

# AFRICA'S PAST ECONOMIC DEVELOPMENT AND ITS DETERMINANTS

Javier A. Birchenall\*  
UNIVERSITY OF CALIFORNIA AT SANTA BARBARA

December 12, 2008

## Abstract

From the colonial era to the present, economic progress in sub-Saharan Africa has been slow. This paper argues that Africa's stagnation started before the European expansion and that modern influences are not able to fully account for Africa's growth tragedy. The paper uses measures of urbanization to proxy for economic progress in pre-modern times and shows that before the 1500s, large- and medium-sized cities were less prevalent in Africa than in South and Central America, a comparable region. Disaggregate measures drawn from the Standard Cross-Cultural Sample (SCCS), which includes 186 pre-industrial societies around the world, confirm and generalize the results. Societal data from the SCCS also give some importance to ethnic diversity and adverse disease environments in pre-industrial Africa. Demography, geography, and technology play only a minor role in explaining the development patterns of African societies.

JEL classification: J11; O11; O33.

Communications to: Javier A. Birchenall

Department of Economics, 2127 North Hall  
University of California, Santa Barbara CA 93106  
Phone/fax: (805) 893-5275  
E-mail: [jabirche@econ.ucsb.edu](mailto:jabirche@econ.ucsb.edu)

[Premilinary]

---

\*I would like to thank Philip Babcock, David Carr, Juan Carlos Cordoba, Stanley Engerman, Hyeok Jeong, Gary Libecap, Kris Mitchener, Phil Hoffman, Jean-Laurent Rosenthal, Raaj Sah, Romain Wacziarg, Warren Whatley, and seminar participants at USC, Universidad de los Andes, the All-UC economic history group meeting, and the Econometric society for very useful comments. I would like to specially acknowledge the many suggestions and criticisms by Peter Lindert, my discussant at the All-UC EH meeting.

# 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. Currently, 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 situation, common reasons for Africa's underdevelopment are modern aspects such as the slave trade and colonialism. The purpose of this paper is not to deny the significance of these modern aspects in Africa's development but to examine the economic performance of Africa in the past, essentially before European colonization.

The central argument of this paper is that sub-Saharan Africa lagged behind the rest of the world long before the European expansion of the 1500s. We also argue that slavery and colonization (broadly viewed) are not able to fully account for the income differences we see today between Africa and other former European colonies in the tropics. Finally, we argue that Africa's pre-industrial economic performance was in part a consequence of the adverse disease environments and high levels of ethnic diversity in the continent. These influences stand out among many other aspects we consider such as demography, geography, and technology.

In exploring Africa's past economic development we focus on the post-agricultural development of sub-Saharan Africa and the Americas. We do so because the disappearance of the land bridge that connected the Americas with the Old World has been widely perceived as a 'natural experiment' in geographical isolation (see, e.g., Diamond [17]; Kremer

[25]; Mann [31]). Whereas Africa, Asia, and Europe have continuous land boundaries between them, the development of the Americas was independent of the development of the Old World.

While Kremer [25] compared the pre-colonial development of the Americas to that of the Old World to study the interaction between population and the economy, we argue here that a comparison between sub-Saharan Africa and the Americas eliminates important confounding factors that could contaminate Kremer [25]'s results. As we describe in detail later on, Africa and the Americas are similar in terms of their geography, endowments, and climate so they provide a cleaner comparison from a comparative point of view.<sup>1</sup> Settled agriculture, for instance, appeared in sub-Saharan Africa and the Americas at similar dates, some 4 to 5 thousand years ago, whereas in the Near East and China agriculture originated some 10 to 8 thousand years ago (see, e.g., Austen [4]; Austen and Headrick [5]; Diamond [17]; Hopkins [24]; Smith [40]).<sup>2</sup>

Following Acemoglu et al. [1], we use measures of urbanization before 1500 to proxy for economic progress in pre-modern times. We measure the number of medium- and large-sized cities from Chandler [13], a source also employed by Acemoglu et al. [1]. (Acemoglu

---

<sup>1</sup>The melting of the ice caps requires a suitable control group. Even if one assumes that population densities before agriculture were close in all regions of the world, and that populations were randomly divided, factor endowments were not equally distributed in the different areas (see, e.g., Diamond [17]). The importance assigned by Kremer [25] to the Old World's population size, essentially Eurasia's, could be in part attributed to advantages in endowments or geography such as a large number of domesticable species or Eurasia's East-West orientation which, according to Diamond [17], favored the origin of agriculture and the diffusion of post-agricultural technologies such as metallurgy and weaponry.

<sup>2</sup>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 [17], 161). We focus on South and Central America because in terms of biogeography 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 deserts. For instance, Mexican corn reached the current US territories only at around 900 A.D., Diamond ([17], 109).

et al. [1], however, omitted Africa from their study of urbanization for reasons that we will describe later on.) Chandler's [13] 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, Teotihuacán (currently Mexico city) was among the ten largest cities of the world in the year 400 A.D., Chandler ([13], 464).

To complement our aggregate analysis, we study pre-industrial economies using Murdock and White's [35] 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.

Some variables in the SCCS measure 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, the Americas, and the rest of the world. In measures of urbanization, food production, and political sophistication, the 'African dummy' is negative and statistically different from zero (even different from an 'American dummy'). More surprising, perhaps,

controls for demography, geography, and technology are still unable to fully account for the relatively low sophistication in pre-industrial Africa. Our disaggregate analyses thus suggest that the prevailing economic and institutional conditions in Africa were not as developed as those in the Americas at the time of the European expansion.

This paper also confronts a series of hypotheses that seek to explain Africa's persistent poverty. First we argue that Africa's current situation is not associated with a 'reversal of fortune' within the tropics as the one described in Acemoglu et al. [1] for the European colonies in America. Whereas North America was relatively poor in 1500 and relatively rich today (compared to South and Central America), compared to North Africa or even to South and Central America, sub-Saharan Africa has been relatively poor since before modern times. Such a 'persistence of misfortunes' suggests some continuity in the institutional conditions observed in Africa, see, e.g., Acemoglu et al. [1] and Herbst [22].

Institutional persistence has been stressed by Herbst [22] who explains current state failures in Africa by the absence of state-building institutions during the pre-colonial period (see also Bockstette et al. [8] and Gennaioli and Rainer [21] for studies that emphasize the importance of 'State antiquity'). According to Herbst [22], the lack of state consolidation in pre-colonial Africa was in part a consequence of a relatively low population density that made state control more difficult and competition for space less attractive.<sup>3</sup>

Implicit in Herbst [22] is a comparison between state formation in Africa and Europe.

The comparison between pre-colonial Africa and the Americas in this paper suggests a

---

<sup>3</sup>Herbst [22] also argues that slavery in pre-colonial Africa was in part a consequence of population being the scarce resource. (See Robinson [39] for a review of Herbst [22].) The presence of slavery is recorded in the societies of the SCCS but slavery was eliminated or substituted by other forms of forced labor early on, see, e.g., Pryor [38]. To quantify the importance of slavery and European colonization we rely on the aggregate estimates of Nunn [36] and Acemoglu et al. [1].

weaker link between state formation and population densities. The Americas had smaller population densities than Africa but the independent development of pre-Columbian states in the Americas resembles to an astonishing degree those patterns seen in the earliest states of Eurasia.<sup>4</sup>

An alternative line of work suggests that much of Africa's poor economic and institutional performance is related to the high levels of ethnic, linguistic, religious, and genetic diversity in the continent, see, e.g., Easterly and Levine [18], Alessina et al. [3], Miguel and Gugerty [33], and Spolaore and Wacziarg [41]. Because one of the reasons for Africa's high ethnic fractionalization is the legacy of colonialism (i.e., by the establishment of borders between colonies), we study ethnic diversity in the pre-industrial SCCS societies based on data from Cashdan [12]. These ethnographic measures are based on the number of ethnic groups in the region of each of the 186 SCCS societies. Finally, we consider other factors that may contribute to Africa's poverty such as their geography and their disease environments as highlighted by Bloom and Sachs [9] and Hibbs and Olsson [23] among many others. We use latitude, altitude, potential for agriculture, and other characteristics for the societies in the SCCS, and include measures 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 [29].

In terms of modern influences, we use the estimates of Acemoglu et al. [1] and Nunn

---

<sup>4</sup>Studies of the economic history of Africa, see, e.g., Austen [4], Austen and Headrick [5], and Hopkins [24] also argue that Africa's pre-colonial stagnation was due to lower population levels and 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 the Americas according to the commonly used estimates of Biraben [7] and McEvedy and Jones [32]. Also, the Americas 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 ([19], 152), but that Africa had several trade routes that connected the continent with the rest of the Old World.

[36] to argue that colonization and slavery are not able to account for most of the large income gap between Latin America and Africa seen today. Because conditions in the past were not as different between Africa and the Americas, compared to the conditions in any of these regions and North America or Australia, the estimates in Acemoglu et al. [1] predict similar economic conditions today for sub-Saharan Africa and Latin America. Current income differences, however, are almost as large as the difference between Latin America and the United States. In terms of the contribution of slavery, we use Nunn [36]’s estimates and show that the absence of slavery would increase the per capita income of African nations but that the gains are still unable to explain most of Africa’s difference with Latin America.

Subject to the limited availability of data, and with the many caveats of data quality very much in mind, we argue that about half of Africa’s current income difference with Latin America is due to modern influences such as colonization and slavery. We consider the remaining half to be a consequence of pre-modern influences such as the absence of state-building in pre-industrial Africa. In terms of pre-industrial influences, our empirical findings give some support to the role of ethnic diversity and adverse disease environments. Past differences in demography, geography, and technology, on the other hand, seem to play a minor role in explaining the development patterns of African societies.

It is perhaps important to acknowledge that with discussions about economics and demography in the very long run one has only a limited amount of data and that there are important concerns for data quality and measurement. For example, Acemoglu et al. [1] did not use Chandler’s [13] estimates of city formation in sub-Saharan Africa arguing

for measurement problems (although they used Chandler [13], or sources derived from Chandler [13], for other regions of the world). 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 by stratifying the sample and by adding several controls. Finally, to keep the paper within reasonable length, we have not mapped past conditions to current individual countries as commonly done in the literature. We have also focused on macroeconomic aspects and have abstracted from several important microeconomic and institutional aspects.<sup>5</sup> Throughout the paper we provide additional inferences to support our main arguments and discuss some of the ways in which the conclusions of the present descriptive analysis could change as more evidence from anthropology, archeology, biology, and demography is accumulated.

The rest of the paper proceeds as follows. Section 2 compares the aggregate economic and demographic conditions in the Americas and sub-Saharan Africa before the European expansion. Section 3 presents an econometric analysis of the pre-industrial societies in the SCCS sample. Section 4 considers some alternative explanations and it offers some remarks on the current conditions in Africa. Section 5 concludes this paper. The Appendix to this paper contains some additional results for robustness.

---

<sup>5</sup>A claim of low urbanization in Africa is valid to the extent that one cannot nowadays point to a large sub-Saharan city in pre-modern times or to evidence of large public works typical of urban life. (Obviously, large cities may have existed in sub-Saharan Africa but none has been found yet or maybe cities existed in the past but are now lost.) It is clear that African urban life existed before Mediterranean and European contact, see, e.g., Davidson [16]; Hull [26]; Connah [15]. 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 play some effect on 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 ([26], 114-117).

## 2 Aggregate analysis

In this section we compare the post-agricultural development of Africa and the Americas using the geographical isolation of the Americas as a ‘natural experiment.’ As in Kremer [25], we assume that the spread of modern humans across the Bering land bridge was essentially random and consider the development of the isolated populations as independent of the development of the Old World. In contrast to Kremer [25], we evaluate the isolation of the Americas with respect to Africa since a control region should have the same ‘pre-treatment’ characteristics as the Americas.<sup>6</sup> A comparison between the Old World and the Americas would most likely reflect influences not related to population but to geography or endowments that favored an early onset of agriculture in Asia (see, e.g., Diamond [17] and Table 1).

The main advantage of a comparison between Africa and the Americas is that both have many similarities. In both, axes run mostly from North to South, Diamond ([17], 177). Also, South and Central America have an area that is somewhat comparable to sub-Saharan Africa’s (Table 3) and, natural conditions and climate variety are similar as both continents cross the Equator. Agriculture originated in both regions at a much later date than in the Near East or China but roughly at the same time (Table 1), both had similar estimated population sizes in 400 B.C. (Table 1), and in neither of them there were many domesticable animals. (In the Americas there was the llama while there were

---

<sup>6</sup>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 [17] cites evidence in favor of the “overkill” hypothesis. Fagan ([19], 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.

no mammalian candidates for domestication in sub-Saharan Africa, Diamond ([17], Table 9.2).) Finally, 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 ([17], Table 8.1).

The comparisons we offer next are based on aggregate evidence of city formation using sources similar to those employed by Kremer [25] and Acemoglu et al. [1]. Later on we study disaggregate data for a cross-section of 186 known pre-modern societies around the world, the SCCS sample of Murdock and White [35].

*Cities:* There is no standard measure of development or technological sophistication in pre-modern societies but we consider city formation as a proxy for differences in economic prosperity during pre-industrial periods. As a measure of sophistication, urbanization offers many advantages since 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. See Acemoglu et al. ([1], Section 2) for a related discussion in support of this view.

Table 1 reports the time of origin of agriculture in several regions with independent origin.<sup>7</sup> The table shows that agriculture originated independently in seven widely separated places on the world including the Americas and Africa. Table 1 also reports population

---

<sup>7</sup>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 [40]. The case of New Guinea is particularly interesting because despite the advantage in size and trade with New Guinea, Australia remained a land of hunter-gatherers until European contact.

sizes in 400 B.C. and the number of cities with more than 100,000 inhabitants between the years 1000 B.C. and 1000 from Modelski [34]. As it is well known, agriculture increases population size and population densities.<sup>8</sup> Agriculture in sub-Saharan Africa, however, was not associated with the development of urban systems such as those in the Near East, China and South and Central America. Before the European expansion, there were no large cities in North America, Australia, or south of the Sahara (see, e.g., Modelski [34]; Chandler [13]).

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 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		
The Americas			
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 ([40], 13). Population size in millions from Biraben ([7], Table 2). McEvedy and Jones [32], 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 ([34], Table 11).

Table 2 complements Table 1 and compares the number of cities with populations

<sup>8</sup>Population changes are well documented in all agricultural transitions, even modern hunter-gatherers with fairly recent settlements, Livi-Bacci ([27], 45). Archaeological material relevant for population change, has been studied by Whitmore et al. [43] for the Egyptian Nile valley, the Tigris-Euphrates lowlands, the Basin of Mexico, and the central Mayan lowlands of Mexico and Guatemala.

over 20 and 40 thousand inhabitants from Chandler [13]. (The inventory in Chandler [13], according to Connah [15], provided accurate patterns of city formation in Africa.) Table 2 reports different time periods as the influence of Eurasia, and the Mediterranean more specifically, 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 Americas.

Year	North Africa	Sub-Saharan Africa				North America	South and Central America
		Muslims	Middle Nile and Ethiopia	Rest (indigenous)	Total		
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 ([13], 39-57). The size of cities in the Americas in Modelski [34] is slightly smaller but there are no African cities for a comparison because the size cut-off is larger in Modelski [34]. 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 Alos) 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 Eurasian influence in sub-Saharan Africa.

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 (3 at most). 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. In the Americas, in 800 A.D., there were already twice as many cities, 10. In the Americas, in fact, the number of cities was as large as the number of cities in North Africa, Table 2. In 800 A.D., the number of large cities, cities with more than 40 thousand inhabitants, was also twice as large in the Americas.

After the first millennia, the Arab influence in Africa increased substantially. In 1500 there were 13 cities in regions with Arab influence. And although the number of non-Arab cities in sub-Saharan Africa increased from 5 to 11 between 800 and 1500, 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 was more urbanized than the Americas. However, in 1500, the total number of cities with more than 40 thousand inhabitants was the same in sub-Saharan Africa as in the Americas. Of the 6 cities with more than 40 thousand inhabitants in sub-Saharan Africa, only 2 have an African origin. In the Americas, there were 6 large indigenous cities.<sup>9</sup>

*Demography:* We next evaluate the hypothesis that low population densities played an

---

<sup>9</sup>Some civilizations in the Americas originated in tropical rainforests similar to the African rainforest. None of the major cities in the Americas or Africa were coastal and in terms of latitude all tropical cities were close. The latitude of the main cities of the Inca empire was about  $-13^\circ$  and most Mayan and Aztec cities were located at latitudes near  $20^\circ$  to  $22^\circ$ . The ruins of the Great Zimbabwe are located at a latitude of  $-20^\circ$  while Kumbi Saleh, the capital of the Ghana empire, at a latitude of  $15^\circ$ . The latitudes of Meroë and Aksum (in East Africa) were  $16^\circ$  and  $14^\circ$ . The next section presents a more detailed analysis of geographic differences with disaggregated data.

important role in Africa’s pre-colonial underdevelopment. Our analysis is a reduced-form approach but population densities play a prominent role in the analyses of Herbst [22], Hopkins [24], and in Boserupian views in general, see, e.g., Boserup [10] and Kremer [25].

To estimate the role of population in economic development one would ideally like to know the size of the population prior to the isolation of the Americas and around 1500 when the European expansion integrated the isolated areas once again. While there are several estimates in 1500, estimates prior isolation are not available. This sub-section relies on modern estimates of past populations beginning in 400 B.C..

Table 3. Estimated population in Africa and the Americas.

Region	Area	Biraben [7]				McEvedy and Jones [32]		
		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
Indian subcontinent	5	30	46	40	95	34	77	100
World population		153	252	253	461	170	265	425

Notes: Population in millions. Area (mill. km<sup>2</sup>) from McEvedy and Jones [32]. 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.

Evidence on the size of the population in America before Columbus varies substantially. For tax purposes, Spanish authorities in 1574 reported a total of about 8 to 10 million inhabitants in Hispanic America although there are much higher estimates, Livi-Bacci ([28], Table 1). Numbers in Africa also vary widely but early estimates suggested

an African ‘consensus’ around 100 million inhabitants in 1650, see, e.g., Caldwell and Schidlmayr [11].<sup>10</sup>

In addition to the estimates at the time of the European expansion, one would like to know the time path of population change in Africa and the Americas. Beginning with Colin Clark’s [14], there have been some attempts to provide longitudinal estimates of regional populations in post-agricultural times. The estimates from Biraben [7] and McEvedy and Jones [32] summarized in Table 3 are useful for a first comparison because both are independent sources (see, e.g., Caldwell and Schidlmayr [11]). From Table 3 is evident that while the estimates of population levels and increase from Biraben [7] and McEvedy and Jones [32] differ, both share a common feature: sub-Saharan Africa had a large population size and the fastest population growth in the world in the years between 400 B.C. (or A.D.) and 1500 (or 1000).<sup>11</sup>

Consider first a cross-sectional difference in population levels between Africa and the Americas in 1500,  $\Delta_D = N^{Africa} - N^{Americas}$ . As Table 3 shows, population in sub-Saharan Africa was about twice as large as the population in the Americas. Second, consider a double difference or a difference in growth rates,  $\Delta_{DD} = n^{Africa} - n^{America}$ ,

---

<sup>10</sup>Although some earlier estimates are based on an “extraordinary amount of material,” they are either informed guesses based on travelers’ observations or impressions based on relative densities, Caldwell and Schidlmayr ([11], 188). Caldwell and Schidlmayr ([11], Table 2) present additional estimates of regional populations circa 1650. In all estimates but in Riccioli’s 1661 figure, Africa is more populous than the Americas. As Livi-Bacci [28] notes, a large population in the Americas is used mostly to give credit to “germs” as an important factor in the population decline after the Conquest. Livi-Bacci [28] also argues that the new pathologies were important in the depopulation of the Americas but additional factors related to violence, civil conflicts, famine and hunger, confiscation of labor, and economic and social disruptions were also powerful factors in the decline.

<sup>11</sup>Rapid population growth in sub-Saharan Africa is associated with a series of geographic expansions of the Bantu-speaking agricultural populations (see Connah [15] and Austen [4]). The rapid growth in population, beginning as early as 3 thousand years ago, has been documented through linguistic, archeological, and even genetic basis. Signatures of the Bantu expansion exist for mtDNA and Y-chromosome data, see Tishkoff and Verrelli ([42], 309). 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 ([24], 30).

with  $n$  as the population growth rate. As Table 4 shows, population in Africa increased between four- and ten-fold, much faster than the populations in the Americas. In other words, population size, population density, and population growth were higher in Africa.

Table 4. Population growth in Africa and the Americas.

	Biraben [7]				McEvedy and Jones [32]	
	400 B.C. to		A.D. to		A.D. to	
	1000	1500	1000	1500	1000	1500
	Baseline population increase					
A. Sub-Saharan Africa	3.3	10.1	1.5	5.5	3.5	1.6
B. The Americas						
B <sub>1</sub> . North	1.0	2.0	0.0	0.5	2.3	0.8
B <sub>2</sub> . South and Central	1.3	4.6	0.6	2.9	2.0	1.0
	Difference with the Americas, $\Delta_{DD}$					
C <sub>1</sub> (=A-B <sub>1</sub> ). North America	2.3	8.1	1.5	5.0	1.2	0.8
C <sub>2</sub> (=A-B <sub>2</sub> ). South and Central	2.0	5.5	0.9	2.6	1.5	0.6
	Controls for Eurasian influence over Africa					
Population increase in						
D <sub>1</sub> . Indian subcontinent	0.7	2.2	0.0	1.1	1.9	0.6
D <sub>2</sub> . Eurasia	0.0	1.4	0.0	0.4	1.3	0.0
	Double difference with the Americas, $\Delta_{DDD}$					
With respect to Indian subcontinent						
E <sub>1</sub> (=C <sub>1</sub> -D <sub>1</sub> ). North America	1.6	6.0	1.5	3.9	-0.7	0.3
E <sub>2</sub> (=C <sub>2</sub> -D <sub>1</sub> ). South and Central	1.3	3.4	0.9	1.5	-0.4	0.1
With respect to Eurasia						
F <sub>1</sub> (=C <sub>1</sub> -D <sub>2</sub> ). North America	2.3	6.7	1.5	4.6	0.0	0.9
F <sub>2</sub> (=C <sub>2</sub> -D <sub>2</sub> ). South and Central	2.0	4.2	0.9	2.2	0.2	0.6

Notes: Data from Table 3. Population increase is not taken on uniform time units but simple normalizations will make rates comparable between periods.

Finally, the previous comparisons assume Africa had no contact with Eurasia so they represent a lower bound for the influence of population, see, e.g., Kremer [25]. Contact with Eurasia existed through the Nile River because of ancient Egypt, though the Sahara by

the Arab trade that started during the seventh century A.D., and by the East African trade through the Indian ocean in medieval times. One way to determine Eurasia’s influence is through a double difference estimator  $\Delta_{DDD} = (n^{Africa} - n^{Eurasia}) - n^{America}$ , with  $n^{Eurasia}$  representing a ‘control’ for the contact of Africa and Eurasia. The difference in growth rates would then discount from Africa’s growth rate the contribution attributed to Eurasian influences. For instance, if the Eurasian influence is large, one should observe a large and positive estimate  $\Delta_{DD}$  but a small estimate of  $\Delta_{DDD}$ .<sup>12</sup>

Table 4 includes estimates of African population growth that discount the population increase in the Indian subcontinent (which also has a North-South axis) and in Eurasia. An alternative would be to use North Africa directly but North Africa’s population growth was negative in most of the years considered in Table 4. (This would actually make population growth in sub-Saharan Africa look even faster than any other comparison.) As the table shows, even after the growth rate of a control region is subtracted, population growth in Africa was faster than in the Americas. The only instance in which there is a negative difference is for the first millennia in the population data from McEvedy and Jones [32].<sup>13</sup>

---

<sup>12</sup>By its population size, one would expect that ancient Egypt had a large influence on sub-Saharan Africa. In a long-run perspective, however, Egyptian influences in sub-Saharan Africa seem small. For example, cities appeared first in Nubia (or the middle Nile) due to the immediate proximity to ancient Egypt. Meroë, is perhaps the best known city in tropical Africa. In 430 B.C. the population of Meroë was about 20,000 inhabitants (Chandler [13], 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. Alternative routes through the Red Sea and the Sahara were secondary early on, Connah ([15], 18-19). Despite the trade stimulus, it has been suggested that the Nubian corridor was a “cultural cul-de-sac,” see Connah ([15], 19).

<sup>13</sup>Hopkins ([24], 121) suggests an estimate of 25 million in West Africa alone during 1700. Caldwell and Schindlmayr [11] suggest an estimate of the population in Africa around 50 million inhabitants in 1500. Note also that about 10 million slaves were transported mostly from West Africa during the Atlantic slave trade, Fogel and Engerman ([20], Figure 2). Overall, about 18 million slaves were transported out of Africa, see Nunn [36]. The demographic impact of slavery in Africa seems small in part because slavery was already practiced in smaller scale in Africa “long before the rise of the Atlantic trade,” see Hopkins ([24], 23, and 120-122). It is not possible to draw pure demographic inferences from the Atlantic slave trade but it may be important to notice that the price of slaves did not increased enough during the slave trade to suggest large population losses, see, e.g., Patterson ([37], 164).

In summary, during the post-agricultural period, sub-Saharan Africa had contact with Eurasia and a larger population size compared to the Americas. Both 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 Americas 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. As today a similar ranking in economic conditions prevails, the aggregate evidence we have presented thus far suggests that ‘misfortune’ have persisted in sub-Saharan Africa.

### **3 Disaggregate analyses**

*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 large 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 for a large number of cultural variables constructed from historical records and published field research by ethnographers. The SCCS also includes a series of measures of economic and political outcomes as well as a richer set of controls that allow us to consider alternative explanations for Africa’s economic conditions in the past. As with many of the variables in this data set, some of the

measures are organized as an ordinal scale.

We consider a sample of 131 agricultural societies and, for robustness, we later use a sub-sample based on the work of Pryor [38] 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). 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.<sup>14</sup>

In what follows we estimate regression equations of the following form:

$$Y_i = \alpha + \delta_A \times \text{Africa}_i + \delta_S \times \text{America}_i + \mathbf{X}_i' \Theta + \varepsilon_i,$$

with  $Y_i$  as the measure of economic and political outcomes in society  $i$ ,  $\text{America}_i$  as a dummy variable for South and Central America, and  $\text{Africa}_i$  as a dummy for sub-Saharan Africa. Consequently, the coefficients on Africa and America capture the difference between each region and the rest of the world (mainly Eurasia). As in the aggregate analysis, our primary emphasis is on the difference between both regions. The vector of controls included in the specification is denoted by  $\mathbf{X}_i$ .

Next we describe our main societal outcome variables,  $Y_i$ , and our controls,  $\mathbf{X}_i$ . First, because the aggregate analysis of the previous section studied medium- and large-sized cities, we study the existence of large or impressive structures (v66 in SCCS). Second,

---

<sup>14</sup>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 provide a series of robustness checks.

we consider measures of direct economic surpluses in agriculture in the form of food storage (v21). Third, we consider measures of political organization and autonomy (v81).<sup>15</sup> (Proxies based on the threat and severity of famine are studied in the Appendix.)

Table 5. Descriptive statistics for agricultural societies in the SCCS.

	Mean	Std. Dev.	Africa	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)	1873.38	213.02	1915.15	1868.23

Notes: Africa and 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.

Table 5 shows summary statistics for our sample. In terms of the outcome variables, the table shows a systematic difference between Africa and the Americas. For example,

<sup>15</sup>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).

as expected, large urban centers were less prevalent in Africa than in South and Central America. The same is also true for additional societal outcomes.

As in modern cross-country regressions, we use control variables  $\mathbf{X}_i$  to evaluate some of the hypotheses proposed to explain Africa’s economic development in the past. 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 that essentially represent the logarithm of size and population density respectively. Notice, however, that Table 5 suggests that population density and size at a societal level were on average higher in Africa.

Table 5 also includes measures of the threat and severity of famine used in the Appendix as well as the date of pinpointing of the SCCS society. Because the only way to study pre-industrial societies is through descriptions of westerns, the sample is contaminated. From the dates listed, it is clear that there is no ‘pristine’ society in the SCCS. However, as pointed out by Pryor ([38], 24-25), the key is to “ask much these preindustrial societies have changed over the millennia until the pinpointed date.” The key assumption in the SCCS is that for most, contamination is not as serious as it may appear.

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 the Americas, Table 5. 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 (including egalitarian societies, castes, and slavery, v158). These ordinal measures are summed to construct an overall index.<sup>16</sup>

To study the role of the disease environment we include 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, Low [29]. The main advantage of the measure we consider is that most of these diseases are vector-borne and are regional in distribution so western influences and the role of population movements are somewhat minimized for these diseases. Measures of ethnic diversity were compiled by Cashdan [12] 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 [12], 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). Notice also from Table 5 that disease loads and ethnic diversity in the societies in the SCCS are much higher in Africa than in any other region.

*Results:* Table 6 examines the relationship between the existence of large structures

---

<sup>16</sup>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 ([4], 14). Cattle domestication also seems to have had an independent origin, see Austen ([4], chapter 1). Important independent achievements in writing, mathematics, and science also took place in America, see Mann ([31], 16-20 and 63-65). Our approach in this section gives equal weight to all the factors.

and geographic region in pre-modern economies. Column (1) includes the African and American indicator variables, not including any covariates. These results simply reflect mean differences between both areas and Eurasia. Table 6 also includes a F-test for differences between Africa and South and Central America for all specifications. There are two versions of the test because we also use an ordered probit for the dependent variables. (The estimates of the ordered probit are available upon request but as evident from the F-test, the results are only marginally different.)

Columns (2)-(4) include measures of population density and community size. In these specifications, the African dummy is statistically different (and lower) from the American dummy. Even more, in column (2), there is no statistical difference between the Americas and Eurasia in terms of city formation. If a low population density had an important effect in Africa, the value of the African dummy should be lowered when densities are included. Similarly, if community size in Africa differs from size in the Americas, size differentials will reduce the African dummy. In fact, what these specifications show is that the Americas had on average lower densities and community sizes and still were more urbanized than Africa.

Column (3) includes an interaction between the regional indicators and population density. The results provide additional evidence that the relationship between population and city formation in Africa is not typical of agricultural societies. Whereas larger densities in the Americas represented more urbanization, an increase in population densities in Africa is not associated with higher urbanization. Column (3) thus suggests that, at least for Africa, larger population densities were not associated with city formation.

Table 6. 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 <sup>2</sup>	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.

The main weakness of the first cross-sectional regressions in Table 6 is that a significant African dummy may simply be a consequence of an omitted variables problem. If there are variables that describe why Africa’s development responds differently to variables that explain city formation elsewhere, their inclusion as controls should render the African dummy insignificant. As Table 6 shows, measures of geography and technological sophistication help explain the presence of large buildings and structures but the value of the African dummy is still different from zero and different from the dummy for the Americas in these specifications. The difference between Africa and the Americas is reduced only when pathogen loads and ethnic diversity are included, columns (7) and (8). Notice, however, that the African dummy in the last specifications is still negative and different from zero.

Table 7. Food surplus in pre-industrial societies.

Dependent variable: Food surplus and storage								
	(1)	(2)	(3) <sup>a</sup>	(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 <sup>2</sup>	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: <sup>a</sup> 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 6.

In Tables 7 and 8 we provide an alternative estimation for the presence of food surplus

and storage and political autonomy. Both variables represent desirable societal outcomes that complement our analysis of city formation. In both tables we report the values of the regional indicators and the tests for differences between both regions. Overall the results are similar to those of Table 6. The African dummy is statistically different from zero in all specifications and the region dummies are statistically different suggesting a difference in the pre-industrial economic conditions within the tropics.

Table 8. Political autonomy in pre-industrial societies.

Dependent variable: Political autonomy								
	(1)	(2)	(3) <sup>a</sup>	(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 <sup>2</sup>	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: <sup>a</sup> 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 6.

Overall, the facts about Africa's pre-colonial development that emerge from the previous tables are consistent with our aggregate analysis and historical evidence in suggesting important differences within the tropics. Africa had lower levels of urbanization and less politically complex societies than South and Central America. In terms of food surplus and storage, while sometimes there is no statistical difference between Africa and the Americas,

there is still a negative and significant African dummy. Finally, the results from the previous tables indicate much lower differentials between the Americas and Eurasia in terms of city formation and political organization. These findings thus suggest that isolation was no major obstacle for the development of pre-modern societies in the Americas.

In terms of the determinants of Africa's pre-modern conditions, Tables 6 to 8 suggest that disease environments and ethnic diversity are the main influences that contributed to the low sophistication of Africa. Differences in demography, geography, and technological sophistication between African and American societies are not sufficiently large to explain why Africa lagged behind Eurasia and the Americas in the pre-colonial period. Disease environments and ethnic diversity have also been commonly cited in explaining Africa's post-colonial conditions, see, e.g., Easterly and Levine [18] and Bloom and Sachs [9].

For robustness, we present an additional set of estimates in the Appendix and report here on the main results.<sup>17</sup> Perhaps the most important concern is the one of selection typical of modern migrations. As we have noted before, only hunter-gatherers populated the Americas. But 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 sample of hunter-gatherers whereas the hunter-gatherers that migrated into the Americas had positive attributes that later conducted to faster development.

To study systematic differences between hunter-gatherers in Africa and the Americas, we estimated a set of regressions for the variables in the tables above for hunter-gatherer societies. While the sample size is reduced to 55 societies, there are no predictable dif-

---

<sup>17</sup>There are only a limited number of possible measures that proxy for economic conditions in pre-modern 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 adaptations to environmental conditions that will provide inadequate inferences.

ferences between the hunter-gatherers in Africa and those in the Americas. If anything, the hunter-gatherers in Africa have marginally better conditions. The lack of important differences in hunter-gatherers also suggests that the observed difference between agricultural societies cannot be due entirely to reporting errors. This is a point we elaborate in the Appendix.

The Appendix also includes results when the dependent variables are the threat and severity of famine but results are similar. The sample is also partitioned in several ways. For instance, we consider an alternative classification of societies in Africa based on the SCCS and restrict the sample to the societies Pryor ([38], 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 included, the results are also similar to those reported in the text. Finally, 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 Africa and the Americas. Overall, as in Tables 6 to 8, the Appendix shows that the only influences that help explain Africa’s pre-industrial economic conditions are the high levels of pathogen stress and ethnic diversity.

## 4 Alternatives and controlled conjectures

*Alternatives:* We have only considered a subset of the many possible explanations for the economic conditions of pre-colonial Africa. Some alternative hypotheses based on a primitive view of Africa have already been discussed in the literature and found to be

inadequate. In terms of anticapitalist value systems or culture, Hopkins ([24], chapter 2) and Austen ([4], chapter 1) have shown that Africans were expert farm managers and that their response to economic incentives was a typical one for traditional agriculture.<sup>18</sup> (See also Austen and Headrick [5].)

Land quality and other inputs of production also have difficulties in explaining African pre-colonial development. Non-indigenous crops were adopted by African farmers and today they are considered as “typical West African agriculture.” 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 ([24], 30) and Austen ([4], 15-16). In fact, today, the majority of the food eaten in sub-Saharan Africa is non-indigenous whereas in Asia, America, and the temperate areas, diets are still based on the crops domesticated during the agricultural revolution; rice, corn, and wheat (Caldwell and Schindlmayr [11], 195).

An important and unaccounted influence in Africa is slavery and its many ramifications. It is known that the many slave trades had detrimental and persistent effects in modern Africa, see, e.g., Nunn [36]. A detailed analysis of slavery is beyond the scope of this paper but it has been carried out by Patterson [37] for the 66 slave societies in the SCCS. Patterson [37] coded the presence, origin, and approximate size of slave populations

---

<sup>18</sup>It is known that African farmers did not employ the European plow despite knowing of its existence. Hopkins ([24], 36) argues that the plow was not an appropriate technology for West Africa. Africa did not adopt the European plow. As Hopkins ([24], 37) notes, 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 ([4], 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 ([24], 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.

in the world. Similarly, Pryor [38] coded the presence of ‘unfree’ labor for agricultural societies and both can be used as initial estimates for the importance of slavery (see Table A5 in the Appendix). 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 because many societies relied on forced labor in the past and the conclusions one can draw are very limited.<sup>19</sup>

*Controlled conjectures:* Our final discussion considers a series of controlled conjectures for the role of modern influences in current conditions in Africa. As in the previous discussions, we focus on a comparison between sub-Saharan Africa and Latin America and the Caribbean. In this sub-section we evaluate the impact of colonization and slavery using the detailed estimates from Acemoglu et al. [1] and Nunn [36].

To estimate urbanization rates in 1500 for the Americas we use the average of the urbanization rates for the 22 countries listed in the Appendix 3 of Acemoglu et al. [1]. Such average is 5.80 percent. Based on Table 2 we construct a relative measure of urbanization in Africa. Multiply the number of cities at each size by the cut-off size to obtain a total estimate of urban populations. For the Americas this number in 1500 is  $10 \times 20,000 + 6 \times 40,000 = 440,000$  with the first part as the number of cities with sizes with more than 20,000 inhabitants and the second as the contribution of large cities. If the Muslim cities are counted as part of Africa, the same estimate for sub-Saharan Africa gives 600,000. If Muslim cities are excluded, the size of the urban population is 260,000. Using the population size from Biraben [7] as the denominator gives urbanization rates for Africa

---

<sup>19</sup>We also considered measures of the origin of slavery and the size of the slave population (v917 and v920) from Patterson [37] but they provide similar results to those reported in text. In order to address the potential effects associated with slavery we will take an alternative approach based on Nunn [36].

that are 3.96 percent (or 1.71 percent if Arab cities are excluded). Using the population size from McEvedy and Jones [32] gives estimates that are 2.70 and 1.17 percent. Table 9 reports the highest and lowest estimates.

Table 9. Counterfactuals for African development.

	Income per capita 2000	Urbanization rate (percent) 1500	Pop. density (per km <sup>2</sup> ) 1500	Income per capita 1500	
				(1)	(2)
				I. South and Central America	6765
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				[7584, 9950]	
Population density				[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 [36]’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 [30] (converted to \$2000 dollars) and from estimates based on Acemoglu et al. ([1], Table 1).

Population densities are simply estimated from our tables above. Using Biraben [7], densities in Africa and the Americas are 3.12 and 1.95 people per km<sup>2</sup>. From McEvedy and Jones [32], densities are 1.52 and 0.65 respectively. It is important, however, to notice

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.

Table 4.1 in Maddison [30] estimated GDP per capita in the Americas 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 9(1). 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, Acemoglu et al. ([1], Table 2(1)), as well as for a cross-country regression in 1995, Acemoglu et al. ([1], Table 2(3)). If the value of 0.038 is assumed stable, the smallest predicted relative income difference between the Americas and Africa in 1500 is  $\exp\{0.038 \times 5.80/3.96\} = 1.06$ . Income in Africa is then  $550/1.06 = 525$ . The highest predicted difference generates an income of 455. Given the large degree of uncertainty, the predicted range seem plausible.

Next we describe a series of countefactuals based on the ‘reversal of fortune’ proposed by Acemoglu et al. [1].<sup>20</sup> As discussed in Acemoglu et al. [1], a ‘reversal of fortune’ provides a framework to estimate how colonization proceeded in different European colonies. 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

---

<sup>20</sup>Notice that the assumptions implicit here generate large estimates 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. Finally, the estimates in Acemoglu et al. [1] do not include sub-Saharan Africa so the prediction for urbanization is out of their sample. To the extent that urbanization rates in Africa were lower and there is a ‘reversal of fortune,’ the prediction of higher incomes in Africa will remain valid.

North America or Australia, colonial powers encouraged investment and economic growth. Acemoglu et al. [1] also provide precise estimates on the relationship between urbanization and population densities in 1500 and current income per capita. For urbanization rates, Acemoglu et al. ([1], Table 3(1)) provides an estimated coefficient of -0.078 (s.e. 0.026) for the baseline case and a series of robustness checks generates similar estimates. That is, high rates of urbanization in the past are related to low economic outcomes today.

Using the previous estimates gives contradictory predictions for Africa. Because urbanization rates in Africa were smaller than in the Americas, predictions based on the previous relationship suggest Africa should have today an income per capita between 20 to 40 percent higher than in Latin America in 2000, \$7584 to \$9950.

Consider next the estimates based on population densities also provided by Acemoglu et al. [1]. The baseline relationship between log-population density in 1500 and current log-incomes 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 useful benchmark, out of the  $\$5520 = \$6765 - \$1245$  current income gap between both regions, a ‘reversal of fortune’ explains at most 33 percent ( $\$6765 - \$4898 = \$1867$ ) of Africa’s gap.

An alternative counterfactual in case B in Table 9 considers continental dummies. The estimates are from Acemoglu et al. ([1], Table 5(5)) in which the value of the African and America dummy is -1.67 and -0.69 respectively. The coefficient on densities is -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, when dummies are included, one can explain 85 percent (\$4729) of the current income gap between both areas. Notice, however, that the main contribution in this case is the difference in dummy variables themselves. The difference in unexplained factors, or factors that are captured by the African dummy, accounts for 76 percent (\$4226) of the income gap. The role of differentials in population densities only accounts for 10 percent of overall gap.

It is relevant to explain why a ‘reversal of fortune’ 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. However, their analysis may not be as informative as to why within the tropics Africa is lagging behind Latin America. The main reason is that Africa and the Americas were much more similar in the past than any of these regions and North America or Australia. For instance, urbanization in sub-Saharan Africa, as Acemoglu et al. ([1], 1238) noted “was at a higher level than in North America or Australia.” However, in order to account for the low incomes seen in Africa today using a ‘reversal of fortune’ argument one would have to argue that societies in Africa were more urbanized than societies in the Americas. 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]’s ‘reversal of fortune’ predicts the correct ranking between regions but only a small quantitative difference in incomes. The

most important aspect that serves to explain this seemingly puzzling result is the fact that today's income gap between Africa and the Americas 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, a 'reversal of fortune' based on differences in population densities would account for the difference between Latin America and Africa only if sub-Saharan Africa was several times more densely populated than the Americas in the past. (At least the same order of magnitude of the difference between South and Central America and North America in 1500.) More precisely, the African population density consistent with an income difference of 5.4 in the year 2000 solves the following equation:  $\exp\{-0.38 \times \ln(0.65/x)\} = 5.4$ . The solution gives an implausible number.

A second and perhaps more detrimental modern influence in Africa is slavery. To evaluate the role of the many Slave trades one can follow closely the findings of Nunn [36] who first showed that African nations would be richer than they are today in the absence of the slave trades. Nunn [36] estimated the impact of slavery using the number of slaves taken from each country between 1400 and 1900. As a normalization, Nunn [36] considered the area of each country and population size. The estimates, however, are robust in all specifications. There are two set of estimates of the impact of slavery. First, the OLS estimates in Nunn ([36], Table 3) and, second, the IV estimates of Nunn ([36], Table 4). The coefficient on the log of exports per area in Nunn ([36], 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 ([36], Table 3(6)). The IV estimates are larger. In Nunn ([36], Table 4(4)) the coefficient on log-slave

exports is -0.248 (s.e. 0.071).

To estimate the income gain for Africa if the slave trade never existed we assume that the exports of slaves are zero. The average value of  $\ln(\text{exports}/\text{area})$  in Nunn ([36], 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 9. 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 effects. Overall, 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 but because the gap between Africa and the Americas 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 description 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. Finally, notice that the absence of slavery might have reduced inequality within Africa and that as slavery conveyed costs to African nations it may also have increased incomes in Latin America. (The fact that the principal importers of slaves in the Americas were the islands of the Caribbean and Brazil, see, e.g., Fogel and Engerman ([20], Fig. 3)) suggest that, if any, there were only only modest long-term income gains from slavery.) Colonial policies also differed in many aspects between both regions. These secondary effects are ignored in our aggregate comparison because they would require a more individualized analysis.<sup>21</sup> Many other possible interactions as well as transitional effects are also ignored. For example, Bates et al. ([6], 917) argued that part of Africa’s poor growth experience is transitional because “Africa and Latin America secure their independence from European colonial rule a century and a half apart.”

## 5 Concluding remarks

Using a series of measures that proxy for economic prosperity in pre-colonial times, this paper studied Africa’s past economic development and argued that sub-Saharan Africa lagged behind the rest of the world long before the European expansion. Inspired by Kremer [25], we compared Africa with South and Central America using the geographic isolation of the Americas as a ‘natural experiment.’ Following Acemoglu et al. [1], we studied the size and number of cities in Chandler [13]’s archeological inventory and showed

---

<sup>21</sup>In the case of Botswana, Acemoglu et al. [2] careful study suggests 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. For additional analyses of pre-colonial influences in Africa see Gennaioli and Rainer [21].

that urbanization in Africa was smaller than in the Americas. We also showed that the absence of pre-colonial states in Africa (as represented by large cities) cannot be easily attributed to demographic influences as suggested initially by Herbst [22].<sup>22</sup> Populations in Africa were larger than in the Americas, had contact with Eurasia, and grew at rates faster than in any other region of the world *circa* 1500, see, e.g., Biraben [7] and McEvedy and Jones [32].

The paper also evaluated a series of hypotheses that seek to explain Africa’s long run development. To examine the determinants of Africa’s pre-industrial conditions, we used disaggregate data from Murdock and White’s [35] Standard Cross-Cultural Sample, SCCS. The SCCS contains detailed and extensive coded data for 186 pre-industrial societies in the world. 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 in agricultural societies. The finding of a 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 able to explain why pre-industrial societies in Africa were less complex than their counterpart in South and Central America. The role of previous influences in Africa’s modern growth tragedy have been stressed by Easterly and Levine [18] and Bloom and Sachs [9] among others.

---

<sup>22</sup>It may be important to acknowledge that we have emphasized institutional aspects because the organization of societies in Africa and the Americas differed at the time of the European expansion. Indigenous empires existed in Africa but most African societies were organized around tribes or lineage groups while 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 precisely because of their political structure and concentration of power. As highlighted by Herbst [22], this concentration of power was not present in Africa; in Africa, pre-colonial states were already “weak.” (In fact, perhaps the absence of pre-colonial states helps explain why sub-Saharan Africa, discovered before the Americas, and despite its proximity to Europe, was only colonized by Europeans in the late 1800s.)

Finally, this paper showed that differences in colonization, as represented by the ‘reversal of fortune’ put forward by Acemoglu et al. [1], are unable to account for the large economic differences within the tropics seen today. While Acemoglu et al. [1] are able to explain why former underpopulated colonies like the United States and Australia are wealthier than Latin America using a ‘reversal of fortune’ argument, 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 [36]’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, but that in relative terms, slavery is still unable to account for most of Africa’s post-colonial economic path.

## 6 Appendix

Here we provide additional results from the SCCS sample. We should note that the SCCS contains over 1800 coded variables for the 186 societies considered so one can almost surely find a combination of variables that can make the difference between Africa and the Americas small. The purpose of this Appendix is not to pursue that objective. Here, instead, we focus on selection and alternative measurement aspects for the variables we considered in the text. It may also be important to point out that the SCCS, by construction, is a very heterogeneous dataset as evidenced by the relatively low  $R^2$  in the tables in the main text. By construction, the SCCS is also prone to big measurement errors and biases although it is not clear that observational biases are responsible for a negative ‘African dummy.’ It is known that if the measurement error is classical, the effects found in the paper are under-estimates of the actual differences. In any event, we have not attempted to link the SCCS societies to individual countries and conducted our analysis at ‘continental’ levels because mapping to countries may introduce even more biases.

The set of robustness check is described next. First we show that there are no systematic differences between current hunter-gatherers in Africa and the Americas 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 were not as severe as one might expect because there are no systematic differences in hunter-gatherers. 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 the Americas, 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 the Americas lived in less diverse conditions or in more isolated areas. This is consistent with the main text.

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 (0.40)	-28.91* (5.19)	2.71* (0.43)	2.50** (1.50)	-4.15* (1.05)	2.02 (1.36)	7.3 (4.89)	0.38 (0.21)	-0.55* (0.19)
America	-0.60** (0.26)	-16.32* (5.93)	0.79 (0.64)	2.39** (1.28)	-3.10* (1.05)	2.93* (1.14)	-3.97* (1.76)	0.32 (0.26)	-0.50* (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

Source: 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.

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 6 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 of the Africa dummy and hence to ‘explain’ Africa’s lack of urbanization.

Notice that population size is often estimated based on inhabitable land or the number of cities so one may think that differences in population between the Americas and Africa are simply 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 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 <sup>2</sup>	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 6. In parentheses are robust standard errors. \* and \*\* denote statistical significance at the 5 and 10 percent level.

Table A3. Date of pinpointing of society and Pryor [38]’s sample.

Dependent variable: Presence of large buildings and structures						
	I. Date of pinpointing			II. Pryor [38]’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 <sup>2</sup>	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 6. 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 the Americas, 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 6. Second, we consider the sub-sample of 41 societies studied in detail by Pryor ([38], 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 become small and estimates imprecise. Using Pryor [38]’s measure of ‘unfree’ labor suggests that slavery is in part responsible for the ‘African dummy.’

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 <sup>2</sup>	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 6. In parentheses are robust standard errors. \* and \*\* denote statistical significance at the 5 and 10 percent level.

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 <sup>2</sup>	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 6. In parentheses are robust standard errors. \* and \*\* denote statistical significance at the 5 and 10 percent level.

## References

- [1] Acemoglu, D., Johnson, S., and Robinson, J. (2002) "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distributions," *Quarterly Journal of Economics*, Vol. 107, 1231-1294.
- [2] Acemoglu, D., Johnson, S., and Robinson, J. (2003) "An African Success Story: Botswana," in Rodrik D. (Ed.) **In Search of Prosperity: Analytic Narratives on Economic Growth**, Princeton University Press, 80-122.
- [3] Alesina, A., Devleeschauwer, A., Easterly, A., Kurlat, S., and Wacziarg, R. (2003) "Fractionalization," *Journal of Economic Growth*, Vol. 8, 155-194.
- [4] Austen, R.A. (1987) **African Economic History: Internal Development and External Dependency**, James Currey.
- [5] Austen, R.A. and Headrick, D. (1983) "The Role of Technology in the African Past," *African Studies Review*, Vol. 26, 163-184.
- [6] Bates, R.H., Coatsworth, J.H., and Williamson, J.G. (2007) "Lost Decades: Postindependence Performance in Latin America and Africa," *Journal of Economic History*, Vol. 67, 917-943.
- [7] Biraben, J-N. (1979) "Essai sur L'évolution du Nombre des Hommes," *Population*, Vol. 34, 13-25.
- [8] Bockstette, V., Chanda, A., and Putterman, L. (2002) "States and Markets: The Advantage of an Early Start," *Journal of Economic Growth*, Vol. 7, 347-369.
- [9] Bloom, D.E. and Sachs, J. (1998) "Geography, Demography, and Economic Growth in Africa," *Brookings Papers on Economic Activity*, Economic Studies Program, Vol. 29, 207-296.
- [10] Boserup, E. (1981) **Population and Technology**, Basil Blackwell.
- [11] Caldwell, J.C. and Schindlmayr, T. (2002) "Historical Population Estimates: Unraveling the Consensus," *Population and Development Review*, Vol. 28, 183-204.
- [12] Cashdan, E. (2001) "Ethnic Diversity and Its Environmental Determinants: Effects of Climate, Pathogens, and Habitat Diversity," *American Anthropologist*, Vol. 103, 968-991.
- [13] Chandler, T. (1987) **Four Thousand Years of Urban Growth: An Historical Census**, St. Davis University Press.
- [14] Clark, C. (1977) **Population Growth and Land Use**, MacMillan Press.
- [15] Connah, G. (2001) **African Civilizations: An Archaeological Perspective**, Cambridge University Press.
- [16] Davidson, B. (1959) **The Lost Cities of Africa**, Little, Brown and Company.
- [17] Diamond, J. (1997) **Guns, Germs and Steel: The Fates of Human Societies**, Vintage.
- [18] Easterly, W. and Levine, R. (1997) "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, Vol. 112, 1203-1250.

- [19] Fagan, B. (2004) **The Long Summer: How Climate Changed Civilization**, Basic Books.
- [20] Fogel, R.W. and Engerman, S. (1974) **Time on the Cross: The Economics of American Negro Slavery**, Little Brown Company.
- [21] Gennaioli, N. and Rainer, I. (2007) “The Modern Impact of Precolonial Centralization in Africa,” *Journal of Economic Growth*, Vol. 12, 185-234.
- [22] Herbst, J. (2000) **States and Power in Africa: Comparative Lessons in Authority and Control**, Princeton University Press.
- [23] Hibbs, D.A. and Olsson, O. (2004) “Geography, Biogeography, and Why Some Countries are Rich and others are Poor,” *Proceedings of the National Academy of Sciences*, Vol. 101, 3715-3720.
- [24] Hopkins, A.G. (1973) **An Economic History of West Africa**, Columbia University Press.
- [25] Kremer, M. (1993) “Population Growth and Technological Change: One Million B.C. to 1990,” *Quarterly Journal of Economics*, Vol. 88, 681-716.
- [26] Hull, R.W. (1976) **African Cities and Towns before the European Conquest**, W.W. Norton.
- [27] Livi-Bacci, M. (2001) **A Concise History of World Population**, Blackwell Publishers.
- [28] Livi-Bacci, M. (2006) “The Depopulation of Hispanic America after the Conquest,” *Population and Development Review*, Vol. 32, 199-232.
- [29] Low, B.S. (1988) “Pathogen Stress and Polygyny in Humans,” in **Human Reproductive Behavior: A Darwinian Perspective**, Betzig, L., Borgerhoff Mulder, M., and Turke, P. (eds.), 115-127, Cambridge University Press.
- [30] Maddison, A. (2001) **The World Economy: A Millennial Perspective**, OECD Development Centre.
- [31] Mann, C.C. (2005) **1491: New Revelations of the Americas Before Columbus**, Alfred A. Knopf.
- [32] McEvedy, C. and Jones, R. (1985) **Atlas of World Population History**, London: Penguin Books.
- [33] Miguel, E. and Gugerty, M.K. (2005) “Ethnic Diversity, Social Sanctions, and Public Goods in Kenya,” *Journal of Public Economics*, Vol. 89., 2325-2368.
- [34] Modelski, G. (2003) **World Cities:-3000 to 2000**, Faros 2000.
- [35] Murdock, G.P. and White, D.R. (1969) “Standard Cross-Cultural Sample,” *Ethnology*, Vol. 9, 329-369. Updates are available online at [http://repositories.cdlib.org/imbs/socdyn/wp/Standard\\_Cross-Cultural\\_Sample](http://repositories.cdlib.org/imbs/socdyn/wp/Standard_Cross-Cultural_Sample)
- [36] Nunn, N. (2008) “The Long-Term Effects of Africa’s Slave Trades,” *Quarterly Journal of Economics*, Vol. 123, 139-176.

- [37] Patterson, O. (1982) **Slavery and Social Death**, Harvard University Press.
- [38] Pryor, F.L. (2005) **Economic Systems of Foraging, Agricultural, and Industrial Societies**, Cambridge University Press.
- [39] Robinson, J. (2002) "States and Power in Africa by Jeffrey Herbst: A Review Essay," *Journal of Economic Literature*, Vol. 40, 510-519
- [40] Smith, B.D. (1995) **The Emergence of Agriculture**, Scientific American Library.
- [41] Spolaore, E. and Wacziarg, R. (2006) "The Diffusion of Development," NBER Working Paper 12153.
- [42] Tishkoff, S.A. and Verrelli, B.C. (2003) "Patterns of Human Genetic Diversity: Implications for Human Evolutionary History and Disease," *Annual Review of Genomics and Human Genetics*, Vol. 4, 293-340.
- [43] Whitmore, T.M., Turner II, B.L., Johnson, D.L., Kates, R.W., and Gottschang, T.R. (1990) "Long-term Population Change," in **The Earth as Transformed by Human Action**, Turner II, B.L., Clark, W.C., Kates, R.W., Richards, J.F., Mathews, J.F., and Meyer, W.B. (Eds.), Cambridge University Press, 25-39.