R3	84.16	-22.34	1.51	0.14	0.20	-0.02	-0.74	1.77	1.88	1.48	-0.21	0.64	0.51
	(2.34)	(-2.09)	(1.89)	(3.08)	(0.87)	(-1.93)	(-2.24)	(2.51)	(1.68)	(1.43)	(-0.24)	(0.61)	
					Sample 1960-1973								
R1	43.68	-12.01	0.83	0.10	0.21	-0.003	-0.18			2.18			0.20
	(1.35)	(-1.22)	(1.12)	(2.29)	(0.93)	(-0.31)	(-0.56)			(2.24)			
R2	22.73	-5.84	0.37	0.07	0.10	0.002	-0.16	0.15	2.01	2.29			0.23
	(0.64)	(-0.54)	(0.47)	(1.66)	(0.45)	(0.24)	(-0.50)	(0.23)	(1.77)	(2.38)			
R3	25.41	-6.40	0.39	0.08	0.17	0.002	-0.18	0.17	2.09	1.73	1.44	0.21	0.25
	(0.70)	(-0.59)	(0.48)	(1.82)	(0.71)	(0.18)	(-0.56)	(0.25)	(1.80)	(1.70)	(1.70)	(0.20)	
					Sample 1974-1980								
R1	-3.88	3.51	-0.31	0.05	0.29	-0.06	-0.45			0.23			0.08
	(-0.07)	(0.25)	(-0.32)	(0.49)	(0.60)	(-2.72)	(-0.67)			(0.11)			
R2	-1.46	2.96	-0.30	0.01	0.21	-0.05	-0.55	2.51	3.82	0.49			0.16
	(-0.03)	(0.22)	(-0.33)	(0.14)	(0.44)	(-2.24)	(-0.85)	(1.91)	(1.73)	(0.24)			
R3	-14.70	6.26	-0.51	0.007	-0.009	-0.05	-0.34	1.87	4.34	1.39	-0.98	2.59	0.16
	(-0.30)	(0.46)	(-0.54)	(0.07)	(-0.01)	(-2.18)	(-0.51)	(1.35)	(1.90)	(0.65)	(-0.54)	(1.20)	
					Sample 1981-1988								
R1	198.05	-50.19	3.28	0.05	0.19	-0.02	-1.80			0.65			0.54
	(5.81)	(-5.32)	(4.97)	(0.76)	(0.56)	(-1.45)	(-3.67)			(0.43)			
R2	199.22	-50.29	3.26	0.04	0.19	-0.02	-1.86	1.16	1.61	0.84			0.53
	(5.77)	(-5.27)	(4.88)	(0.62)	(0.54)	(-1.21)	(-3.73)	(1.14)	(0.95)	(0.54)			
R3	197.05	-49.74	3.22	0.04	0.15	-0.02	-1.81	1.04	1.72	1.03	-0.17	0.55	0.50
	(5.46)	(-5.00)	(4.62)	(0.59)	(0.41)	(-1.15)	(-3.44)	(0.95)	(0.94)	(0.61)	(-0.12)	(0.32)	

Notes: $\log Y_0$ represents initial conditions, $(\log Y_0)^2$ squared initial conditions, I/Y the investment-output ratio and School the percentage of working age population in secondary school; Fract an index of Ethnic fractionalization: Pright an index of political rights; Pidev the price of investment in 1960 in deviation from sample mean; DFR is a dummy for France as metropolitan ruler, DDEP is a dummy for British dependencies, Oil is a dummy for oil producing countries, DR1 (DR4) ia a dummy which assumes the value of the GNP/GDP ratio in 1960 if it is smaller than 0.94 (larger than 0.99) and zero otherwise.

Table 10: World Growth Regressions
Sample 1960-1988

Regressions	Basic	Variant 1	Variant 2
Constant	0.151	0.155	0.149
	(4.85)	(4.87)	(4.61)
$\log Y_0$	-0.014	-0.015	-0.013
	(-4.48)	(-4.62)	(-4.28)
SEC	0.0002	0.0002	0.0002
	(1.00)	(1.18)	(0.95)
PRIM	-0.00001	0.00004	-0.000003
	(-0.15)	(0.05)	(-0.04)
G/Y	-0.097	-0.097	-0.103
	(-3.28)	(-3.23)	(-3.30)
REV	-0.004	-0.003	-0.003
	(-1.38)	(-1.21)	(-1.23)
ASSAS	0.001	-0.0009	0.001
	(0.28)	(0.27)	(0.42)
PIDEV	-0.002	-0.002	-0.001
	(-1.16)	(-1.02)	(-0.85)
I/Y	0.050	0.049	0.052
	(2.49)	(2.46)	(2.55)
FERT	-0.003	-0.004	-0.003
	(-2.60)	(-2.34)	(-2.08)
AFRICA	-0.021	-0.017	
	(-5.14)	(-3.11)	
LATIN	-0.010	-0.009	-0.010
	(-2.89)	(-2.61)	(-2.78)
DFR		0.005	0.010
		(1.17)	(2.07)
DDEP		0.009	0.007
		(1.04)	(0.85)
DRAIN		-0.00006	-0.0002
		(0.80)	(-4.43)
$\bar{R}^2$	0.60	0.60	0.60

Notes: $\log Y_0$ represents initial conditions, SEC and PRIM secondary and primary education attainments, G/Y the government expenditures to output ratio, I/Y the investment-output ratio, REV the number of revolutions and coups per year, ASSAS the number per million of population of political assassinations per year, PIDEV is the deviation of the Price of investment from the sample mean, FERT the fertility rate; AFRICA is a dummy for Sub-Sahara Africa and LATIN a dummy for Latin and South America, excluding Mexico. All these variables are from Barro (1991). Drain is the GNP/GDP ratio in 1960; DFR is a dummy for African countries with France as metropolitan ruler and DDEP is a dummy for African countries which were British dependencies. Basic corresponds to regression 29 of Barro (1991) for our data set.