Quantitative Aspects of Africa's Past Economic Development

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Abstract

This paper provides a comparative analysis of pre-modern economic conditions in sub-Saharan Africa. We find that large- and medium-sized cities, our *proxy* for pre-modern economic development, were less prevalent in Africa than in South and Central America, a comparable region. Empirical analyses of the Standard Cross-Cultural Sample (SCCS), which includes 186 pre-industrial societies around the world, confirm and generalize the results. Ethnic diversity and pathogenic loads sometimes help explain pre-colonial disparities within the tropics whereas demographic, geographic, and technological differences play a minor role. We also find that modern influences (broadly defined) do not fully account for Africa's current poverty.

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1 Introduction

There are large differences in economic development and income levels in the world but from the colonial era to the present, economic progress in sub-Saharan Africa has been relatively slow. Today, sub-Saharan Africa faces severe problems of poverty, high rates of child and adult mortality, illiteracy, civil war, and political instability among many others. Although no single factor is likely to have been responsible for Africa's poverty, much of the current quantitative work emphasizes modern influences such as the transatlantic slave trade and the legacies of European colonialism (see, e.g., Acemoglu et al. [1], [2]; Bertocchi and Canova [8]; Nunn [39]). The purpose of this paper is not to deny the significance of these modern influences but to provide a comparative study of long-term development that extends into Africa's pre-colonial past.

The central finding of this paper is that sub-Saharan Africa lagged behind comparable regions long before the European expansion of the 1500s. We also find that adverse disease environments and the high levels of ethnic diversity in the continent sometimes help explain Africa's pre-industrial comparative economic performance. These aspects stand out among other potential factors such as demography, geography, and technology. They have also been stressed in analyses of the modern period (e.g., Bloom and Sachs [12]; Collier and Gunning [16]; Easterly and Levine [20]; Kamarck [28]) although their influence seems to pre-date the European expansion. Finally, we find that slavery and colonization (broadly viewed) do not account for the majority of the income difference we see today between Africa and other former European colonies in the tropics. These findings suggest that Africa's poverty has deep roots in its pre-colonial past.

In exploring Africa's past economic development we focus on the post-agricultural development of sub-Saharan Africa and South and Central America. We do so because the disappearance of the land bridge that connected the Old and the New World has been widely perceived as a "natural experiment" in geographical isolation (see, e.g., Diamond [19]; Kremer [29]; Mann [34]). Whereas Africa, Asia, and Europe have continuous land boundaries between them, the development of the New World was independent of the development of the Old World.

A comparative study between sub-Saharan Africa and South and Central America has several advantages. First, it serves to examine the role of the isolation of Africa from the rest of the world, a cause typically emphasized in the literature (see, e.g., Austen [5]; Hopkins [27]; Kamarck [28]). Second, as we will see below, sub-Saharan Africa and South and Central America are similar in terms of their geography, endowments, and climate. This permits a cleaner comparison from a comparative point of view.[1] For example, settled agriculture originated in sub-Saharan Africa and tropical America at similar dates, some 4 to 5 thousand years ago, whereas in the Near East and China agriculture originated some 8 to 10 thousand years ago (see, e.g., Austen [5]; Austen and Headrick [6]; Diamond [19]; Hopkins [27]; Smith [43]).[2]

[1] Kremer [29] also used the separation between the Old and the New World due to the melting of the ice caps as a "natural experiment." He focused on demographic influences. As discussed in detail in Birchenall [10], our comparison eliminates confounding factors that could contaminate Kremer [29]'s results. Briefly, Kremer [29] assumed that population size was the only difference between both regions. Differences in factor endowments and geography, i.e., differences in the number of domesticable species or in continental orientation, were also important for the origin of agriculture and the diffusion of post-agricultural technologies such as metallurgy and weaponry, Diamond [19].

[2] Throughout the paper we treat North Africa (including ancient Egypt) as part of Eurasia because biogeographically it is closer to Eurasia than to sub-Saharan Africa (Diamond [19], 161). We focus on South and Central America because these regions and the West Indies conform a single Neotropical region. (North America is part of the Nearctic zone.) Communication between South and Central America was far more common than between Central and North America by the Mexican desserts. For instance, Mexican corn reached the US territories only at around 900 A.D., Diamond ([19], 109).

In this paper, we follow Acemoglu et al. [1] and use measures of urbanization before 1500 to *proxy* for the economic progress of pre-modern societies. We measure the number of medium- and large-sized cities from Chandler [15], a source also employed by Acemoglu et al. [1]. (Acemoglu et al. [1], however, omitted Africa from their study of urbanization for reasons that we will describe later on.) Chandler's [15] inventory of cities indicates that sub-Saharan Africa had fewer and less densely populated cities than South and Central America before 1500. For example, while there were no large cities south of the Sahara at the time of the European expansion, Teothihuacán (currently Mexico city) was among the ten largest cities of the world in the year 400 A.D., Chandler ([15], 464).

To complement our aggregate analysis, we study pre-industrial economies using Murdock and White's [38] Standard Cross Cultural Sample (SCCS). The SCCS consists of disaggregate data from 186 ethnographically well-described societies with different subsistence strategies. The SCCS was designed to be representative of all the pre-industrial societies in the world and it was constructed to maximize independence in terms of cultural and historical origin. Societies are described from historic and ethnographic literature at the time coinciding with or just after contact with western cultures when some reliable observer (i.e., traveler, missionary, trader, colonial agent, or anthropologist) first visited the society and wrote about it in sufficient detail.

The SCCS contains measures of the complexity of various aspects of pre-modern economies such as the existence of large buildings, social stratification, specialization and the division of labor, monetary exchange, and political autonomy among many others. We use some of these measures as indices of sophistication and estimate regional differences between Africa, South and Central America, and the rest of the world. In measures of urbanization, food production, and political sophistication, the 'African dummy' is negative, statistically different from zero, and sometimes even different from a 'tropical American dummy'. Our disaggregate analyses thus suggest that the prevailing economic and institutional conditions in Africa were not as developed as those in South and Central America at the time of the European expansion.

Another concern of this paper is to confront a series of well-known hypotheses that seek to explain the fundamental causes of Africa's poverty. First, in Acemoglu et al. [1]'s felicitous language, the disparities within the tropics suggest that Africa has experienced a relative 'persistence of misfortunes.' By relative we mean that within the tropics, a ranking based on economic conditions has persisted since pre-modern times. That is, compared to South and Central America, sub-Saharan Africa has been relatively poor even before the European expansion. This finding contrasts with but does not contradict the absolute reversal of fortune described in Acemoglu et al. [1] among all of the European colonies, e.g., in 1500, North America and Australia were the poorest regions of the world whereas today, both are among the richest nations.

The observed economic disparities within the tropics suggest two possibilities for Africa. First, that some economic, social, and political institutions that originated during the pre-modern stage survived the European influence or were magnified by it. Among those views that recognize institutional persistence, Herbst [25] has explained current state failures in Africa by the absence of state-building institutions during the pre-colonial period (Bockstette et al. [11] and Gennaioli and Rainer [24] also emphasize the importance of 'State antiquity'. See Robinson [42] for a review of Herbst [25].) Further, Herbst [25] argued that the lack of state consolidation in pre-colonial Africa was a consequence of Africa's low population density which made state control more difficult and competition for space less attractive. Our comparison between pre-colonial Africa and South and Central America suggests a weaker link between state formation and population density. Besides their complete isolation, South and Central America had smaller population densities than Africa. Yet, the independent development of pre-Columbian states resembles to an astonishing degree those patterns seen in the earliest states of Europe and Asia. In other words, demography does not appear to be a key determinant of Africa's pre-modern institutional or technological development.[3]

As a second direction of analysis, the relative poverty of pre-modern Africa suggests a role for distinctive and intrinsic aspects that pre-date the European expansion such as geography, factor endowments, and the greater prevalence of ethnic, linguistic, religious, and genetic heterogeneity in Africa, see, e.g., Alessina et al. [4], Bloom and Sachs [12], Collier and Gunning [16], Easterly and Levine [20], Hibbs and Olsson [26], Kamarck [28] , Miguel and Gugerty [36], and Spolaore and Wacziarg [45]. To minimize colonial influences, we use data from Cashdan [14] on the number of ethnic groups in the region of each of the 186 SCCS pre-industrial societies. Further, societal data in the SCCS allow us to consider in greater detail geographic influences and disease environments. We examine measures

[3] Studies of the economic history of Africa, see, e.g., Austen [5], Austen and Headrick [6], and Hopkins [27] also argue that Africa's pre-colonial stagnation was due to lower population densities that prevented specialization and the division of labor. As we will show later on, population size and densities in Africa were actually larger than in tropical America according to the commonly used estimates of Biraben [9] and McEvedy and Jones [35]. Also, the New World was the last continent ever to be populated and Africa was connected to Eurasia. It may be important to acknowledge that the Sahara offered a barrier to human passage especially since after 4000 B.C., Fagan ([22], 152), but that Africa had several trade routes that connected the continent with the rest of the Old World.

of “pathogen stress” obtained from medical and public health sources on the latitude and longitude of the sample societies, using data as close as possible to the defined dates for the sample societies' SCCS data, see Low [32]. Among all these potential influences, we find that demographic, geographic, and technological differences are unable to account for the economic conditions in pre-industrial Africa. On the oter hand, ethnic diversity and disease environments sometimes lower the magnitude and significance of the pre-industrial ‘African dummy.’

It is perhaps important to acknowledge that quantitative observations for pre-modern societies cannot be made easily as there is no well-established data. For example, Acemoglu et al. [1] did not use Chandler's [15] estimates of city formation in sub-Saharan Africa arguing for measurement problems (although they used Chandler [15], or sources derived from Chandler [15], for other regions of the world).[4] The SCCS also has important though known biases. Cross-cultural influences do not appear to be a major concern. A more serious problem is the role of Western influences which we address in many ways in the paper. Finally, we have not mapped past conditions to current individual countries. Nations are not a natural unit of analysis for pre-modern economic conditions. Throughout the paper we provide additional inferences to support our main arguments and discuss some of the ways in which our conclusions could change as more evidence from

[4] Low urbanization in Africa is likely to the extent that we cannot nowadays point to a large sub-Saharan city in pre-modern times or to evidence of large public works typical of urban life. It is clear that African urban life existed before Mediterranean and European contact, see, e.g., Davidson [18]; Hull [30]; Connah [17]. Urbanization, however, seems less common than in other agricultural societies. Acemoglu et al. [1] also considered cities with more than 5 thousand inhabitants whereas we look at cities with more than 20 and 40 thousand inhabitants. Evidence on the existence of small cities is more difficult to find for the tropics, even for Asia where Acemoglu et al. [1] used extrapolations. To the extent that environmental conditions lead to the disappearance of cities, a comparison between Africa and South and Central America is preferable to a more general comparison. On the role environmental aspects for the decline and deterioration of cities in Africa see Hull ([30], 114-117).

anthropology, archeology, biology, demography, geography, and history is accumulated.

The rest of the paper proceeds as follows. Section 2 discusses the framework for our comparative study. Section 2 also presents aggregate and disaggregate analyses. Section 3 considers alternative explanations and offers a brief analysis of current economic conditions. Section 4 concludes this paper. The Appendix contains additional econometric results.

2 Empirical analyses

This section contrasts the post-agricultural development of Africa to that of South and Central America using the geographic isolation of the New World as a "natural experiment." We first describe the basic framework for this comparison. Then, we report aggregate evidence of city formation and past demography from Chandler [15], and Biraben [9] and McEvedy and Jones [35]. Later on, we study disaggregate data for a cross-section of 186 known pre-industrial societies around the world, the SCCS sample of Murdock and White [38].

2.1 The basic framework

This paper considers the isolation of the New World after the last glaciation as a "natural experiment." This natural experiment was first used in economics by Kremer [29]. Thus, as in Kremer [29], we assume that the spread of modern humans across the Bering land bridge was essentially random and treat the development of the isolated populations as independent of the development of the Old World. In contrast to Kremer [29], we focus on

South and Central America and sub-Saharan Africa since control and treatment regions should have the same "pre-treatment"characteristics.[5] The comparison between the Old and the New World in Kremer [29] would most likely reflect influences related to geography or biological endowments that favored an early onset of agriculture in Asia (see, e.g., Diamond [19]).

Table 1. First domestication of plants and animals, population in 400 B.C., and large cities.

Region	Time of origin (KYA)	Population in 400 B.C. (in millions)	Number of large cities 1000 B.C. to 1000 A.D. (in 1000 A.D. only)
Near East (Fertile crescent)	10.00	42	31 (10)
China			
South (Yangtze river)	8.50	19	58 (6)
North (Yellow river)	7.75		
South and Central America			
Central Mexico	4.75	7	8 (1)
South Central Andes	4.50		
Eastern United States	4.50	1	0
Sub-Saharan Africa	4.00	7	0

Source: Time of origin in thousand of years ago (KYA) is taken from Smith ([43], 13). Population size in millions from Biraben ([9], Table 2). McEvedy and Jones [35], suggest higher population for China (42 millions in 200 B.C.), lower population in the Near East (about 20 millions in A.D.) and slightly smaller populations in the other regions. The number of large cities is cumulative and include cities with more than 100,000 inhabitants. In parentheses is the number of cities in 1000 A.D. only. The Mediterranean had 58 (4) cities and Southeast Asia 31 (4), see Modelski ([37], Table 11).

The advantages of the proposed comparison can be discussed using Table 1. Table

[5] Only hunter-gatherers settled on the Americas so the first settlers had no major technological advantage. We will later on evaluate the possibility of selection effects using a sample of hunter-gatherers in Africa and the Americas from the SCCS. It may be possible that the availability of large mammals in North America played a role but this seems unlikely. The debate on the role of modern humans in the extinction of large mammals in the Americas is not yet resolved. Diamond [19] cites evidence in favor of the "overkill" hypothesis. Fagan ([22], 35-40) argues that human hunters had a very minor role in the extinction since most species were extinct before modern humans populated the New World.

1 reports the time of origin of agriculture in several regions with independent origin. The table shows that agriculture originated in seven widely separated places in the world including South and Central America and sub-Saharan Africa.[6] In these two regions, agriculture originated at a much later date than in the Near East or China but roughly at the same time. This is perhaps not surprising since the number of large-seeded grass species needed for agriculture in sub-Saharan Africa (4) is closer to South and Central America (with 2 and 5 respectively) than to Eurasia (with more than 30), see Diamond ([19], Table 8.1). Separately, in neither of these two regions were there many domesticable animals. In the New World there was the llama while there were no mammalian candidates for domestication in sub-Saharan Africa, Diamond ([19], Table 9.2).

Africa and South and Central America also have many other similarities. In both, the continental axes of orientation run mostly from North to South, Diamond ([19], 177). Further, their areas are comparable (see Table 3 below) and, natural conditions and climate variety are similar as both continents cross the Equator.

The similarities between sub-Saharan Africa and South and Central America just listed also serve to identify relevant differences between both areas. For example, Table 1 reports the earliest available estimated population sizes from Biraben [9] and the number of cities with more than 100,000 inhabitants between the years 1000 B.C. and 1000 A.D. from Modelski [37]. In 400 B.C., sub-Saharan Africa and South and Central America had similar estimated population sizes. Agricultural developments in sub-Saharan Africa, however,

[6] An independent origin of agriculture in the Fertile Crescent, China, Mesoamerica, and the Andes is well established but the case of Ethiopia, New Guinea, and North America is more problematic as diffusion rather than innovation could have taken place, see Smith [43]. Using "linguistic archaeology," Ehret [21] argues that Saharan and Sub-Saharan Africa had three independent centers of domestication rather than just one.

were not associated with urban systems such as those in the Near East, China, and South and Central America.[7] Before the European expansion, there were no large cities south of the Sahara (see, e.g., Modelski [37]; Chandler [15]). As the next sections show in greater detail, aggregate and disaggregate evidence give additional support to this view.

2.2 Aggregate analysis

The use of cities. There is no well-established measure of economic development or technological sophistication in pre-modern societies. We consider city formation as a *proxy* for differences in economic prosperity during pre-industrial periods because, as a measure of sophistication, urbanization offers many advantages: Cities are a complex form of organization. Cities are more complex than movable agricultural settlements and they exhibit a significant degree of division of labor. Cities often result from advances in agricultural productivity or incentives given by external or internal trade and physical evidence on the existence of cities tends to be well preserved. That is, cities can be measured retrospectively. Further, cities reflect the institutional conditions of pre-modern societies as "the growth of cities is a manifestation of the growth of institutions capable of organizing large regions into integrated systems," see Modelski ([37], 5). Acemoglu et al. ([1], Section 2) contains a related discussion in support of this view.

Table 2 compares the number of cities with populations over 20 and 40 thousand inhabitants in sub-Saharan Africa and South and Central America. We rely on data from Chandler [15]. (The inventory in Chandler [15], according to Connah [17], provided

[7] It is well known that agriculture increases population size and population densities. Population changes are well documented in all agricultural transitions, even modern hunter-gatherers with fairly recent settlements, see Livi-Bacci ([31], 45). Birchenall [10] presents a detailed discussion of demographic influences in post-agricultural populations.

accurate patterns of city formation in Africa.) Table 2 reports different time periods because Eurasia, and the Mediterranean more specifically, exerted an influence over Africa that differed over time. Table 2 also divides sub-Saharan Africa in three sub-regions. The cities in regions with high Arab influence are coded as Muslims while the Middle Nile and Ethiopia are regions with influence from trade through the Indian ocean and North Africa. The rest of sub-Saharan Africa can be consider as indigenous city formation.

Table 2. Cities in Africa and the New World.

Year	North Africa	Sub-Saharan Africa: Muslims	Sub-Saharan Africa: Middle Nile and Ethiopia	Sub-Saharan Africa: Rest (indigenous)	Sub-Saharan Africa: Total	North America	South and Central America
	A. Number of cities with populations over 20,000 inhabitants						
800	10	0	2	3	5	0	10
1000	13	0	1	4	5	0	9
1200	18	6	2	4	12	0	10
1300	18	8	2	5	15	0	11
1400	18	8	2	9	19	0	18
1500	19	13	3	8	24	1	16
	B. Number of cities with populations over 40,000 inhabitants						
800	4	0	0	1	1	0	2
1500	7	4	0	2	6	0	6

Source: Chandler ([15], 39-57). The size of cities in the Americas in Modelski [37] is slightly smaller but there are no African cities for a comparison because the size cut-off is larger in Modelski [37]. The indigenous cities in sub-Saharan Africa cover mostly Ghana, Zimbabwe and the Bantus. The middle Nile corresponds to Dongola (modern Sudan) and Kaffa. North Africa includes cities in the Mediterranean (i.e., Arabian, Egypt, Spanish Africa, and Aloa) and the Maghreb.

Table 2 suggests that up until 1460, when the Portuguese traveled down the coast of West Africa, the Islamic world was the main influence in sub-Saharan Africa. In all the years studied in Table 2, the number of cities with more than 20 thousand inhabitants in the Middle Nile and Ethiopia, a region adjacent to ancient Egypt, was very small (at most

3).[8] Around the time Islam spread into Africa, after the seventh and eighth centuries, there was a total of 5 cities with more than 20 thousand inhabitants in Africa. At this time, in 800 A.D., South and Central America already had twice as many cities, 10. In fact, the number of cities in this region was as large as the number of cities in North Africa, Table 2. Further, in 800 A.D., the number of cities with more than 40 thousand inhabitants was also twice as large in South and Central America.

After the first millennia, the Arab influence in Africa increased substantially. In 1500 there were 13 cities in regions with Arab influence. The number of non-Arab cities in sub-Saharan Africa increased from 5 to 11 between 800 and 1500 but the number of cities with more than 20 thousand inhabitants in South and Central America was still larger in 1500. Including the medium-sized Arab cities as part of sub-Saharan Africa would suggest that Africa had more cities than South and Central America. However, in 1500, the total number of cities with more than 40 thousand inhabitants was the same in both regions. Of the 6 cities with more than 40 thousand inhabitants in sub-Saharan Africa, 4 had some Arab influence. The 6 large cities in South and Central America were indigenous.[9]

Demographic influences. We next examine the hypothesis that demography played an important role in Africa's pre-colonial underdevelopment. The analysis is a reduced-

[8] Ancient Egypt appently did not have a strong influence on sub-Saharan Africa although cities appeared in Nubia (or the middle Nile) earlier than in other areas. Meroë, is perhaps the best known city in tropical Africa. In 430 B.C. the population of Meroë was about 20,000 inhabitants (Chandler [15], 461). Gold, ivory, slaves, and other mineral, animal and vegetable products were traded with Eurasia through the Nubian corridor that connected tropical Africa with Egypt. It has been suggested that the Nubian corridor was a "cultural cul-de-sac," see Connah ([17], 19).

[9] Civilizations in South and Central America originated in tropical rainforests similar to the African rainforest. None of the major cities in these areas were coastal and in terms of latitude all tropical cities were close. The latitude of the main cities of the Inca empire was about -13° and most Mayan and Aztec cities were located at latitudes near 20° to 22°. The ruins of the Great Zimbabwe are located at a latitude of -20° while Kumbi Saleh, the capital of the Ghana empire, at a latitude of 15°. The latitudes of Meroë and Aksum (in East Africa) were 16° and 14°. The next section presents a more detailed analysis of geographic differences with disaggregated data.

form approach but population plays a key role in Kamarck [28], Kremer [29], Herbst [25], and Hopkins [27].

To examine demographic influences, we rely on estimates of population size that begin in 400 B.C. and end in 1500 when the European expansion integrated the isolated areas once again. The available evidence is presented in Table 3. The table reports data from Biraben [9] and McEvedy and Jones [35]. The estimates of population levels and increase differ because these are independent studies (see, e.g., Caldwell and Schidlmayr [13]). However, both share a common feature: sub-Saharan Africa had a large population size in 1500 and the fastest population growth in the world in the years between 400 B.C. (or A.D.) and 1500 (or 1000). That is, population size, population density, and population growth were higher in Africa than in South and Central America.[10]

Table 3. Estimated population in Africa and the Americas.

		Biraben [9]				McEvedy and Jones [35]		
Region	Area	400 B.C.	A.D.	1000	1500	A.D.	1000	1500
Africa								
North	2	10	14	9	9	8	11	8
Sub-Saharan	25	7	12	30	78	8	22	38
The Americas								
North	20	1	2	2	3	0.4	0.7	1.3
South and Central	20	7	10	16	39	4	8	13
World population		153	252	253	461	170	265	425

Notes: Population in millions. Area (mill. km^2) from McEvedy and Jones [35]. North Africa includes the Maghreb, Libya and Egypt. The area in North Africa does not include the Sahara. North America includes the US, Canada, and the Caribbean.

[10]Rapid population growth in sub-Saharan Africa was associated with a series of geographic expansions of the Bantu-speaking agricultural populations (see, e.g., Connah [17] and Austen [5]). The rapid growth in population, beginning as early as 3 thousand years ago, has been documented through linguistic, archeological, and even genetic basis, see, e.g., Ehret [21]. Connections with Eurasia also provided an inflow of plants and seeds such as the "Asian yams, cocoyams [taro], bananas and plantains." Those crops were introduced between the first and the eight centuries A.D., Hopkins ([27], 30).

The previous analysis gives a lower bound for demographic influences because we have assumed that Africa had no contact with Eurasia. Yet, contact with Eurasia existed through the Nile River, through the Sahara (by the Arab trade that started during the seventh century A.D.), and through the Indian ocean (by the East African trade in medieval times). Thus, during the post-agricultural period, sub-Saharan Africa had contact with Eurasia and a larger population size compared to South and Central America. These aspects, however, were not associated with higher rates of urbanization. Cities in sub-Saharan Africa were scarcer and less densely populated than those in the New World or in North Africa. As we have relied on measures of urbanization to *proxy* for economic progress in pre-modern times, this suggests that Africa was less developed than North Africa, South and Central America, and Eurasia at the time of the European expansion. Further, our comparison suggests that demographic influences and Africa's relative geographic isolation were not first order influences in the absence of large-scale urbanization in pre-modern Africa.

2.3 Disaggregate analyses

Societal data. The results thus far must be tempered by the fact that there are important measurement problems in past population and urbanization and that there may still be geographic and other differences within the areas we have studied. This section addresses some of these concerns by looking at disaggregated data from the Standard Cross-Cultural Sample (SCCS). The SCCS includes 186 pre-industrial societies with various subsistence strategies, including hunter-gatherers, fishers, pastoralists, horticulturalists, and agriculturalists. The SCCS provides extensive coded data constructed from historical records and published field research by ethnographers.

We consider a sample of 131 agricultural societies and, for robustness, we later use a sub-sample based on the work of Pryor [41] as well as a sample of 55 hunter-gatherers (those in which the contribution of agriculture to the local food supply is less than 10 percent in §v3 in the SCCS database). The societies included in the sample are distributed relatively equally among the major regions of the world. The geographic composition of the SCCS sample is as follows: 32 societies are in sub-Saharan Africa, 35 in South and Central America, 24 in West Eurasia, 34 in East Eurasia, 31 in the insular Pacific and 30 in North America.[11]

In the analysis that follows, we estimate regression equations of the following form:

$$Y_i = \boldsymbol{\alpha} + \boldsymbol{\delta}_A \times \text{Africa}_i + \boldsymbol{\delta}_S \times \text{South and Central America}_i + \mathbf{X}_i'\boldsymbol{\Theta} + \varepsilon_i, \tag{1}$$

with Y_i as the measure of desirable outcomes in society i, South and Central America$_i$ as a dummy variable for societies in this region, and Africa$_i$ as a dummy for sub-Saharan Africa. Consequently, the coefficients $\boldsymbol{\delta}_A$ and $\boldsymbol{\delta}_S$ capture the difference between each region and the rest of the world (mainly Eurasia). Our primary emphasis is on the regional dummies and on the difference between both regions. That is, the parameters of interest are $\boldsymbol{\delta}_A$, $\boldsymbol{\delta}_S$, and $\boldsymbol{\delta}_A - \boldsymbol{\delta}_S$.

Next we describe our main outcome variables, Y_i, and our controls, $\mathbf{X}_i$. For reasons previously discussed, mainly due to data availability, the aggregate analysis studied

[11] The geographical distribution of societies is slightly different from the one in the SCCS (§v200) because we treat South and Central America as a single unit. We also treat some African societies south of the Sahara as part of sub-Saharan Africa whereas in the SCCS some are seen as part of Eurasia. In the Appendix to this paper we examine the effects of changes in the sample and many other robustness checks.

medium- and large-sized cities. Here, we focus on the existence of large or impressive structures (§v66 in SCCS) which is a reasonable *proxy* for urban life. Later on we consider measures of direct economic surpluses in agriculture in the form of food storage (§v21) and measures of political organization and autonomy (§v81).[12] As with many of the variables in the SCCS, these measures are organized as an ordinal scale.

Table 4. Descriptive statistics for agricultural societies in the SCCS.

	Mean	Std. Dev.	Africa	South and Central America
	A. Outcome variables			
Large buildings and structures	2.40	1.38	1.50	2.03
Food surplus and storage	1.90	0.71	1.69	1.76
Political autonomy	3.72	1.72	3.07	3.73
	B. Demography			
Population density	4.53	1.72	4.80	3.24
Community size	3.98	1.41	3.92	3.50
	C. Geography and technology			
Distance to Equator	18.12	13.29	9.15	13.30
Log-altitude	4.40	2.62	5.74	4.65
Agricultural potential	17.66	2.55	18.42	18.30
Technological sophistication	22.36	6.39	21.88	18.34
	D. Disease environments and ethnic diversity			
Pathogen stress	13.59	3.31	17.46	13.73
Ethnic groups within 250 miles	7.53	9.47	18.73	3.76
	E. Other variables			
Threat of famine (§v1265)	3.33	1.03	3.73	2.69
Severity of famine (§v1267)	3.09	1.04	3.43	2.57
Date of pinpointing of society (§v838)	1873	213.02	1915	1868

Notes: Africa and South and Central America are the means for societies in both areas. The description of the variables is in the text. Because many of these variables are ordinal in scale, the exact value is not informative. As in all the measures of the SCCS, the order is increasing in complexity.

[12] In our sample, the variables are coded as follows, §v66: 1 = None (51 cases), 2 = Residences of influential individuals (19), 3 = Secular or public buildings (29), 4 = Religious or ceremonial buildings (25), 5 = Military structures (3), 6 = Economic or industrial buildings (4). For §v21: 1 = None or barely adequate (40), 2 = Simple or adequate (64), 3 = Complex or More than adequate (27). Finally, for §v81: 1 = Dependent totally (14), 2 = Semi-autonomous (33), 3 = Tribute paid (1), 4 = De facto autonomy (36), 5 = Equal status in pluralistic society (16), 6 = Fully autonomous (29).

Table 4 shows summary statistics for our sample. In terms of the outcome variables, the table shows a systematic difference between Africa and South and Central America. For example, large or impressive structures were less prevalent in Africa. The same is true for additional societal outcomes. Table 4 also includes the date of pinpointing of the SCCS society. Because the only way to study pre-industrial societies is through descriptions of Westerners, the sample is contaminated. The dates listed in Table 4 show that many of the native societies in Africa were not reached by Europeans until late in the nineteenth century or early in the twentieth century. Thus, it is clear that there is no 'pristine' society in the SCCS. As pointed out by Pryor ([41], 24-25), the key is to "ask how much these preindustrial societies have changed over the millennia until the pinpointed date." The key assumption is that contamination in the SCCS is not as serious as it may appear.

We use control variables $\mathbf{X}_i$ to examine some of the hypotheses proposed to explain Africa's past economic development. Thus, our approach mimics empirical analyses that seek to explain the 'Africa dummy' in modern growth regressions, see, e.g., Collier and Gunning [16]. Through the rest of this section we consider five broad categories: i) demography, ii) geography, iii) technology, iv) pathogen stress, and v) ethnic diversity.

For demography, we consider population size and density (defined as number of people per square mile). Community size (§v63) and population density (§v64) are ordinal scales from 1 to 7. They essentially represent the logarithm of size and population density respectively. For geography we consider distance to the Equator and log-altitude (§v183), and a measure of the agricultural potential in the region where the societies are located. Potential for agriculture is an index based on land slope, soil quality, and climate (§v921).

These variables though differ little between Africa and tropical America, Table 4. Controls for differences in technology are measures associated with the existence of writing and records (§v149), the fixity of residence (§v150), technological specialization (i.e., presence of pottery, metal work, and loom weaving, §v153), land transport (§v154), monetary exchange (§v155), and social stratification (§v158). These ordinal measures are summed to construct an overall index.[13]

We also examine a general measure of pathogen stress (§v1260). A total of seven pathogens (leishmanias, trypanosomes, malaria, schistosomes, filariae, spirochetes, and leprosy, §v1253-1259) are rated on a 3-point scale for frequency. The individual scores are summed for a total pathogen stress score, see Low [32]. The main advantage of this measure is that most of these diseases are vector-borne and are regional in distribution. That is, Western influences and the role of population movements are minimal for these diseases. Measures of ethnic diversity were compiled by Cashdan [14] based on 3,193 ethnographic societies in the world. These measures are calculated using the number of ethnic groups present within a given radius (100-500 miles in 50-mile increments) of each SCCS society. As discussed in Cashdan [14], these measures are highly correlated with alternative estimates of concordance and linguistic diversity. Our baseline analysis considers measures based on a 250 mile radius (§v1867). We shall note that disease loads and ethnic diversity are much higher in Africa than in any other region, Table 4.

Econometric results. Table 5 reports the main results for the existence of large

[13] Africa seems to have experienced an independent origin of iron work often cited as being part of the advancements spread with the Bantu expansions. However, "iron apparently made no dramatic impact upon early African agriculture," Austen ([5], 14) and Austen and Headrick [6]. Cattle domestication also seems to have had an independent origin, see Austen ([5], chapter 1). Important independent achievements in writing, mathematics, and science also took place in the New World, see Mann ([34], 16-20 and 63-65). Our approach in this section does not give special emphasis to any of the factors just listed.

structures in pre-industrial societies. Column (1) includes the African and the South and Central American indicator variables, not including any covariates. These results simply reflect mean differences between both areas and Eurasia. As these estimates are negative, Column (1) shows that these two isolated areas were less developed than agricultural societies in Eurasia. Further, Table 5 also includes a F-test for differences between Africa and South and Central America for all specifications.[14] In Column (1), despite the numerical difference in the coefficients, the dummy variables are not statistically different.

[14] There are two versions of the test because we also use an ordered probit in the estimation. The estimates of the ordered probit are available upon request because results are only marginally different. Besides, the ordered probit estimates a series of cutpoints or threshold parameters that make the economic interpretation less transparent.

Table 5. Urbanization in pre-industrial societies.

Dependent variable: Presence of large buildings and structures	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.82**	1.81**	1.75**	1.40**	1.50**	1.25	2.30**	2.31**
	(0.14)	(0.34)	(0.39)	(0.36)	(0.85)	(0.85)	(1.11)	(1.12)
Africa	-1.32**	-1.30**	1.31	-1.24**	-1.16**	-1.14**	-0.84**	-0.76*
	(0.25)	(0.26)	(1.44)	(0.27)	(0.32)	(0.33)	(0.39)	(0.43)
America	-0.78**	-0.40	-0.93*	-0.40	-0.40	-0.35	-0.26	-0.27
	(0.30)	(0.31)	(0.54)	(0.30)	(0.35)	(0.34)	(0.34)	(0.35)
Population density		0.20**	0.21**	0.12	0.09	0.01	-0.00	0.00
		(0.06)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
Africa×Pop. density			-0.54**					
			(0.26)					
America×Pop. density			0.16					
			(0.14)					
Community size				0.19**	0.18**	0.14*	0.14*	0.14*
				(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
Distance to Equator					-0.00	-0.00	-0.02	-0.02
					(0.01)	(0.01)	(0.02)	(0.02)
Log-altitude					-0.01	-0.03	-0.03	-0.02
					(0.05)	(0.05)	(0.05)	(0.05)
Agricultural potential					-0.00	-0.00	-0.01	-0.01
					(0.05)	(0.05)	(0.05)	(0.05)
Tech. sophistication						0.05**	0.06**	0.06**
						(0.02)	(0.02)	(0.02)
Pathogen stress							-0.07*	-0.07
							(0.04)	(0.04)
Ethnic diversity								-0.007
								(0.01)
F-test for sub-Saharan Africa=South and Central America								
OLS	2.54	5.49**	6.45**	5.06**	3.43*	3.88**	1.77	0.97
Ordered probit	2.20	4.15**	5.79**	3.59*	2.73*	3.05*	1.69	0.84
R^2	0.15	0.20	0.25	0.24	0.21	0.24	0.26	0.24
N. Obs.	130	128	129	128	124	124	124	121

Source: In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level. The F-test in all specifications but (3) measures differences between the indicators for Africa and South and Central America. In specification (3), the test is based on differences in the interaction terms. The F-tests are based on the OLS regression reported and on an ordered probit available upon request. Data definitions in the text.

Columns (2)-(4) includes population density and community size. In these specifications, the African dummy is statistically lower than the South and Central American dummy. Further, columns (2) and (4), show no statistical difference between South and Central America and Eurasia. Thus, demographic differences 'explain' South and Central America's perfomance. If a low population density or low community size had an important effect in Africa's past economic development, the value of the African dummy should also be lowered when these variables are included. These specifications thus show that, on average, societies in South and Central America had lower population densities and community sizes but, on average, were more urbanized than societies in Africa. This finding is quite consistent with the previous section in suggesting that demographic variables alone do not help 'explain' Africa's disparities with Eurasia or South and Central America. The interaction between regional indicators and population density in column (3) also suggests that an increase in population densities in Africa was not associated with more urban life.

A weakness of column (1) in Table 5 is that a significant African dummy may be a consequence of inadequate controls or an omitted variables problem. As Table 5(5-6) shows, our measures of geography play no role in the estimation. Measures of community size and technological sophistication help explain the presence of large buildings and structures but the size and significance of the African dummy changed little with these variables.[15] The coefficient for Africa is noticably reduced only when pathogen loads and ethnic diversity are included, columns (7) and (8). The value of the 'African dummy' is lowered by about one half compared to column (1) and by about one third compared

[15] The fact that the coefficient on the African dummy is slightly smaller (in absolute value) in column (6) is to be expected. Technological sophistication and community size are endogenous variables but we have treated them as exogenous. The inclusion of endogenous controls will bias $\boldsymbol{\delta}_A$ toward zero since these variables are ranked in increasing order, see Acemoglu et al. ([2], Appendix A) for a proof of the biases of overcontrolling.

to column (6). Further, in the last specifications, there is no statistical difference in the performance of agricultural societies in South and Central America and societies in Africa although the dummy variable for Africa is still negative. These results suggest that disease environments and ethnic diversity are important for understanding Africa's pre-industrial economic performance.

Modern growth analyses treat ethnic diversity as an endogenous variable. For example, "ethnolinguistic fragmentation tends to disappear after the formation of centralized markets," see Acemoglu et al. ([2], 1391) and Easterly and Levine [20]. A similar argument applies here. That is, we cannot treat ethnic diversity as an exogenous cause. The influence of ethnic diversity may be a consequence of the absence of state consolidation in pre-colonial times or of influences derived from Africa's distinctive historical background and heritage of hunter-gathering, see, e.g., Birchenall [10]. Pathogenic loads are plausibly more exogenous. Their persistent influence is well-known in modern analyses and the distinctiveness of sub-Saharan Africa is also well-established, see, e.g., Bloom and Sachs [12], Kamarck [28], and Wolfe et al. [46].[16]

It is interesting to examine additional societal outcomes as a robustness check. In Tables 6 and 7 we provide an alternative estimation for the presence of food surplus and storage, and for measures of political autonomy. Both variables represent desirable societal outcomes although the measurement of these aspects is more subjective than the

[16] Tropical diseases are not 'crowd epidemic diseases' such as those in temperate areas byproduct of agriculture. Tropical diseases typically have animal reservoirs and vector-borne transmision. Among the reasons why disease environments in Africa differ markedly from those in South and Central America are that humans and Old World monkeys and apes are genetically closer and have had much more evolutionary time for disease transfers. Further, monkeys and apes in the Old World serve as reservoirs for many of the human diseases, see Wolfe et al. [46]. Africa's disease environments seem quite persistent as they are evidenced at least since earlier European encounters, see, e.g., Acemoglu [2].

observation of urban structures just studied. To focus on the parameters of interest, we only report the values of the regional indicators and the tests for differences between both regions. The results are quite similar to those of Table 5. In Tables 6 and 7, the African dummy is statistically different from zero in all specifications. In Table 7, the dummies for sub-Saharan Africa and South and Central America are also statistically different. That is, Table 7 provides evidence of significant differences in the political organization of pre-industrial societies within the tropics. The influence of disease environments and ethnic diversity in Table 5, however, is not observed in Tables 6 and 7.

Table 6. Food surplus in pre-industrial societies.

Dependent variable: Food surplus and storage								
	(1)	(2)	(3)[a]	(4)	(5)	(6)	(7)	(8)
Africa	-0.32**	-0.31**	-0.01	-0.31**	-0.40**	-0.40**	-0.42*	-0.53**
	(0.15)	(0.15)	(0.12)	(0.15)	(0.18)	(0.18)	(0.22)	(0.23)
America	-0.24	-0.12	0.05	-0.13	-0.22	-0.22	-0.22	-0.19
	(0.16)	(0.17)	(0.07)	(0.17)	(0.18)	(0.18)	(0.19)	(0.19)
F-test for sub-Saharan Africa=South and Central America								
OLS	0.15	0.82	0.30	0.76	0.74	0.73	0.77	1.76
Ordered probit	0.14	0.73	0.26	0.68	0.66	0.66	0.70	1.71
R^2	0.07	0.06	0.07	0.07	0.09	0.09	0.09	0.10
N. Obs.	131	129	129	128	124	124	124	121

Notes: [a] The results in specification (3) are for the interaction terms. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level. The results include the covariates that correspond to each specification in Table 5.

Overall, the facts about Africa's past economic development that emerge from the previous tables suggest that Africa lagged behind the agricultural societies of the Old World. In Tables 5 to 7, and even after the addition of several controls, the 'African dummy' was negative and statistically different from zero. Previous results also indicate important differences within the tropics. Agricultural societies in Africa were less urbanized, had less prevalence of food surpluses and storage, and had less politically complex societies than agricultural societies of South and Central America. A causal interpretation may not possible, but the evidence presented thus far suggests that disease environments and ethnic diversity sometimes help 'explain' Africa's pre-industrial comparative performance.

Table 7. Political autonomy in pre-industrial societies.

Dependent variable: Political autonomy	(1)	(2)	(3)^a	(4)	(5)	(6)	(7)	(8)
Africa	-0.87**	-0.88**	-0.50*	-0.81**	-0.86*	-0.82*	-0.89*	-1.20**
	(0.37)	(0.38)	(0.29)	(0.38)	(0.44)	(0.44)	(0.51)	(0.44)
America	-0.21	-0.03	0.18	-0.06	0.08	0.00	0.16	0.26
	(0.36)	(0.42)	(0.22)	(0.41)	(0.45)	(0.01)	(0.44)	(0.44)
F-test for sub-Saharan Africa=South and Central America								
OLS	2.22	3.08*	4.61**	2.44	3.62*	4.32**	4.38**	7.56**
Ordered probit	2.17	2.92*	2.91*	2.51	3.49*	4.31**	4.26**	6.94**
R^2	0.04	0.06	0.09	0.12	0.19	0.25	0.25	0.25
N. Obs.	129	127	127	127	123	123	123	120

Notes: [a] The results in specification (3) are for the interaction terms. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level. The results include the covariates that correspond to each specification in Table 5.

Robustness checks. For robustness, we present an additional set of estimates in the Appendix. Here we report the main results.[17] Perhaps the most important concerns are those of selection typical of modern migrations and that of prejudice Westerners may have about Africa. As we have noted before, only hunter-gatherers populated the Americas. Still, since most of the population movements in the long pre-agricultural period have been out of Africa, the sample of societies in Africa may be a negatively selected

[17] There are only a limited number of possible measures that *proxy* for economic conditions in premodern times but we should notice that anthropometric measures such as height cannot be easily applied to understand economic differences in the past. The main reason is that there are important genetic adaptations to environmental conditions that will provide inadequate inferences. These genetic differences are unlikely to play any role in economic outcomes. Birchenall [10] contains a discussion of these issues.

sample of hunter-gatherers whereas the hunter-gatherers that migrated into the Americas had positive attributes that later conduced to faster agricultural developments. Further, because most of the societies in Africa were described at the peak of colonization, there may be reporting biases associated with prejudice against African societies.

To study sample selection and prejudice, we examine systematic differences between hunter-gatherers in Africa and South and Central America. That is, we look for differences in the variables in Tables 5-7 for hunter-gatherer societies in both regions. A negative estimate for Africa may suggest important pre-agricultural differences between both regions or it may be consistent with reporting biases for Africa. While the sample size is reduced to 55 societies, we find no predictable differences between the hunter-gatherers in Africa and those in South and Central America. If anything, the hunter-gatherers in Africa have marginally better conditions as they live in less disease prone environments. Ethnic diversity is also higher for current hunter-gatherers in Africa but this is expected. Thus, the lack of important differences in hunter-gatherers suggests that the observed difference between agricultural societies may not be due entirely to reporting biases or to the prejudice Westerners may have against Africa.

The Appendix also includes results when the dependent variables are the threat and severity of famine. The results are similar as those of Tables 5-7. The sample is also partitioned in several ways to address measurement problems. For instance, we consider an alternative classification of societies in Africa based on the SCCS and restrict the sample to the societies Pryor ([41], chap. 4) considered as representative of the pre-industrial economies. Additional regressions in which measures of population density are not based on indirect inferences are also included in the Appendix. When high quality measures of population densities are used, the results are also similar to those reported in Table 5. Further, we include measures of date of pinpointing of the society to control for selection. Even in these cases, there is a negative 'African dummy' and significant differences between sub-Saharan Africa and South and Central America. If we restrict the analysis only to socities in Africa and tropical America, we still observe a negative coefficient on Africa although the results are not significant partly because we have less than 50 observations. As in Tables 5-7, the Appendix shows that the only influences that sometimes help 'explain' Africa's pre-industrial economic conditions are the high levels of pathogen stress and ethnic diversity.

3 Alternatives, controlled conjectures, and remarks

Alternative hypotheses. We have considered a limited set of possible explanations for the economic conditions of pre-colonial Africa. Alternative hypotheses based on a primitive view of Africa have already been discussed in the literature and found to be inadequate. In terms of value systems or culture, Hopkins ([27], chapter 2) and Austen ([5], chapter 1) have shown that Africans were expert farm managers and that their response to economic incentives was a typical one for traditional agriculture.[18] Kamarck ([28], 7) also points out

[18] It is known that African farmers did not employ the European plow despite knowing of its existence. Hopkins ([27], 36-37) argues that the plow was not an appropriate technology for West Africa; soils were not heavy and could be easily cleared by fire. Also, "pre-colonial West Africa, developed a relatively simple technology, but one that was well suited to its requirements." Austen ([5], 13) also notes that "within the West African forest, it is also impossible to cultivate millet or sorghum related plants," although Asian and South American crops are more appropriate. Draught animals were also needed for plowing but they could not survive in the West African forest. It is also known that Africa south of the Sahara never invented the wheel, Hopkins ([27], 71), but this innovation was not essential in the tropics; the Aztecs invented the wheel but it was never employed in transportation because it was not an appropriate technology.

that African 'entrepreneurship' made the large-scale commerce of the slave trades possible.

The diffusion of agricultural products following the European expansion also provides important insights into the adequacy or inadequacy of soils in Africa. After the European arrival, a number of South American crops such as "maize, cassava, groundnuts, tobacco and later cocoa, as well as a variety of fruits," were introduced and adopted, see Hopkins ([27], 30) and Austen ([5], 15-16). Today, these non-indigenous crops are considered as "typical West African agriculture," Caldwell and Schidlmayr [13]. Hence, the adoption of New World plants suggests that African agriculture was not limited exclusively by soil quality and further enhances our claims on the comparability of both regions.

An important and unaccounted influence in Africa is slavery and its many ramifications. A detailed analysis of slavery is beyond the scope of this paper but it has been carried out by Patterson [40] for the 66 slave societies in the SCCS. Because many societies relied on forced labor in the past, the conclusions we can draw from slavery in the SCCS are very limited.[19] As we will see immediately below, we take an alternative approach to study the influence of slavery based on the findings presented by Nunn [39].

Controlled conjectures for modern influences. Thus far, we have examined the pre-modern conditions of sub-Saharan Africa using aggregate and disaggregate data. Our final discussion considers a series of controlled conjectures that quantify the importance of colonization and slavery in current African development. This sub-section can be understood as a further robustness check for our analysis. If modern influences are able to

[19] Patterson [40] coded the presence, origin, and approximate size of slave populations in the world. The presence of slavery per se does not help 'explain' Africa's dummy variable but it is significant sometimes. Unfortunately, a coding of slavery in terms of its presence and absence is not informative. We also considered measures of the origin of slavery and the size of the slave population (§v917 and §v920) from Patterson [40] but they provide similar results to those just reported. Pryor [41] coded the presence of 'unfree' labor in agricultural societies. We use this measure in the Appendix.

account for the majority of Africa's current poverty, then, this implies that pre-modern influences or the interaction between modern and pre-modern influences are quantitatively unimportant. As in previous discussions, we focus on a comparison between sub-Saharan Africa and Latin America and the Caribbean.

In the remaining of this sub-section, we quantify the impact of colonization and slavery using detailed estimates from Acemoglu et al. [1] and Nunn [39]. Acemoglu et al. [1] demonstrated a reversal in the ranking of economic conditions since 1500 and argued that this reversal was associated with differences in colonization. In particular, Acemoglu et al. [1] argue that the colonization of rich and densely populated countries such as Mexico and Peru was extractive whereas in sparsely settled areas, such as North America or Australia, colonial powers encouraged investment and economic growth.

Key variables in Acemoglu et al. [1] are the urbanization rate and population density. Hence we devote attention to obtaining relative measures for these variables in a consistent way. Based on Table 2 we can construct a relative measure of urbanization in Africa. We multiply the number of cities at each size by the cut-off size to obtain an estimate of the size of urban populations. For South and Central America this number in 1500 is $10 \times 20,000 + 6 \times 40,000 = 440,000$, see Table 2. If the Muslim cities are counted as part of Africa, the same estimate for sub-Saharan Africa is $600,000$. If Muslim cities are excluded, the size of the urban population is $260,000$. To obtain urbanization rates, we would need to divide both numbers by population size. Using the population size from Biraben [9] in the denominator gives urbanization rates for South and Central America of 1.12 percent and for Africa it gives 0.76 percent (or 0.3 percent if Arab cities are excluded).

Because we are interested in relative differences, these previous estimates are adequate. The previous numbers, however, are very different from current estimates of urbanization rates as we have ignored small-scale urbanization. For example, the average urbanization rate for the 22 countries in South and Central America in 1500 listed in the Appendix 3 of Acemoglu et al. [1] is 5.80 percent. If we re-scale the previous differences in urbanization rates, we obtain an urbanization rate for Africa of 3.96 percent (or 1.71 percent if Arab cities are excluded). If we use the population size from McEvedy and Jones [35], the re-scaled estimates are 2.70 and 1.17 percent. Table 8 reports the highest and lowest re-scaled estimates.[20] Further, we estimate population densities from our tables above. Using Biraben [9], densities in Africa and South and Central America are 3.12 and 1.95 people per km^2. From McEvedy and Jones [35], densities are 1.52 and 0.65 respectively. As we just mentioned, it is important to stress that the counterfactuals we derive depend only on the relative differences between both areas but not on the absolute size of population densities or urbanization rates.

To guide the interpretation, we also need a baseline estimate of GDP per capita in 1500. Table 4.1 in Maddison [33] estimated GDP per capita in Latin America to be $416 (1990 international dollars) whereas for sub-Saharan Africa estimates are $400, Table 6.2. In 2000 dollars, the previous values are approximately $550 and $525 which are the numbers in Table 8(1).

Acemoglu et al. [1] provided precise estimates of the relationship between current

[20] The assumptions implicit here generate a bias in favor of higher rates of urbanization in Africa because large cities in Africa are assumed as large as the large cities in the Americas. Assuming that Muslim cities contributed to African income is also likely to introduce a bias that favors Africa. Still, because populations were larger in Africa, even with large urban populations, urbanization rates are smaller in Africa. Urbanization rates in Africa would be larger is small-scale urban life was far more common than in South and Central America. At the present, there is no evidence to support or reject this claim.

urbanization rates and income per capita. The relative income difference predicted by differences in urbanization rates can be estimated as follows. The relationship between urbanization and GDP in Acemoglu et al. ([1], Table 2) has a coefficient of 0.038 (s.e. 0.006) and $R^2 = 0.69$. This value holds for a cross section estimate in 1913 as well as for a cross-country regression in 1995, Acemoglu et al. ([1], Table 2(1) and (3)). If the value of 0.038 is assumed stable, the smallest predicted relative income difference between the Americas and Africa in 1500 is $\exp\{0.038 \times 5.80/3.96\} = 1.06$. Using 550 as the income in Latin America implies that in Africa is $550/1.06 = 525$. The highest predicted difference generates an income of 455, Table 8. These estimates are not unreasonable.

Table 8. Counterfactuals for African development.

	Income per capita 2000	Urbanization rate (percent) 1500	Pop. density (per km^2) 1500	Income per capita 1500 (1)	Income per capita 1500 (2)
I. South and Central America	6765	5.80	[0.65, 1.95]	550	550
II. Sub-Saharan Africa	1245	[1.17, 3.96]	[1.52, 3.12]	525	[455, 520]
Counterfactuals for Africa					
A. Acemoglu et al. [1]'s 'reversal of fortune,' baseline case					
Predicted income in sub-Saharan Africa, 2000, using					
Urbanization in 1500				[7584, 9950]	
Population density in 1500				[4898, 5658]	
B. Acemoglu et al. [1]'s 'reversal of fortune,' with continent dummies					
Predicted income in sub-Saharan Africa, 2000, using					
Population density and dummies				[2035, 2246]	
Regional dummy variables				2538	
C. Slave trades					
Predicted African income per capita in the absence of slavery using Nunn [39]'s					
OLS estimates				1889	
IV estimates				2794	

Notes: Income per capita in 2000 defined as gross national income converted to international dollars using purchasing power parity rates for the year 2000. Data from the World Bank. The urbanization rate for the Americas in 1500 is the average from Acemoglu et al. ([1], Appendix 3). Population densities are estimated from Table 2 and income in 1500 is from Maddison [33] (converted to $2000 dollars) and from estimates based on Acemoglu et al. ([1], Table 1).

Next we describe a series of counterfactuals based on Acemoglu et al. [1]. Acemoglu et al. ([1], Table 3(1)) provides an estimated coefficient of urbanization rates in 1500 on current GDP per capita for former European colonies of -0.078 (s.e. 0.026). That is, high rates of urbanization in the past are associated with low economic outcomes today. Using the previous estimates gives contradictory predictions for Africa.[21] Because urbanization rates in Africa were smaller than in the Americas, predictions based on the previous relationship suggest Africa should have an income per capita between 20 to 40 percent higher than in Latin America in 2000, \$7584 to \$9950.

Consider next estimates of colonial influences based on population densities. The baseline relationship between log-population density in 1500 and current log-incomes for European colonies in Acemoglu et al. ([1], Table 5(1)) is -0.38 (s.e. 0.06). Given the estimates of population densities above, the highest predicted relative income gap in 2000 is $\exp\{-0.38 \times \ln(0.65/1.52)\} = 1.39$. The lowest income gap is 1.20 which corresponds to income levels of \$4898 to \$5658. If one takes the income in Latin America and the Caribbean as a benchmark, out of the $\$6765 - \$1245 = \$5520$ current income gap between both regions, a 'reversal of fortune' explains about 33 percent ($\$6765 - \$4898 = \$1867$) of Africa's gap.

An alternative counterfactual in case B in Table 8 considers continental dummies. The estimates are from Acemoglu et al. ([1], Table 5(5)). The value of the African and Latin American indicators is -1.67 and -0.69, respectively. The coefficient on densities is

[21] It is important to stress that the estimates in Acemoglu et al. [1] do not include sub-Saharan Africa so the prediction for urbanization is *out of sample*. To the extent that urbanization rates in Africa were lower and there is an absolute 'reversal of fortune,' the prediction of higher incomes in Africa will remain valid. The analysis of Acemoglu et al. [1] also addresses colonial influences in a general sense. Further, they show that there is a positive relationship between urbanization in 1500 and income today for non-colonies.

-0.26 (s.e. 0.05). The predicted income gap in 2000 using these estimates is $\exp\{-0.26 \times \ln(0.65/1.52) + (1.67 - 0.69)\} = 3.30$. Thus, we can explain 85 percent ($4729) of the current income gap between both areas. The main contribution in this case is the difference in dummy variables themselves. The difference in factors that are captured by the African dummy accounts for 76 percent ($4226) of the income gap.

It is relevant to explain why the absolute 'reversal of fortune' in Acemoglu et al. [1] does not account for Africa's poor performance. Acemoglu et al. [1] provide an important account for why the colonies of North America and Australia are today an order of magnitude richer than Latin America and Africa. These colonies were less densely populated and hence provided fewer incentives for extractive institutions. Their analysis may not be as informative as to why within the tropics Africa is lagging behind Latin America. Africa and the Latin America were much more similar in the past than any of these regions and North America or Australia. As Acemoglu et al. ([1], 1238) noted, urbanization in sub-Saharan Africa "was at a higher level than in North America or Australia." Thus, in order to account for the low incomes seen in Africa today using an absolute 'reversal of fortune' argument, we would have to argue that societies in Africa were far more urbanized than societies in Latin America. If the urbanization rates in Africa were in between the high urbanization rates of South and Central America and the low urbanization rates of North America, current incomes in Africa should also lie in the middle of the world income distribution.

In terms of population densities, Acemoglu et al. [1] predicts the correct ranking between regions but only a small quantitative difference in incomes. The most important aspect that explains this result is the fact that today's income gap between Africa and Latin America is large; 5.43 times. This gap is almost as large as the gap between the United States and Latin America (i.e., per capita income in the US is \$44710 or 6.6 times the income of Latin America and the Caribbean). Thus, past differences in population densities would account for the current income difference between Latin America and Africa only if sub-Saharan Africa was several times more densely populated than Latin America in the past. This difference must be at least in the same order of magnitude as the difference between South and Central America and North America in 1500.

We next turn attention to slavery. To evaluate the role of the many Slave trades we employ the findings of Nunn [39] who first showed that African nations would be richer than they are today in the absence of the slave trades. Nunn [39] estimated the impact of slavery using the number of slaves taken from each country between 1400 and 1900. He provided OLS and IV estimates of the impact of slavery on current income per capita, Nunn ([39], Tables 3 and 4). The coefficient on the log of slave exports per area in Nunn ([39], Table 3(1)) is -0.112 (s.e. 0.024) but OLS estimates are as high as -0.128 (s.e. 0.034) in Nunn ([39], Table 3(6)). The IV estimates are larger. In Nunn ([39], Table 4(4)) the IV coefficient on log-slave exports is -0.248 (s.e. 0.071).

To estimate the income gain for Africa if the slave trades never existed we assume that the exports of slaves are zero. The average value of ln(exports/area) in Nunn ([39], Table A1) is 3.26. Using this value as the average for sub-Saharan Africa and the OLS estimates suggests that the income gain in the absence of the slave trades is $\exp\{0.128 \times 3.26\} = \exp\{0.41\} = 1.51$. That is, average income per capita in Africa would be about 50 percent higher. Instead of \$1245, per capita income in the year 2000 would be \$1889, see Table 8. Under the IV estimates the income gain would be higher. The predicted income gain is: $\exp\{0.248 \times 3.26\} = \exp\{0.80\} = 2.24$ or a doubling of income per capita. Predicted income in 2000 would be \$2794. Once again, if Latin America is used as a benchmark, the OLS estimates suggests that the slave trades explain about 11 percent of the income gap whereas using the IV estimates explain about 28 percent of the gap.

As in the case of colonization, it is useful to describe why the absence of slavery produces relatively small quantitative effects. The impact of slavery is small because the absolute gains if slavery never existed are relatively small. Under the OLS estimates, the 'extra' income per capita for Africa would be \$644 whereas under the IV estimates the extra income per capita would be \$1549. In relative terms, the IV estimates suggests that incomes in Africa would more than double. Yet, because the gap between Africa and Latin America is still large, a doubling of income would only narrow the gap within the tropics in a relatively small amount. An alternative reading of the previous discussion is that the absence of slavery would make poor nations in Africa look like rich African nations. Rich African nations, however, are still on average poor compared to the average income in Latin America.

Remarks and qualifications. Our discussion so far has examined, from three different perspectives, the comparative development of sub-Saharan Africa using as a base of comparison South and Central America as this region is the most similar in size, geography, climate, and natural resource endowments. In the discussion that follows, we deal briefly with three broad qualifications of the findings. First, despite the controls taken into account by our comparison, some differences may still be unaccounted for. For example, in contrast to African empires, the empires in South and Central America were geographically limited by oceans, in the case of the Aztecs and Mayas, or by the ocean and the Andes, in the case of the Incas. We have neglected physical barriers to mobility or similar and very specific causes. Further, since we only have a glimpse of pre-modern life, we cannot rule out that the differences just described are historical accidents and that at earlier times these differences were non-existent. Separately, our post-colonial comparison in Table 8 ignores differences in the timing and nature of colonial influences but more importantly transitional differences in economic performance. Bates et al. ([7], 917) argued that part of Africa's post-colonial poor growth experience is transitional because "Africa and Latin America secure their independence from European colonial rule a century and a half apart."

Second, our appraisal of modern influences is limited on other accounts. Our inferences rely on indirect links from the demographic variables examined by Acemoglu et al. [1]. Bertocchi and Canova [8] considered 'direct' measures of colonization. However, these inferences fail to account for the selective penetration of European influences. Colonial policies were not exogenous. They were based on factor endowments, e.g., Sokoloff and Engerman [44], on the disease conditions faced by European settlers, e.g., Acemoglu et al. [2], and perhaps on the institutional conditions in 1500.[22] In other words, direct measures

[22] We have noted that indigenous empires existed in Africa but most African societies were organized around tribes or lineage groups. A large part of South and Central America had a social order typical of tributary empires. The empires in the Americas, notably the Aztec and Inca empires, were taken so quickly by the Europeans because of their political structure and concentration of power. This concentration of power was not present in Africa since pre-colonial states were already "weak," see, e.g., Herbst [25]. In fact, the absence of pre-colonial states helps explain why sub-Saharan Africa, discovered before the New World, and despite its proximity to Europe, was only colonized by Europeans in the late 1800s.

of colonial influences may simply reflect pre-colonial aspects and hence provide misguided inferences.

The analysis of slavery is also partial as we focused on direct influences. The absence of slavery might have reduced inequality within Africa and this may further increase income per capita. Slavery may have also increased incomes in Latin America closing even more the income gap between these regions. The fact that the principal importers of slaves were the islands of the Caribbean and Brazil (see, e.g., Fogel and Engerman ([23], Fig. 3)) suggest only modest long-term income gains from slavery for Latin America and the Caribbean. (Brazil's income per capita in 2000, $6810, is quite close to the average for Latin America and the Caribbean in Table 8 and islands of predominant African descent tend to do poorly today.)

Finally, we have studied either large geographic areas or the SCCS societies within these areas as a unit of analysis whereas sovereign states are the usual units of analysis in modern economic growth. Some societies, notably China, have been politically independent and unified for centuries. For these societies, there is only a subtle distinction between pre-colonial societies and modern states. Empires in the New World also organized the population into unified and long-lasting political units. These units, however, were disintegrated by European colonization. The colonial influence on the number, size, and demographic composition of nations is perhaps more evident in sub-Saharan Africa. The boundaries of many recently politically independent nations in Africa are artificial in the sense of enclosing many different communities, see, e.g., Alessina et al. [4], Herbst [25], Easterly and Levine [20]. Societal data makes no presumption about political divisions and it grant us with more degrees of freedom.

4 Conclusions

Using a series of measures that *proxy* for economic prosperity in pre-colonial times, this paper studied Africa's past comparative economic development. Inspired by Kremer [29], we compared sub-Saharan Africa with South and Central America using the geographic isolation of the New World as a "natural experiment." Following Acemoglu et al. [1], we studied the size and number of cities in Chandler [15]'s archeological inventory and showed that urbanization in sub-Saharan Africa was smaller than in South and Central America. In this specific sense, we concluded that sub-Saharan Africa lagged behind comparable areas long before the European expansion. We also found that demographic influences did not play a central role in Africa's past development. Populations in sub-Saharan Africa were larger than in South and Central America, had contact with Eurasia, and grew at rates faster than in any other region of the world prior to the 1500s, see, e.g., Biraben [9] and McEvedy and Jones [35].

The paper also confronted a series of hypotheses that seek to explain Africa's long run comparative development. To examine the determinants of Africa's pre-industrial conditions, we used disaggregate data from Murdock and White's [38] Standard Cross-Cultural Sample, SCCS. As in modern cross-country growth regressions, we found a negative and statistically significant 'African dummy' in measures of urbanization, food surplus, and political complexity. The negative African dummy is robust to the inclusion of controls for demography, geography, and technological sophistication. Only variables associated with pathogenic loads and ethnic diversity are sometimes able to partially reduce the size and significance of the African dummy.

Finally, this paper finds that colonial influences associated with differences in demography, as examined by Acemoglu et al. [1], are unable to fully account for today's large economic differences within the tropics. While Acemoglu et al. [1] are able to explain why former underpopulated colonies like the United States and Australia are wealthier than Latin America, their analysis is not able to fully account for the equally large differences currently seen between Latin America and sub-Saharan Africa. The paper also made similar inferences about slavery. Using Nunn [39]'s estimates, we argued that the many slave trades experienced by Africa have large absolute effects on income, i.e., the absence of slavery would double income per capita in Africa. In relative terms, however, slavery is still unable to account for most of Africa's poverty.

The implications of the evidence just summarized can be briefly stated. The central implication of our analysis is that Africa's poverty has deep roots in the epoch preceding the European expansion. Further, of a variety of potential influences, past differences in demography, geography, and technology seem to play only a minor role in explaining the disparities within the tropics. On the other hand, the comparative development of African societies may be associated with Africa's distinctive disease environments and ethnic diversity. These previous aspects are recognized as potential causes (or mediating factors) in Africa's modern growth performance. Yet, their influence seems to pre-date the European expansion. That is, their influence may not be an exclusive consequence of the positive or negative economic, institutional, social, and political interconnections that originated after the European expansion.[23] Africa's distinctive disease environments and the survival of an institutional framework that once limited pre-colonial development may still stand in the way of modern economic growth.

[23] There is a large literature that examines direct geographic or pre-modern influences –some already discussed in the text, see, e.g., Herbst [25]; Bockstette et al. [11]; Gennaioli and Rainer [24]; Bloom and Sachs [12]; Kamarck [28]. Interconnections between endowments or disease environments and colonial policies are also prominent in the literature, see, e.g., Sokoloff and Engerman [44]; Acemoglu et al. [3]; Acemoglu et al. [2]. Acemoglu et al. [3] suggest that relatively inclusive pre-colonial institutions were in part responsible for Botswana's post-colonial success. The lack of strong influences during colonization also helped preserve these inclusive institutions. Acemoglu et al. [2] further examined the role of colonial influences using settler mortality to disentangle differential effects of colonial institutions. A central assumption in their analysis is that disease environments only influence current outcomes through differential settlements and colonial institutions.

5 Appendix

This Appendix provides additional results from the SCCS sample. The SCCS contains over 1800 coded variables. Hence we focus on selection and alternative measurement aspects for the variables we considered thus far. Further, the SCCS is a very heterogeneous dataset. By construction, the SCCS is prone to big measurement errors and biases although it is not clear that observational biases are responsible for a negative 'African dummy.'

Table A1. Hunter-gatherer societies.

Dep. var.	Pop. density	Distance to Eq.	Log-altitude	Agric. potential	Tech. sophist.	Path. stress	Ethnic diversity	Political autonomy	Food surplus
Africa	-0.05	-28.91**	2.71**	2.50*	-4.15**	2.02	7.3	0.38	-0.55**
	(0.40)	(5.19)	(0.43)	(1.50)	(1.05)	(1.36)	(4.89)	(0.21)	(0.19)
America	-0.60*	-16.32**	0.79	2.39*	-3.10**	2.93**	-3.97**	0.32	-0.50**
	(0.26)	(5.93)	(0.64)	(1.28)	(1.05)	(1.14)	(1.76)	(0.26)	(0.24)
F-test	2.11	3.86**	12.21**	0.01	0.70	0.36	5.81**	0.04	0.04
R^2	0.03	0.23	0.13	0.06	0.19	0.26	0.08	0.03	0.11
N. Obs.	55	55	55	55	55	21	55	55	55

Notes: In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level. The F-test is for equality between Africa and America. The measures of urbanization and community size are identical for the hunter-gatherers in Africa and the Americas so the results are not included.

Table A2. Alternative classification and population density.

Dependent variable: Presence of large buildings and structures	I. Non-inferential pop. density			II. Alternative classification		
	(1)	(6)	(8)	(1)	(6)	(8)
Africa	-1.31**	-0.99*	-0.61	-1.30**	-0.99**	-0.55
	(0.29)	(0.39)	(0.47)	(0.27)	(0.36)	(0.43)
America	-0.38	-0.05	0.02	-0.74**	-0.26	-0.21
	(0.44)	(0.45)	(0.48)	(0.30)	(0.34)	(0.35)
F-test (Africa=America)	3.85**	3.20*	1.12	2.52	2.87**	0.46
R^2	0.13	0.19	0.20	0.13	0.22	0.23
N. Obs.	100	95	93	131	124	121

Notes: The results correspond to the specifications in Table 5. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level.

The set of robustness checks is described next. First we show that there are no systematic differences between current hunter-gatherers in Africa and in South and Central America in the dimensions we have considered in the text. This suggests that selection is not a first order factor in the regressions in the text. A comparison between both regions also suggests that reporting problems and prejudice against Africa were not as severe as one might expect. In fact, as Table A1 shows, hunter-gatherer societies in Africa are located at higher altitudes, have slightly more potential for agriculture, are more densely populated than in tropical America, and are located further away from the Equator. These aspects suggest a marginal advantage for these African societies. In terms of ethnic diversity, the hunter-gatherers in tropical America live in less diverse settings. This is consistent with the main text.

Table A3. Date of pinpointing of society and Pryor [41]'s sample.

Dependent variable: Presence of large buildings and structures	I. Date of pinpointing			II. Pryor [41]'s sample		
	(1)	(6)	(8)	(1)	(6)	(8)
Africa	-1.27**	-1.13**	-0.79*	-1.60**	-0.61	-1.63
	(0.25)	(0.33)	(0.43)	(0.37)	(0.55)	(1.26)
America	-0.77**	-0.36	-0.34	-0.00	0.49	1.04
	(0.29)	(0.33)	(0.33)	(0.83)	(1.06)	(0.84)
F-test (Africa=America)	2.28	3.70**	0.82	3.85**	1.22	4.22**
R^2	0.17	0.24	0.26	0.14	0.31	0.44
N. Obs.	131	124	121	35	32	32

Notes: The results correspond to the specifications in Table 5. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level.

Second, we consider a quality adjustment for the measures of population density we employed in the text. Table A2 uses a sample in which measures of density are not inferential. Because an adequate measure of density may capture more general measurement problems, we consider the whole set of specifications of Table 5 for this sub-sample. As the table shows, improved measures suggest no difference between the Americas and Eurasia and even larger differences with Africa. As in the text, the inclusion of measures based on pathogen stress and ethnic diversity are able to reduce the value and significance of the Africa dummy and hence to 'explain' Africa's performance.

Table A4. Threat and severity of famine.

Dependent variable: Threat and severity of famine	I. Threat of famine			II. Severity of famine		
	(1)	(6)	(8)	(1)	(6)	(8)
Africa	0.32*	0.54**	0.63**	0.29	0.42	0.38
	(0.18)	(0.24)	(0.30)	(0.22)	(0.32)	(0.48)
America	-0.72**	-0.50	-0.55	-0.56	-0.27	-0.29
	(0.28)	(0.31)	(0.33)	(0.38)	(0.38)	(0.39)
F-test (Africa=America)	12.39**	10.20**	9.63**	5.04**	2.87*	1.48
R^2	0.10	0.19	0.20	0.07	0.16	0.15
N. Obs.	118	112	109	73	70	69

Notes: The results correspond to the specifications in Table 5. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level.

Further, notice that population size is often estimated based on inhabitable land or the number of cities. Thus, differences in population between South and Central America and sub-Saharan Africa may simply be a reflection of these differences. The biases introduced by this reasoning work against our conclusions because they would imply lower estimates for population in Africa.

Similarly, to the extent that population is a reflection of overall economic conditions, as assumed in Malthusian views, one would expect to see smaller population size in underdeveloped areas. Once again, this works against our hypothesis.

Table A5. Slavery and unfree labor.

Dependent variable: Presence of large buildings and structures	I. Presence of slavery			II. Presence of 'unfree' labor		
	(1)	(6)	(8)	(1)	(6)	(8)
Africa	-1.23**	-1.11**	-0.77*	-1.54**	-0.00	-1.08
	(0.27)	(0.34)	(0.43)	(0.49)	(0.56)	(1.18)
America	-0.79**	-0.35	-0.27	-0.20	-0.08	0.46
	(0.3)	(0.34)	(0.35)	(0.85)	(1.05)	(0.87)
Slavery	-0.15	-0.05	0.01	-0.84**	-1.33**	-1.23**
	(0.25)	(0.23)	(0.26)	(0.39)	(0.42)	(0.45)
F-test (Africa=America)	1.44	3.26*	1.00	2.31	0.01	1.44
R^2	0.15	0.24	0.25	0.21	0.45	0.56
N. Obs.	131	124	121	35	32	32

Notes: The results correspond to the specifications in Table 5. In parentheses are robust standard errors. ** and * denote statistical significance at the 5 and 10 percent level.

In Table A2 we also consider a sample composed by the African societies described in the SCCS. The difference with the sample in the text is that we have considered the following societies as part of sub-Saharan Africa: Wolof (#21), Songhai (#24), Pastoral Fulani (#25), and Hausa (#26). The results in Table A2 treats them as part of Eurasia. Perhaps it is important to notice that we have excluded Madagascar from our sub-Saharan sample. Despite the proximity to East Africa, the first human settlements of Madagascar came from Asia around 500 A.D.. In tropical America, only in Haiti (#160) there is some possible African influence but excluding this one society has no effects in the estimation results.

Table A3 addresses the issue of how representative the SCCS is for pre-industrial economies. We consider two checks. First, we add the date of pinpointing of the society to the controls of Table 5. Second, we consider the sub-sample of 41 societies studied in detail by Pryor ([41], chap. 4) for societies that "reflect a primarily pre-industrial society." In both cases, the 'African dummy' is negative and statistically different from zero. The final two tables study additional outcomes and the role of slavery. Table A4 studies additional societal outcomes related to the threat and severity of famine and shows that both were also higher in African societies. Table A5 includes the presence of slavery and 'unfree' labor as a control and shows that the 'African dummy' is still negative although samples are small and estimates imprecise. Using Pryor [41]'s measure of 'unfree' labor suggests that slavery is in part responsible for the 'African dummy.'

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