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of Africa's Underdevelopment

by

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# Did Colonization Matter for Growth?

An Empirical Exploration into the Historical Causes of Africa's Underdevelopment

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## Abstract

This paper investigates the impact of 20th-century European colonization on African countries. We find that colonization mattered for growth: having been a dependency rather than a colony, a colony of the UK or France rather than Portugal, Belgium or Italy, and having been less exploited, had some beneficial growth effects. On average, growth accelerates after independence. Variables proxying for colonial heritage add explanatory power to standard growth regressions, while indicators for human capital and political and ethnic instability lose significance. The coefficient of a dummy for sub-Saharan Africa becomes less significant in a cross section of 98 countries after controlling for colonial experience.

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 <sup>1</sup>. However, little attention has been so far devoted 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 attempt to empirically assess the economic impact of colonial rule on the growth rates of colonized countries. We focus attention on the case of Africa. There are several reasons for our choice. First, historically, nowhere else colonization was so far-reaching and homogeneous in nature as in the African experience that started at the end of the last century <sup>2</sup>. 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 the African continent and all were colonies <sup>3</sup>. 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 by the available studies. 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 <sup>4</sup>. 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

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<sup>1</sup>For a systematic description of recent developments in growth theory, see Barro and Sala-i-Martin (1995).

<sup>2</sup>See Oliver and Fage (1962) and Boahen (1990) for a history of Africa.

<sup>3</sup>Only 5 of the 23 countries in the upper quintile are from the African continent, of which 3 were colonies.

<sup>4</sup>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.

cross-country regressions, and by Schmidt-Hebbel (1995), who focuses on fiscal indicators.

Our conjecture is that colonization may be the reason why growth rates of per-capita GDP have been low in African countries. Colonial rule, by exploiting natural resources, monopolizing access to local markets and repatriating profits obtained from investment activities, may in fact have created the conditions for a permanent reduction in the growth rates of these countries. Bertocchi (1994) has provided a stylized theoretical model, describing an underdeveloped country before and after colonization takes place, which accounts for these phenomena. Colonial domination is described as the presence of restrictions on foreign investment in the colony, unilaterally imposed by the metropolitan country, and of direct exploitation activities through subtraction from local resources<sup>5</sup>. In this paper 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 concerning the effects of colonial rule on the growth rate of African countries.

In the available empirical literature, the causes of slow growth have been found 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 explanatory power, in the sense that their sign and significance vary 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 so that the relationship between these variables and the average growth rates of GDP found in the data is not structural.

Our 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 enslavement of the indigenous population and distortive educational policies, for example, colonization may have affected human capital accumulation and be responsible for the observed low level of literacy rates. Moreover, the high degree of political instability and ethnic conflict<sup>6</sup> which characterizes African countries can also be viewed as a legacy of colonization. At independence, 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-existing political institutions operated by the colonizers.

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<sup>5</sup>See also Lucas (1990) and Grossman and Iyigun (1995) on the economics of colonialism.

<sup>6</sup>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 empirical analysis is organized in four parts. In the first part, we report basic statistics on selected variables once we take into account heterogeneities having to do with the countries' colonial history. Then we try to measure the effects of decolonization by focussing on the growth pattern before and after political independence. In the third part of our investigation 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 African dummy away.

Our results demonstrate that there are economically significant differences in the growth pattern of African countries and in other crucial macroeconomic and sociopolitical variables, once we group them according to political status, metropolitan ruler and drain of wealth, with dependencies performing better than colonies, and British and French colonies performing better than others'. We also show that, over the cross section of countries, the average growth rate of GDP after political independence was substantially higher than before independence and that actual growth rates exceeded by 1-2% forecasted ones, 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 cross sectional growth experience of African countries 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 drain had some beneficial growth effects in Africa. We also find that variables included in standard growth regressions, in particular, proxy measures for human capital and political and ethnic stability, 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 reduce considerably its significance in the regression. We conclude that colonial history is a crucial factor in explaining the poor performance of African nations relative to other continents.

The rest of the paper is organized as follows. In section 2 we briefly discuss a theoretical framework which helps us to motivate the empirical investigation and interpret the results. In section 3 we discuss the data and describe the criteria used to classify and group countries. In section 4 we present the results. Section 5 draws some conclusions.

## 2 A theoretical framework

Before colonization takes place, the economy of the would-be colony can be described by a neoclassical growth model which, under standard assumptions on preferences and technology, generates a dynamic equation for capital accumulation of the form

$$k_{t+1} = s[w(k_t), r(k_t)] \quad (1)$$

where  $k_t$  is local capital,  $s$  denotes the saving function,  $w$  is the wage rate and  $r$  the interest rate. Equation (1) can be obtained within an overlapping-generations model with two-period-lived agents, constant population and full capital depreciation. Under additional assumptions the dynamics generated by (1) are associated with a unique equilibrium path converging to a stationary equilibrium starting from any initial  $k_0$ . Since the economy is underdeveloped, we assume that  $k_0$  is relatively small.

As in Bertocchi (1994), the economic effects of colonization are captured by adding two features to (1): (i) the stock of local capital is augmented by an exogenous flow of foreign investment,  $i_t$ , which is controlled by the metropolitan country and restricted so as to keep colonial returns to capital higher than in the metropolis (in other words,  $i_t$  is not large enough to equalize returns worldwide)<sup>7</sup>; (ii) the metropolitan country exercises direct exploitation onto the colony, in the form of taxes, tariffs, and forced labor, by subtracting a fraction  $e$  to the income of factors of productions. The colonial economy can therefore be described by a dynamic equation for capital accumulation of the form:

$$k_{t+1} = s[(1 - e)w(k_t + i_t), (1 - e)r(k_t + i_t)] \quad (2)$$

Notice that equation (2) includes a “modernization” effect (possibly in the form of infrastructures) generated by the flow of metropolitan capital  $i_t$ , as well as a “drain of wealth” effect, which works through several channels. First, the remuneration of local capital is reduced by the presence of foreign investment, with a negative effect on domestic capital accumulation; second, the remuneration of foreign capital is repatriated to the metropolis; finally, there are direct predatory activities captured by the parameter  $e$ . The intensity of the net drain of wealth borne by the colony can be measured empirically by the ratio of GNP to GDP, which accounts for repatriated profits,

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



royalties, etc., and increases with the degree of economic penetration imposed by the metropolis. A large discrepancy between GNP and GDP, testifying large repatriated profits, may also indicate the presence of a large inflow of foreign capital, which has positive effects on GDP growth. In other words, the relationship between the GNP/GDP ratio and growth may be non-linear.

Depending on the relative strength of the various effects, colonization can increase or decrease long-run capital accumulation in the colony. When local accumulation increases then, unambiguously, GDP per capita will also grow in the long run. In the opposite case, the effect on GDP per capita will depend on the severity of the crowding-out effect between foreign and local capital. Any impact of colonization on long-run economic variables will of course be reflected in an impact of equal sign on the growth rates along the corresponding dynamic paths. Note that  $e$  and the mean level of metropolitan investment  $\bar{i}$  can vary across different colonial regimes.

In this simple set-up, decolonization starts with the removal of monopolistic controls on foreign investment and the reduction of exploitation activities. After decolonization takes place, the colony may go back to its original accumulation dynamics or may permanently deviate from it if colonization has permanently affected accumulation through, e.g., human capital. As shown in Bertocchi (1994), rapid industrialization induced by foreign investment may in fact create a chronic relative shortage of human capital which will hamper growth even after decolonization. Moreover, the level of human capital may be directly and permanently affected by the practice of forced labor and of neglect of public education experienced by the colonies<sup>8</sup>. These considerations suggest that, if colonization is important for growth, there should be a correlation between variables proxying for the level of human capital and variables which account for a country's colonial past.

### 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 has colonialism been for growth. Unfortunately, however, such data for Africa is not available. Maddison (1995) provides estimates of GDP and population for a selected number of 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, 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)

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<sup>8</sup>See Lucas (1988) and Azariadis and Drazen (1990) on the relationship between human capital and growth.

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 may bias 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 in the Asian continent, whose data go back to the 40's and are slightly more reliable, the process of colonization in Asia was historically substantially different from the one in Africa, and showed much less uniformity along several dimensions. First, the timing of the colonization of Asian countries has been less homogeneous, with the unique experience of India, and the US as influential newcomers. Second, Japanese colonization of Taiwan and Korea had a very peculiar character. For example, 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 on the fact that colonization did not significantly affect growth in the colonial powers<sup>9</sup>. Economic interests were not the only factor justifying colonial expansion, and political and even humanitarian considerations played a significant role<sup>10</sup>. The most interesting aspects on the metropolitan countries, have to do with the redistribution of wealth among different social classes operated by colonial enterprises within the metropolis<sup>11</sup>.

It is not clear, in a study which tries to assess the impact of colonialism on growth, what is the relevant measure of income one should use. The existing growth literature 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 too much

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<sup>9</sup>See, for example, Bairoch (1993).

<sup>10</sup>See Gallagher and Robinson (1953) for a discussion.

<sup>11</sup>This thesis is put forward by Davis and Huttenback (1988).

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 in African families tends to be 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 like income per-capita may give a more complete picture 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 will be displayed by the former and a tighter relationship with colonialism (if it affected means of production and distribution) will 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<sup>12</sup>, 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 may have vanished. For the same reason, we also decided to study a sample which, for each country, goes 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 a sample that goes from the beginning of the sample up to independence. However, this sample for many countries includes only few years, and sampling error is likely to be very large. Moreover, the income data for the first few years in the 1960's are unlikely to be very 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 date of independence. The classification we chose in terms of the political status distinguishes between colonies, dependencies and independent countries. There are only two countries that 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 noticed 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

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<sup>12</sup>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).

by former slaves sent over by Northamerican philanthropers, but became a sovereign country back 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<sup>13</sup>, 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<sup>14</sup>. Zimbabwe is in the same class, since after 1923 it was essentially subject to the same political rules as South Africa. Finally, Egypt is a dependency even if it became politically independent in 1922, both because of its long colonial history and because of the heavy economic influence exercised by the UK even after political independence was obtained. The remaining 38 countries are classified as colonies.

We assigned metropolitan countries by selecting the colonial power that ruled longer. We divided the former German colonies - Burundi, Cameroon, Rwanda, Tanzania, and Togo - among the countries that took them over after WWI. Burundi and Rwanda then appear under Belgium, 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. As for Cameroon, it currently includes the portion which went under French mandate and the south of the portion that was under 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 it under France, and Somalia appears under Italy, even if there were (smaller) British and French portions too. 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 the colonial dependence persisted and were detectable well past the end of the colonial period.

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<sup>13</sup>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.

<sup>14</sup>The presence of sizable spillover effects among these countries is documented by Easterly and Levine (1994) and Barro and Sala-i-Martin (1995).

## 4 A summary of the results

### 4.1 Tabulations and tests

To start 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 variables describing colonial status, i.e., the political status, the metropolitan ruler and the size of the drain of wealth. 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 ruler 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) and 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<sup>15</sup>. All measures are from Barro and Lee (1994b), with the exception of the schooling measure which is from UNESCO and was employed by Mankiw, Romer and Weil (1992) and the ethnic instability index which was calculated by Taylor and Hudson (1972) and employed by Mauro (1995).

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 countries that were always independent).

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 as large as the one of countries which used to

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<sup>15</sup>The index of political rights, which is provided by Gastil (1987), ranks countries from 1 to 7, where 1 indicates the maximum degree of political rights.

be colonies or independent, and this pattern persists in all other samples<sup>16</sup>. The growth pattern of countries which used to be 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 in our data set, small sample biases are substantial

The differences we detect are economically significant, especially for some of the very poor countries which used to be 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 as large as the one of 1960, as opposed to an average per capita income 1.6 times as large as the one of 1960 had the average growth rate been 1% per year. Statistically, however, in most cases these differences are not 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 we consider all the countries together. However, when we break the sample according to the political status enjoyed by the countries, 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 the variables considered: on average dependencies had higher investment-output ratios, human capital, political rights and lower political instability, ethnic fractionalization and market distortions than colonies. This implies that the effect of colonization on growth may also be indirect.

Our indicator for political rights was also used by Barro (1996) as a proxy for democracy. For a cross section of countries from the entire world, Barro finds that noncolonies are more likely to be democratic, but the result is not robust and disappears after controlling for the standard of living of the countries.

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<sup>16</sup>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.

#### 4.1.2 Metropolitan ruler

It is well documented that the 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, the local educational policies and the kind of 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 UK 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 stayed on.

However, despite the existence of a large body of historically-oriented descriptive literature<sup>17</sup>, previous work has been unable to detect any differential pattern along the metropolitan dimension. For 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, instead, do offer some support, at least for the case of Africa, for the belief that economic performances were affected by the kind of colonial regime that was in place. Table 4 shows that former French and UK 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 in fact there are several subsamples where income differences of former colonies of the same metropolis persisted or even increased.

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<sup>17</sup>See, for example, Carocci (1979).

The results we have presented, however, 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 of interest<sup>18</sup>. However, 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, which are taken from Svedberg (1981)<sup>19</sup>, reflect the metropolitan country shares of foreign direct investment and trade in African colonies, after discounting for the fact that different metropolitan countries accounted for unequally large shares of overall investment in the continent. 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 twice as large as in the entire continent. Consistent with our previous findings, we find that for the UK and France both 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 displayed by the other macroeconomic and sociopolitical variables along the metropolitan ruler dimension is illustrated in Table 5. Our previous conclusions are strengthened by the fact that UK and French colonies display higher levels of the investment-output ratio, human capital and political rights than other colonies.

#### 4.1.3 Drain of wealth

In Table 6, we analyze growth rates once we have grouped colonies according to the “drain of wealth” experienced in 1960. The “drain of wealth” is measured here by the discrepancy between GDP and GNP, which reflects repatriated profits on foreign investment, royalties as well as direct exploitation activities. We construct four drain classes: in the first class, up to 6% of GDP was sent out of the country; the last class comprises countries in which, according to our measure, there was no drain. Tabulations obtained using the GNP/GDP ratio at dates between 1960 and independence produced similar results, because the GNP/GDP ratio does not change much over

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<sup>18</sup>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.

<sup>19</sup>See also related work by Kleiman (1976).



the period for most countries, and are not presented. The table provides some supporting evidence for the conjecture that the higher was the degree of economic penetration, the lower was the growth rate of GDP over the period. For the sample 1960-88, colonies which were not subject to a drain of wealth had an average growth rate which was up to four times as large as the average growth rate of countries with a higher level of drain. Also, consistent with the results of Table 2, dependencies experienced a lower average level of exploitation 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. Three warnings, however, 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, as expected from the discussion of Section 2, the relationship between the GNP/GDP ratio and growth can be nonlinear: a large outflow of repatriated profits can be determined by a large inflow of foreign capital, and therefore be associated with a marked modernization effect. Finally, the fact that oil-producing countries such as Gabon and Cameroon belong to the highest-drain class may partially distort the results.

As before, even though the economic significance of these differences is substantial, statistically growth rates of GDP per-capita do not 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 drain level and other macroeconomic and sociopolitical variables of interest.

#### 4.1.4 Summary

In conclusion, 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 terminated with the gain of political independence. Also, the data show time instabilities in the mean growth rate of GDP per-capita by classes which could be associated with the end of the colonization era. In particular, over the last subsample, the behavior of growth rates of GDP per-capita is much more uniform across subgroups than in the first subsample.

Finally, macroeconomic and sociopolitical indicators thought to be associated with growth are also clearly linked to classifications. For example, the investment-output ratio and school attain-

ment were higher for dependencies and for British and French colonies. Therefore, there is some evidence that the association found between these variables and growth may in fact be due to the colonial history of the African continent.

## 4.2 Measuring the gains from decolonization

The process of economic decolonization in many UK colonies started 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. 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 reaches 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, some features of colonial economic domination, such as 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<sup>20</sup>. Most colonies were set free when they were economically more dynamic than 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 try here to measure the gains from decolonization by focussing on the growth pattern experienced by the colonies in the years before and after political independence.

Since data on GDP per-capita for many countries only start in 1960, we are forced to drop from the sample almost all countries which acquired independence before 1960. 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 then 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 are dependencies. For this sample of countries, the average drain of wealth declined by about 1% in the two years immediately following political independence, suggesting that political independence coincided, at least partially, with economic decolonization.

To quantify the effects of decolonization, we compute, first, the average growth rates for six

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<sup>20</sup>See, for example, Fieldhouse (1986).

years before and after independence for each country; second, the cross sectional average growth rate in the 12 years surrounding independence; and third, we construct a simple forecasting model which uses the cross sectional information in the years before independence to assess the presence of a structural break in the mean growth pattern after independence. The model has the form

$$y_0^i = \alpha_0^i + \sum_{t=1}^4 \alpha_t y_{-t}^i + e_t^i \quad i = 1, 2, \dots, 18 \quad (3)$$

where  $t = 0$  is independence time. We construct estimates of  $\alpha_0^i$  and  $\alpha_t$  and forecasts  $\hat{y}_t^i$ ,  $t = 0, 1, \dots, 4$  using simple recursive prediction formulas based on the information variable at  $t = 0$ . We allow the intercept to be country-specific, since forcing homogeneity on the constant 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 and that four of these countries were actually dependencies, suggesting that it might have been dependencies that were able to take 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 at the third year. Figure 1 presents the mean forecasts at  $t = 0, 1, \dots, 4$  together with the actual mean values computed using cross sectional variations at each point in time. It is clear that the model fails out-of-sample despite the fact that the in-sample fit is pretty good (adjusted  $R^2$  is of the order of 0.95). Statistical forecasting measures - like 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 also clearly shows that the mean growth rate of GDP per-capita after independence was substantially higher than the one before independence. Also, on average, the actual mean growth rate exceeded by 1-2% points the forecasted one, 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.

In conclusion, for the countries in the sample 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 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 next run simple growth regressions adding proxies for colonial heritage to standard variables, and examining (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 regression variables. To this end, in Table 9 we present 3 regressions for each sample under consideration (labelled R1 to R3) of the form

$$\bar{y}_i = \beta x_i + \gamma D_i + u_i \quad (4)$$

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 have 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 have 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) and the index of political rights (Prigh) (regression R1). All regressors are measured in 1960 except for Prigh which is an average over the 1960-64 period. To these variables we add a dummy for oil producing countries (Oil) to account for the likely differential growth patterns of oil vs. non-oil countries.

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 seems to clearly appear in African data (see also Easterly and Levine (1994)). We do not directly consider here the index

of political instability 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" cross sectional regression we add a number of indicators for colonial heritage constructed using the information collected in the tabulation analysis. 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. In regression R3 we add to the above dummies two other dummies measuring classes of GNP/GDP ratio in 1960: DR1 (highest drain) has the value of the GNP/GDP ratio if it is less than 0.94 and zero otherwise, while DR4 (lowest drain) has the value of the GNP/GDP ratio if it is greater than 0.99 and zero otherwise. We use dummies to describe drain classes (as opposed to the direct use of the drain variable) because of the nonlinear effects that the size of the GNP/GDP ratio may have had on growth, effects which will be 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 starting in 1965 (as opposed to 1960) on these variables no qualitative changes are detected.

The message of the regressions contained in the table depends on the sample considered, but there are interesting regularities which are common to all samples.

#### 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 the basic regression (R1), except for the human capital proxy which is insignificant (as appears to be in all regressions that include the investment ratio). 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 a nonlinear relationship, possibly due to polarization in the income distribution in African countries.

The dummies for dependencies and for French colonies turn out to be positive and significant in

both regressions 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. Note that 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. A dummy for UK colonies turned out to be not significant, since most of its impact is already captured by DDEP, with which it is highly correlated. The two drain dummies are not significant in R3 when they are added to the variables previously appearing in R2, but their contribution raises the explanatory power of the regression (the adjusted  $R^2$  is 0.62 against the 0.49 of the basic regression). Notice that, since the coefficient of both dummies is positive, African countries which had either a very high or a very low drain of wealth did comparatively better in the African continent, strengthening the idea that there is a nonlinear relationship between modernization-exploitation effects and growth.

These findings provide evidence that colonial heritage is important to explain the cross sectional growth pattern of African nations. Also, they suggest that various measures of ethnic and political stability and human capital previously employed in growth regressions may proxy for a deeper phenomenon which we can identify with colonial heritage, or else, that colonial heritage had a direct impact on human capital accumulation and/or sociopolitical development.

#### 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 lose 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 drain classes are not significant and they tend to be correlated with the index of ethnic fractionalization. Notice also that the adjusted  $R^2$  of the last regression is smaller to that of R2, suggesting that the effects of the drain 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 UK dependence did not vanish with political independence.

### 4.3.3 The 1960-73 subsample

The results for subsample 1960-73 can be viewed as the ones 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. One reason for the insignificance of this dummy in the sample is that the political unrest and the destructions caused by the process of political independence may have temporarily wiped out the beneficial growth effects of being a French colony. Notice also that in  $R^2$  the significance of the investment-output ratio drops relative to the baseline case, probably as a consequence of the high correlation with the dependency dummy.

Adding the drain dummies increases the explanatory power, but the improvement is relative. It is worth stressing that for this subsample having a low GNP/GDP ratio was good for growth, possibly due to the fact that the modernization effect that colonial investment had in the colony overweighed the negative drain 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  $R^2$ , but appear to be uncorrelated with other variables in the equation. Adding the drain dummies does not change much 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

Finally, for the subsample 81-88, the initial conditions and the initial conditions squared are the variables with the largest explanatory power. In the basic regression the index of political rights is the only other significant variable. None of the colonial dummies is significant in this sample, indicating that the influence of colonial rule may have faded away in the last decade on the sample. On the other hand, the fact that standard variables also have little explanatory power suggests the

need for further research into the causes of the negative growth performance that characterizes this period of African history <sup>21</sup>. Notice also that the two drain 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 of all, 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 fades away 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, consistent with the analysis of Section 4.2, that colonial influence faded somewhat slowly after African countries reached political independence.

Our analysis also 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 possibility of finding a single "cause" for Africa's poor growth performance in the last thirty years and could be interpreted as suggesting that different variables matter for different stages of development. For example, in the initial stage investment in physical capital is more important and only later on human capital accumulation and political rights become relevant factors 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 level.

#### 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

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<sup>21</sup>See Ghura and Hadjimichael (1995) for a specific investigation for sub-Sahara Africa in 1981-92.



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 drain of wealth experienced by African countries is sufficient to drive away the importance of the dummy for sub-Saharan Africa in cross sectional 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. The results are presented in Table 10. To be noticed 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 drain variable and growth appear to be linear in this sample, 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 UK 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. In the first regression (called Basic), and consistent with the evidence presented in Barro, 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 the human capital variables, the magnitude of market price distortions and the 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 much 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 essentially unchanged: those which were significant still are and those which were not still keep being insignificant.

In Variant 2 we exclude the Africa dummy from the regressions while keeping our colonial dummies. We would like to know whether the explanatory power of the regressions is changed and whether the coefficient on other variables is changed. Although one of the colonial dummies is not significant, we do find that the regression  $R^2$  is unchanged as are the coefficients on other variables. Hence, there is a high correlation between colonial past and the peculiarities of Africa's underdevelopment.

## 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, a negative one. We indeed find economically significant differences in the average growth rates once we group countries according to the political status, the metropolitan ruler and the drain of wealth: dependencies do better than colonies, British and French colonies do better than Portuguese and Italian ones, and low-drain countries do better than high-drain ones. Moreover, we show that other important macroeconomic and sociopolitical variables 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 ending of the colonization era.

The mean growth rate of African nations after independence was substantially higher than the one before independence and, on average, actual growth rates exceeded by 1-2% forecasted ones, where forecasts are based on the information available before independence. Also, the gains from decolonization start materializing only 4-6 years after independence was obtained.

The regression analysis demonstrates that variables proxying for colonial heritage are significant in explaining the cross sectional distribution of average growth rates and that 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 can account for the differential and negative performance of Africa relative to other continents and turn out to be highly correlated with the Africa dummy which other studies have used.

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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 (1.905)	0.846 (1.649)	3.280 (2.355)	-0.139 (1.430)
Indep-88	$\overline{\Delta Y}$	1.360 (2.730)	1.089 (2.660)	3.526 (2.747)	0.010 (1.242)
60-73	$\overline{\Delta Y}$	1.965 (2.203)	1.624 (2.031)	4.351 (2.103)	1.075 (0.790)
74-80	$\overline{\Delta Y}$	0.532 (4.519)	0.013 (4.609)	3.933 (2.985)	0.193 (1.217)
81-88	$\overline{\Delta Y}$	-0.547 (4.274)	-0.333 (4.315)	-1.327 (4.778)	-2.268 (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>I/Y</i>	13.979	13.045	19.600	13.450
<i>School</i>	2.302	2.061	3.833	1.800
<i>Polinst</i>	0.080	0.085	0.038	0.159
<i>Pright</i>	5.415	5.523	4.638	5.694
<i>Fract</i>	61.690	63.428	43.800	76.000
<i>Pidev</i>	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	$\Delta Y$	1.061 (1.836)	1.097 (1.534)	-0.156 (1.514)	0.227 (0.869)	-0.216	1.362 (0.698)
Indep-88	$\Delta Y$	1.474 (2.317)	1.385 (1.828)	-1.209 (5.906)	1.026 (1.544)	0.038	2.006 (0.772)
60-73	$\Delta Y$	1.661 (2.358)	1.872 (1.247)	1.657 (2.852)	1.347 (1.872)	-0.950	1.998 (2.353)
74-80	$\Delta Y$	1.018 (2.979)	-0.716 (5.132)	-3.039 (7.779)	-0.863 (5.936)	5.452	2.827 (0.937)
81-88	$\Delta Y$	-1.119 (2.457)	1.080 (6.493)	0.021 (4.984)	-0.962 (1.431)	-2.737	-1.283 (1.622)
Cross Sectional Correlation: Average Growth- Log Initial Conditions Colonies of							
Sample		France	U.K.	Portugal	Belgium	Former	German
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	NA	

Notes:  $\Delta Y$  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
<i>School</i>	2.094	2.400	1.259	1.466	1.100	1.520
<i>Polinst</i>	0.058	0.107	NA	0.109	0.200	0.087
<i>Pright</i>	5.669	4.782	6.361	6.074	6.777	5.866
<i>Fract</i>	61.777	77.181	71.500	36.000	8.000	54.200
<i>Pidev</i>	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 Drain of Wealth Level 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 (2.023)	0.387 (1.772)	0.677 (1.363)	1.266 (1.513)
Indep-88	$\overline{\Delta Y}$	0.409 (3.971)	0.516 (1.702)	1.053 (1.797)	1.900 (2.083)
60-73	$\overline{\Delta Y}$	2.104 (2.720)	2.505 (1.701)	1.522 (1.913)	0.906 (1.389)
74-80	$\overline{\Delta Y}$	-1.268 (6.083)	-2.589 (3.650)	-0.185 (2.792)	2.239 (3.908)
81-88	$\overline{\Delta Y}$	-1.347 (3.308)	-0.265 (4.758)	-0.062 (2.076)	0.304 (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  $X = \frac{(m_i - m_j)}{\sqrt{(var_i + var_j - 2 * cov_{i,j})}}$ , where  $m_i$  and  $m_j$  are the means growth rate before and after independence,  $var_i$  and  $var_j$  their variance and  $cov_{i,j}$  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 UK 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	$R^2$
<b>Sample 1960-1988</b>													
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)	
<b>Sample Independence-1988</b>													
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)	
<b>Sample 1960-1973</b>													
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)	
<b>Sample 1974-1980</b>													
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)	
<b>Sample 1981-1988</b>													
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 UK dependencies, Oil is a dummy for oil producing countries, DR1 (DR4) is 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 (4.85)	0.155 (4.87)	0.149 (4.61)
log $Y_0$	-0.014 (-4.48)	-0.015 (-4.62)	-0.013 (-4.28)
SEC	0.0002 (1.00)	0.0002 (1.18)	0.0002 (0.95)
PRIM	-0.00001 (-0.15)	0.00004 (0.05)	-0.000003 (-0.04)
G/Y	-0.097 (-3.28)	-0.097 (-3.23)	-0.103 (-3.30)
REV	-0.004 (-1.38)	-0.003 (-1.21)	-0.003 (-1.23)
ASSAS	0.001 (0.28)	-0.0009 (0.27)	0.001 (0.42)
PIDEV	-0.002 (-1.16)	-0.002 (-1.02)	-0.001 (-0.85)
I/Y	0.050 (2.49)	0.049 (2.46)	0.052 (2.55)
FERT	-0.003 (-2.60)	-0.004 (-2.34)	-0.003 (-2.08)
AFRICA	-0.021 (-5.14)	-0.017 (-3.11)	
LATIN	-0.010 (-2.89)	-0.009 (-2.61)	-0.010 (-2.78)
DFR		0.005 (1.17)	0.010 (2.07)
DDEP		0.009 (1.04)	0.007 (0.85)
DRAIN		-0.00006 (0.80)	-0.0002 (-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 UK dependencies. Basic corresponds to regression 29 of Barro (1991) for our data set.

# Actual and Forecasted mean growth rate

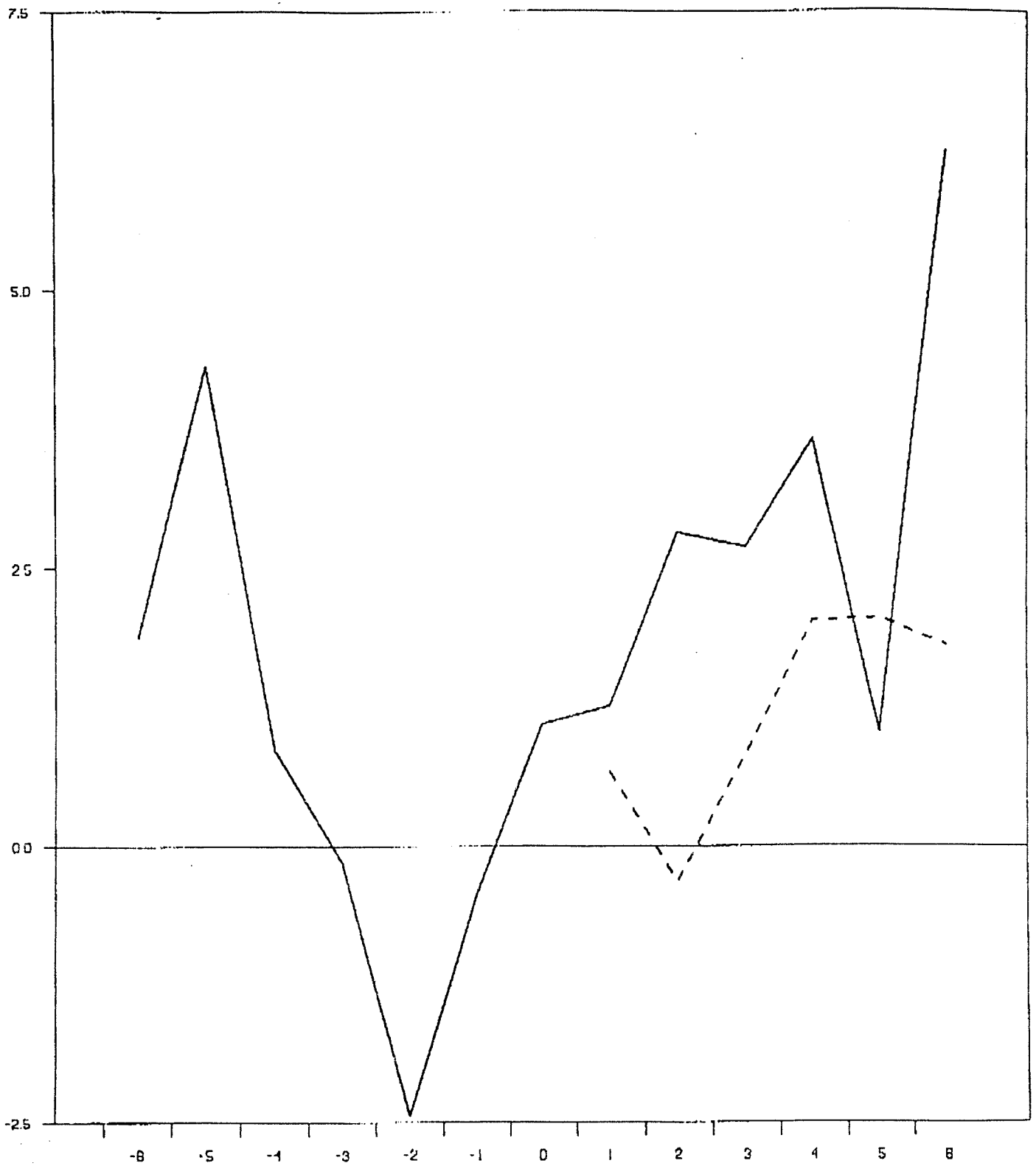


Figure 1.

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