

# How deep are the roots of Africa's underdevelopment? On the causes of the African slave trade.

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## Abstract

This paper analyses the forces shaping the evolution of the African slave trade over the early modern period. The discussion extends to all regions of the world (Africa, Europe, the Americas and Asia) and covers technological, institutional and cultural factors. We also place the African slave trade in the perspective of Africa's long-term economic development and expand on the ultimate role of biogeographic endowments.

**Keywords:** Africa; Slave Trade; Long-term development; Biogeography; Culture.

**JEL classification:** O13, O14, O33, N17, N37.

## 1 Introduction

To what degree is the current economic backwardness of Sub-Saharan Africa historically determined? To understand the region's present state we need to look into its past, but how far away do we need to go?

The importance of history and the large degree of path-dependence in developing countries' growth experiences has been a major theme of research

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over the last decade and a half. Perhaps it is best exemplified by the boom in the empirical literature on institutions and growth.<sup>1</sup> Applied to the African case, this literature would suggest that we look at events taking place not much more than a century ago - the literature tends to emphasize colonialism as the main determinant of institutional quality and the partition of Africa among European nations had hardly started before the late 19th century.

But a hundred and odd years may be too short a period to account for today's massive differences. Crucially, Africa's integration within the emerging world economy had been rapidly increasing over the three or four centuries preceding its colonial conquest. Between the 16th and 18th centuries, during a time that economic historians usually refer to as the early modern period, the major continent-wide socioeconomic phenomenon affecting Africa was surely the development of the Trans-Atlantic Slave Trade.

The case for the slave trade as a fundamental explanation of Africa's long-term economic underachievement has been made recently by Nathan Nunn in a couple of admirable papers (Nunn 2008, Nunn and Wantchekon 2011). By putting together an estimate of the total exports of slaves from every African country to the different Eurasian buyers, Nunn (2008) shows a strong negative relationship between slave exports and current levels of income per capita. Nunn (2008) hypothesizes that the multiplication of small-scale wars and raids that characterized the African slave trade led to higher levels of ethnic fractionalization and lower levels of interpersonal trust; and the second interpretation has been supported by the survey-based evidence in Nunn and Wantchekon (2011). That ethnic fractionalization and lack of interpersonal trust are detrimental to economic development tends to be well-accepted within the relevant literature (see Easterly and Levine 1997, Knack and Keefer 1997, and subsequent works on these subjects).

Next to this perspective, finally, we may place a few additional contributions in which the roots of underdevelopment are pushed far deeper into

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<sup>1</sup>See, in particular, Knack and Keefer (1995), Hall and Jones (1999), Acemoglu et al. (2001, 2002) or Easterly and Levine (2003). For dissenting views see Glaeser et al. (2004) and Angeles (2011).

the distant past. Comin et al. (2010) show that current levels of GDP per capita are strongly related to levels of technology adoption in 1500AD, 0AD and even 1000BC. Bockstette et al. (2002) find that countries with a longer story of state-level political institutions over the last two millennia are richer today. Olsson and Hibbs (2005) and Putterman (2008), finally, show that societies with earlier transitions to agriculture have higher levels of income per capita today.

This last idea leads us pretty much as far as we can possibly go, the adoption of agriculture was first observed in the Fertile Crescent about 12,000 years ago, and suggests that Africa's economic development has been handicapped since the beginning by biological, climatic and geographic factors. The best exponent of this line of argument is possibly Jared Diamond, whose 1997 monograph "Guns, Germs and Steel" masterly presents the thesis that Africa's initial endowment of domesticable plants and animals and its geographic characteristics - what we may call the continent's biogeography - severely limited the possibility of developing an advanced agrarian civilization.<sup>2</sup>

While highly convincing, Diamond's argument needs to be somehow stretched beyond its limits to account for Africa's present outcome - and the fact that the continent has failed to catch up with the world in all areas of economic production and not just agriculture. Industry is much less dependent on biogeographic endowments; machines and methods of production can be imported, plants and animals often cannot. Moreover, Malthusian forces should have ensured that Africa's retard in agricultural technology did not translate into large difference in incomes per capita. As is well-known, the "Great Divergence" was largely the outcome of the last couple

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<sup>2</sup>As is so often the case, Diamond's thesis was anticipated by other authors in a less detailed form. William H. McNeill, for instance, when referring to the transition towards agricultural production noted that "Many communities in different parts of the earth moved in this direction, with results that varied in accordance with what was available in wild state to start from" (McNeill 1976, p. 36). McNeill (1976) would also add as additional biogeographic factors handicapping the economic development of Africa the higher density of germs (attacking humans) and weeds (attacking edible plants) that characterize the tropical rain forest.

of centuries and the rise of industrial societies - a time when Diamond's arguments appear to apply with less force.

A first piece of evidence against a straight relationship running from Africa's biogeography to its current lack of development can be found in Nunn (2008), who shows that variables such as distance from the equator, rainfall, humidity and temperature have no effect on current African incomes once slave exports are controlled for (see Nunn 2008, table 3; an exception is access to the coast, which remains important). The result suggests that Africa's initial disadvantage in biogeographic characteristics is no longer relevant when analyzing present-day outcomes. The continent's current woes would be essentially the outcome of events taking place over the last few centuries.

We bring further support to this interpretation by presenting some empirical evidence relating to two points in time, the year 2000 and the year 1500. We are interested in how biogeographic endowments and the intensity of the slave trade measure against each other as explanatory factors of economic development at these two dates. Biogeographic endowments are proxied by the number of years since the country in question experienced its transition to agriculture, a summary measure that would pool together aspects such as the existence of domesticable plants and animals, climate, geographic isolation and so on. This exercise complements and expands the analyses of Olsson and Hibbs (2005) and Putterman (2008), who do not consider slave exports, and of Nunn (2008), who limits his sample to Africa and does not use the number of years since the agricultural transition as an overarching measure of biogeographic endowments. Results are given in table 1.<sup>3</sup>

The first three columns of table 1 use the log of GDP per capita in the year 2000, a standard measure of economic development, as the dependent

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<sup>3</sup>Data on the agricultural transition is from Putterman (2008), on slave exports from Nunn (2008), on GDP per capita from the World Bank and the Penn World Tables, and on population density in 1500 AD from Chanda and Putterman (2007).

**Table 1**  
**Biogeography and economic development, years 1500 and 2000.**

	<i>Dependent variable: Log of GDP per capita, year 2000</i>			<i>Dependent variable: Population density, year 1500</i>		
Years since agricultural transition	0.143 (0.040)**	0.026 (0.037)	-0.029 (0.040)	0.357 (0.047)**	0.400 (0.053)**	0.420 (0.061)**
Log of slave exports to country area		-0.220 (0.021)**	-0.102 (0.035)**		0.080 (0.028)**	0.036 (0.058)
Sub-Saharan Africa dummy			-1.242 (0.344)**			0.459 (0.564)
Observations	162	162	162	130	130	130
R <sup>2</sup>	0.07	0.33	0.37	0.27	0.3	0.3

Note: Robust standard errors in parenthesis. The symbols \* and \*\* denote statistical significance at the 5% and 1% level.

variable. We retrieve in column 1 the result that initial biogeographic endowments are related to current levels of economic development: the number of years since the agricultural transition has a positive and statistically significant effect on GDP per capita. The effect is not very large (an extra thousand years of experience with agriculture is associated with incomes 15% higher) and the explanatory power of the variable is quite low ( $R^2$  coefficient of 0.07); but the relationship is in the data.

Things change when we add the measure of slave exports normalized by country area. The second column shows that the time since the agricultural transition has no longer a meaningful or statistically significant effect, while slave exports have a strong negative relationship with current levels of development. Because Nunn (2008) computes slave exports only for African countries, this variable may be picking up other non-measured aspects of this continent. We control for this eventuality by introducing a dummy variable for Sub-Saharan Africa in column 3. The effect of slave exports falls by half but remains large and statistically significant, while years since

the agricultural transition is now negative and not significant. We also note that the explanatory power of these last two regressions is much larger than that of the first one ( $R^2$  coefficient of 0.33 and 0.37).

Thus, slave trading and not the aspects accounting for a late agricultural transition appear to be playing a major role in Africa's current underdevelopment. Diamond's thesis is not to be dismissed, however, since this conclusion would not hold if we look at development outcomes five centuries ago. The last three columns of table 1 use population density in the year 1500 AD as the dependent variable. The use of population density as a measure of economic development is not just dictated by the difficulty to estimate levels of GDP per capita at this early period. It is actually perfectly in line with Malthusian forces that, as we have argued, would transform technological advances into larger populations - thus higher densities - while leaving GDP per capita largely unchanged.<sup>4</sup>

The fourth column of table 1 shows that the number of years since the agricultural transition is positively related to population densities in 1500 AD. The relationship is much stronger than the one found in column 1: an extra thousand years since the transition is associated with a 43% increase in density and the variable explains 27% of the variation in the data. Most important, however, is what we find in columns 5 and 6 when we control for slave exports and introduce the African dummy.<sup>5</sup> In both cases the effect of the agricultural transition remains statistically significant and even increases in magnitude. Future slave exporting countries, on the other hand, do not appear to be any different from those that did not experience that phenomenon in the coming centuries. Even more remarkable, countries from Sub-Saharan Africa are somewhat above the level of economic development that we would have expected in 1500 AD based on the date of their agricultural transition (though the effect is not statistically significant).

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<sup>4</sup>See Clark (2007, chapter 2) for a textbook exposition of the Malthusian model.

<sup>5</sup>Slave exports took place mainly after 1500 AD, so this variable should be interpreted as capturing those factors that made some countries more vulnerable to the slave trade than others.

To summarize, table 1 paints a consistent picture where biogeographic advantages - as synthesized in an early agricultural transition - conditioned economic development since the dawn of human history until about five centuries ago. Current economic outcomes, however, appear to be the result of more recent events such as the expansion of slave trading and bear little or no relationship to biogeography.

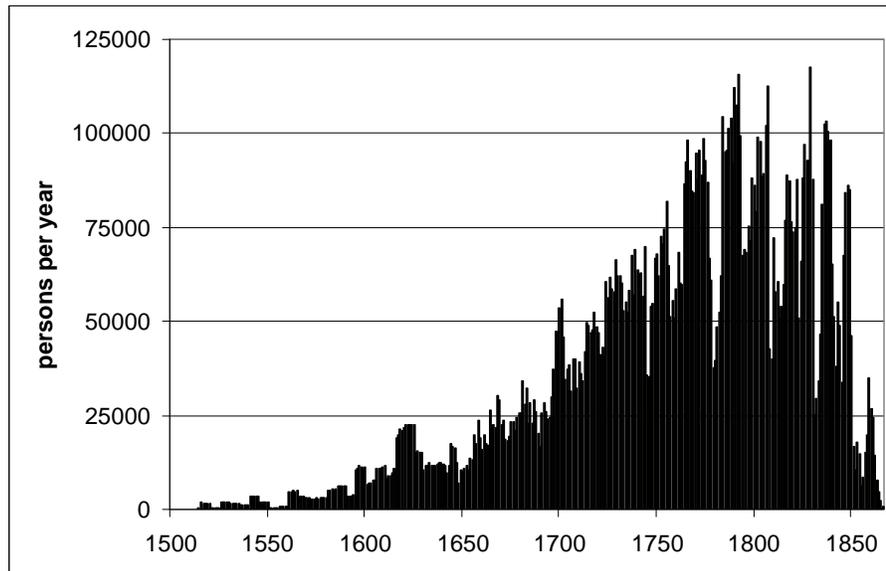
The question that this paper addresses is why did Africa, out of all places in the world, suffer from the historically unprecedented development of the early modern slave trade. As the regressions above suggest, this is a question that should figure high on the agendas of development economists and economic historians. But that is not all. We also wish to argue that the two great historical events mentioned above - Africa's late and limited transition to agricultural production and its much later connection with the world economy as an exporter of slaves - are in fact related. Africa became the source of the overwhelming majority of the world's slaves as a consequence of its initial underdevelopment. Ultimately, then, we believe that the proper time scale for understanding Africa's present is measured in millennia - but that this extraordinary persistence is not the outcome of unchanging mechanisms. We wish to argue that Africa's long-standing lag in economic development is not caused by a fixed set of factors holding the region back throughout history but that an initial backwardness engendered the factors that would later perpetuate it.

The rest of the paper is organized as follows.

## **2 The African slave trade: facts and explanations**

Although slavery is as ancient as the first large civilizations and has existed in some form or another in most if not all human societies until the late 19th century, several characteristics set the African slave trade of the early modern period apart from all previous experiences. First, its magnitude. It is estimated that about 12.5 million Africans were embarked as slaves towards the Americas during the three and a half centuries of existence of

**Figure 1**  
**African slaves embarked to the Americas**



the Trans-Atlantic Slave Trade. Figure 1 illustrates the rise of this trade over time, which at its peak reached levels of 80,000-100,000 slaves exported per year. A recent calculation estimates that for the West and West Central coasts of Africa the probability of being sent as a slave to the Americas at some point during one's lifetime was an astonishing 9.3 percent during the period 1701-1850 (Whatley and Gillezeau 2011). This meant that slavery was a much more prevalent feature of Africans' lives than anywhere else in the world during any historical period.

This order of magnitude required a system for ensuring the capture and supply of slaves which was another feature setting the African slave trade apart. Up to this point in history, slaves were a traditional by-product of wars - a convenient source of revenues but not the main motive for starting an armed conflict in the first place. Alternative methods of obtaining slaves

were not unknown but of relatively little importance.<sup>6</sup> This changed in Africa. Wars were increasingly fought with the sole objective of obtaining slaves, and they became more common (Lovejoy 1983, chapter 4). And new methods of obtaining slaves became increasingly widespread: kidnapping and raiding, enslavement by judicial process, enslavement as a consequence of debts, and so on. Slavery became a central feature of many African societies.

Finally, and of most relevance for us, the slave trade of the early modern period is also unique in that Africa became essentially the only source of the world's slaves. If becoming a large-scale slave exporter has long-lasting consequences on economic development then Africa is suffering from this handicap to an extent unknown elsewhere in the world. It is also noteworthy that in all previous historical periods not only slaves came from a multitude of sources but also their buyers were geographically spread. This changed during the early modern period as Europeans became by far the largest slave buyers in the world. Although slaves were exported towards the Muslim lands since the Middle Ages, this trade remained relatively constant and about an order of magnitude smaller than the trade towards the European colonies in the Americas.<sup>7</sup> The other major civilizations of Eurasia, India and China, do not seem to have participated in the African slave trade at all.

Perhaps somewhat surprisingly, very few explanations have been advanced for the causes of the African slave trade in the economics literature. The economic analysis of slavery has developed into a rich and voluminous literature, but most of the attention has been focused on slavery in the Americas - with the question of the profitability of slave plantations in the Southern United States taking a prominent place.<sup>8</sup>

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<sup>6</sup>An example would be the trade in Slavic people from Russia and Eastern Europe to Muslim lands, where the Varangian overlords obtained the slaves mainly through tribute (Findlay and O'Rourke 2007, p.76).

<sup>7</sup>Lovejoy (1983, p. 24) estimates that between 5,000 and 10,000 persons were exported each year towards Muslim lands since the 10th century. Nunn (2008) estimates that this trade doubled in magnitude during the 19th century, but this may have been a consequence of the abolition of slave trading by European nations during the first half of that century.

<sup>8</sup>Seminal works in this area are Conrad and Meyer (1958) and Fogel and Engerman

The best-known theoretical contribution on the causes leading to the rise or fall of slavery within a country is probably Domar (1970).<sup>9</sup> Domar's thesis is simply that slavery develops in land-abundant regions as a mechanism allowing the creation of rents for the land-owning elite. As population grows and the marginal productivity of labor decreases, slavery becomes unnecessary as the elite will be able to secure cheap labor inputs through the market. The idea has some problems fitting the empirical evidence: as Domar (1970) himself admitted, the great depopulation that followed the Black Death should have led to slavery in Europe - it didn't. The one instance of comprehensive empirical testing to which the theory has been subjected ended up rejecting it (Patterson 1977). The most fundamental reason for seeking beyond Domar's model, however, is that it ultimately does not relate to the African slave trade at all.

The phenomenon that Domar (1970) was trying to explain was the rise and fall of serfdom in Russia - with some extensions to the rest of Europe. A first observation is that most experts on slavery would make a clear distinction between slavery and serfdom - even if some similarities are no doubt present. As Finley (1980, p.299) put it, "Societies have never been reluctant to reduce substantial sections of their own people to debt bondage, serfdom, and the rest, but I know of no society that has tolerated the enslavement, at home, of its own people". Serfs lack some important rights, in particular the right of free movement to seek a better remuneration for their work, but they are otherwise considered a part of society and enjoy numerous rights such as having a family, owning property, and not being sold individually. Slaves had none of these rights and they were considered as outside the social realm.

Setting the distinction between serfdom and slavery aside, an even more substantial observation is that Domar's thesis is only applicable to domestic slavery, not to the slave trade. It is, if we are allowed the expression, a

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(1974).

<sup>9</sup>Domar (1970) cited Nieboer (1900) as the source of his ideas. For a more recent theoretical treatment along the same lines see Lagerlof (2009).

"closed economy" theory of slavery whereas the African slave trade clearly requires an "open economy" explanation.

A good point of departure for such an explanation was put forward by Patrick Manning in his 1990 monograph "Slavery and African Life". Manning (1990) argues that Africans' low productivity in agriculture, a consequence of Africa's less advanced agricultural technology (hoe-based instead of the plow-based agriculture of Eurasia), offered important arbitrage possibilities. In short, Europeans could offer to buy a slave for more than the value of its production, and the deal would be profitable for both parts since African slaves would be put to work using European technology. "As long as African agricultural technology, constricted by the limits of the hoe, was trapped at a level of productivity below that of Europeans, European buyers were able to pay consistently more than the value of an African person's produce at home" (Manning 1990, p.34).<sup>10</sup>

Although apparently intuitive, the argument does not survive a careful analysis. The main problem with Manning's thesis is that if the productivity of agricultural labour was higher in Europe than in Africa it would have been profitable to buy African slaves and put them to work in the European countryside, something that was completely absent over the early modern period. The same would apply to many other regions in Eurasia which were also using the more advanced plow-based agriculture. Sociocultural factors aside, this did not happen because labour productivity in African agriculture was most likely not lower than labour productivity in Eurasia.

There is indeed no contradiction between the (well-established) fact that African agriculture was less technologically advanced than its Eurasian counterpart and the claim that labour productivity was similar in both regions. Labour productivity, the marginal change in total production due to an increase in labour, depends not only on technology but on the availability of all factors of production such as land, capital and labour itself. A long-standing

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<sup>10</sup>Manning's thesis has gained considerable acceptance among economic historians; see, for instance, Austin (2008, p. 1006).

theme among economic historians of Africa is precisely its relative labour scarcity - in other words, the abundance of land with respect to labour. This land abundance was clearly reflected in a land-intensive choice of techniques such as slash-and-burn agriculture and very long periods of fallow. The large availability of land could then compensate for a less advanced agricultural technology.

The situation is best understood from the perspective of the Malthusian model. As is well known, Malthusian forces transform technological advances into larger populations - leaving production per capita unchanged because of decreasing returns in the presence of a fixed factor of production, in this case land. We would thus advance that the labour scarcity that economic historians have always emphasized in Africa was an endogenous response to the less advanced agricultural technology of the continent (and, we may add, to the constraints that climate and the availability of plants and animals imposed).

Empirical evidence on labour productivity in agriculture for pre-colonial Africa is essentially inexistent<sup>11</sup>, but good indirect evidence can be found in the literature on human heights as a measure of economic well-being. If labour productivity in agriculture is interpreted as the real wage in terms of agricultural goods, higher labour productivity in agriculture would translate into a better-nourished, and thus taller, population. Good information on the height of different African ethnic groups is given in Eltis (1990, table 1). The data refers to African-born slaves, which is the best we can do given the absence of any statistical data in pre-colonial Africa. The simple average height of the 21 groups listed is 163.89 cm. This is very much in line with average heights from all over Eurasia for the pre-industrial period. Clark (2007, p. 57) reports heights of 163 cm. for Indians, 164 cm. for the Chinese and 159 cm. for the Japanese. As for Europeans, Africans' average height is very similar to those of countries such as Italy (162.2 cm.), Portugal (163.4 cm.) or Spain (163.7 cm), while Europe's richest areas (England,

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<sup>11</sup>See Thornton (1990) for some efforts along these lines. His numbers, though, refer to land and seed productivity; not to labour productivity.

166 cm.) are matched by some African groups such as the Yoruba (166.6 cm.).<sup>12</sup> There is thus no reason to think that Africa's labour productivity in agriculture was lower than in any of the advanced civilizations of Eurasia.

Notice, however, that although Manning was probably wrong in assuming a differential in labour productivity in agriculture his central insight that there should be an arbitrage opportunity somewhere is clearly sound. African slave sellers and European slave buyers were in it for the money - and we have good evidence that the business was profitable on both sides of the Atlantic.<sup>13</sup> An arbitrage opportunity existed, and we need to follow the historical evidence to find out exactly where.

### **3 The basic economics of the African slave trade**

African slaves were bought almost exclusively against manufactures. In the 1780s, when slaves dominated African exports, the composition of imports into Western Africa was as follows: textiles 56.4%, alcohol 9.7%, tobacco 8.1%, miscellaneous manufactures 10.5%, iron 3.5%, food 1.8%, guns and gunpowder 8.6%, raw materials 1.7% (Eltis and Jennings 1988, table 2). Not all of these manufactures were produced in Europe, with Indian textiles of paramount importance until the advent of the Industrial Revolution. Europeans thus supplied the African continent with manufactures, their own and Asia's, and got slaves in return. This indicates that we must consider at least a two-sector economy in order to understand the slave trade.

As was the case in agriculture, Europe was well in advance of Africa in most or all industrial technologies. A few examples will suffice to illustrate this fact. In textile production, by far the largest industrial sector of any economy up to the 19th century, Africa had not adopted the spinning

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<sup>12</sup>Data on European heights is from Floud (1994, table 1.1) and correspond to the second half of the 19th century, except for England (Clark 2007, p.57). The height of the Yoruba is from Eltis (1990).

<sup>13</sup>See Evans and Richardson (1995) for some data showing the existence of large profits among African sellers.

wheel - which spread throughout Eurasia during the Middle Ages and removed the main bottleneck in textile production. In transport technologies Africans had no vessels capable of long-distance travel, the wheel had not been adopted, and transportation relied on human portage south of the Sahel. Even in metallurgy, a sector where Africans had been at some point in history at a similar level of sophistication as Eurasians, their technology had stalled and by the early modern period iron bars had become an important item that Europeans exchanged for African slaves.<sup>14</sup>

Crucially, this technological retard was not counterbalanced by Malthusian forces, as was the case in agriculture. The Malthusian model works in full swing in agriculture due to the fixity of land, whereas capital - the counterpart of land in industrial production - is indefinitely expandable given time and resources. Thus, while African farmers managed to feed themselves as well as Eurasian ones (although at lower population densities), all indicates that the consumption of manufactured products in Africa was much below Eurasian standards, and that some manufactured goods such as firearms were not available at all.

Given the above circumstance standard trade theory would predict trade based on the comparative advantage of each region: Europe would sell manufactures and Africa would sell agricultural products. Most African agricultural products, however, were not tradable over long distances during the early modern period due to their low value per unit of mass or volume (unlike the valuable spices of the East and the sugar or tobacco from the Americas). If Africa wanted to buy European manufactures it had to offer a product that could be profitably transported overseas. Gold fitted the bill but its production was geographically limited and could not be easily increased. The solution was to export the labour used in agriculture instead of agricultural products. As predicted by trade theory, a significant degree of specialization ensued - Africa specialized in the "production" and selling of slaves.

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<sup>14</sup>See Austen and Headrik (1983) for more on pre-modern African technology.

The point may be made clearer by the use of a simple model. Consider an economy with two sectors, agriculture and manufactures. Production in each sector is given by an aggregate production function with decreasing marginal returns to labour:

$$Y_a = A_a L_a^\alpha \quad (1)$$

$$Y_m = A_m L_m^\alpha \quad (2)$$

Subscripts  $a$  and  $m$  stand for agriculture and manufactures and parameters  $A_a$  and  $A_m$  summarize the effect of all factors making labour more or less productive in each sector. This includes technology and the availability of other factors of production such as land.

Assume that labour is perfectly mobile between sectors and that perfect competition implies it is remunerated at the value of its marginal product. It follows that wages will be equalized across sectors, which means:

$$w_a = w_m$$

$$p_a A_a \alpha L_a^{\alpha-1} = A_m \alpha L_m^{\alpha-1} \quad (3)$$

where  $p_a$  is the relative price of agricultural goods, defined as the number of units of manufacturing goods that would be exchanged for one unit of agricultural goods in the market. Equation (3) lets us solve for the distribution of labour between the two sectors as a function of the relative price:

$$\frac{L_m}{L_a} = \left( \frac{1}{p_a} \frac{A_m}{A_a} \right)^{\frac{1}{1-\alpha}} \quad (4)$$

The equilibrium in one of the goods markets can then be considered in order to determine the relative price (the goods market left out will be at equilibrium by Walras' law). Assume thus that consumers are characterized by Cobb-Douglas utility functions resulting in a constant share of income,

which we note  $\gamma$ , being allocated to the consumption of manufactures. The resulting demand will be confronted to the supply of manufactures in the economy:

$$\gamma(Y_m + p_a Y_a) = Y_m \quad (5)$$

Substituting equations (1) and (2) and solving for  $p_a$  we obtain:

$$p_a = \frac{1 - \gamma}{\gamma} \frac{A_m}{A_a} \left( \frac{L_m}{L_a} \right)^\alpha \quad (6)$$

Equations (4) and (6) give us a system of two equations on  $\frac{L_m}{L_a}$  and  $p_a$ , which we solve to find:

$$\frac{L_m}{L_a} = \frac{\gamma}{1 - \gamma} \quad (7)$$

$$p_a = \frac{A_m}{A_a} \left( \frac{1 - \gamma}{\gamma} \right)^{1 - \alpha} \quad (8)$$

Equation (7) says that in this simple framework the allocation of labour between the two sectors is entirely determined by demand parameters. Normalizing the total amount of labour in the economy to 1, we have that  $L_m = \gamma$  and  $L_a = 1 - \gamma$  whatever the values of  $A_m$  and  $A_a$ . Equation (8) then says that the relative price of agricultural goods will be proportional to  $\frac{A_m}{A_a}$ , which reflects the productivity of labour in the two sectors.

Consider now the possibility of buying a slave, who would give its owner a unit of labour services over  $T$  periods of time. What price would labour employers be prepared to pay for him? The answer is the actualized value of all wage costs that would be saved over the next  $T$  years<sup>15</sup>, thus:

$$P_S = \sum_{t=1}^T \frac{1}{(1+i)^t} w$$

Using equation (3) to substitute for the wage rate in terms of manufacturing goods ( $w = A_m \alpha L_m^{\alpha-1}$ ) and  $L_m = \gamma$  we can obtain the price of a slave

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<sup>15</sup>We abstract from the costs of maintaining the slave (food, shelter, etc). In principle this would simply add a constant to our mathematical expressions.

in terms of manufacturing goods:

$$P_{S,m} = \phi A_m \alpha \gamma^{\alpha-1} \quad (9)$$

where  $\phi = \sum_{t=1}^T \frac{1}{(1+i)^t}$  is the value of an annuity over  $T$  years paying 1 each year.

Dividing this last expression by  $p_a$ , and substituting equation (8), then gives us the price of a slave in terms of agricultural goods:

$$P_{S,a} = \phi A_a \alpha (1 - \gamma)^{\alpha-1} \quad (10)$$

Equations (10) and (9) give us the maximum price that a labour employer would be ready to pay for a slave, either in terms of agricultural goods or in terms of manufacturing goods. The important point is that these prices are proportional to  $A_a$  and  $A_m$ .

Applying the model to Africa and Europe we may assume that  $A_a$  was of similar magnitude in both continents but that  $A_m$  was much larger in Europe. As discussed above, there is no doubting Europe's technological advantage in agriculture, but Malthusian forces would have countered this advantage by increasing population densities in Europe. The overall effect would be to keep labour productivity in agriculture at similar levels in both continents, in accordance with the evidence on human heights presented above. Productivity in manufacturing, on the other hand, would have been much larger in Europe thanks to better technology and larger availability of capital.

It follows from equation (8) that a unit of agricultural goods would be worth more in terms of manufactures in Europe. More important, equation (9) shows that the amount of manufactures that Europeans were ready to pay for an African slave was vastly superior to what it could command in African lands. In other words, there were arbitrage opportunities for both European slave buyers and African slave owners.

While the discussion so far has made clear the role of technological differences it does not yet sum up to a full explanation of the African slave trade for a simple reason: we have not considered the cost of "producing" the slaves. That Europeans were able to offer a high price for slaves in terms of manufactures does not guarantee that Africans were willing to take it. The cost of capturing a slave may well be higher than the price Europeans were ready to pay. Indeed, the simple model developed above is best seen as determining the demand for slaves. A high productivity in manufacturing allowed Europeans to have a large demand for slaves, but we still need to consider the supply side of this unique market. This will be the subject of section 5, after we consider some consequences of the above framework in the following section.

## **4 Why Europe and why the Americas?**

The mechanism developed above offers a clear starting point for thinking about the economic forces shaping the slave trade of the early modern period. As Manning (1990) pointed out, there was an arbitrage possibility in the productivity differentials between Africa and Europe - though it was technological progress in manufactures and not agriculture that made this possible. Assume, for the time being only, that the price Europeans could offer for an African slave was interesting enough to attract Africans into the market. Although this implies that the African slave trade would take place, it says nothing about two of its most important characteristics: the large majority of the buyers were European, and almost all slaves went to the Americas.

The large dominance of Europeans in the market for African slaves, with Muslims playing a minor role and regions such as India and China none at all, is puzzling for a simple reason: before the Industrial Revolution, which for most of Western Europe should be placed during the first half of the 19th century, Europe was not the clear technological leader of Eurasia. Although early modern Europe could claim technological leadership in some industries

such as firearms and shipbuilding, Asia was clearly ahead in other sectors such as textiles and porcelain. Trade between Africa and Asia had been taking place for millennia before Vasco da Gama's arrival to India, and could take truly spectacular dimensions as best exemplified by the fleets of China's Admiral Zheng He. If Europe could exchange manufactures for African slaves at a profit then so could China and India.<sup>16</sup>

A second question of interest is that if Europeans could buy labour for less than the value of its marginal production then any labour-using sector would be able to benefit. In the model of the previous section owners of manufacturing and agricultural firms in Europe would profit from buying African slaves against manufactures. In both cases, the value of the slave's production in terms of manufacturing products would exceed the price paid. We should thus see African slaves being employed everywhere in Europe's domestic economy, and not exclusively in Europe's American plantations as it was indeed the case.

Answering this second question should take us quite far along the answer to the first one, since the absence of American colonies would work well as an explanation for the lack of interest of most of Asia in the African slave trade. Let us then begin by considering what was special about the Americas.

A common misconception here is to believe that the flow of slaves to the Americas was a straightforward consequence of this continent's labour scarcity, itself a consequence of the arrival of a suite of infectious diseases previously unknown in the Western Hemisphere (McNeill 1976). Gemery and Hogendorn (1974), for instance, start their otherwise admirable account of

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<sup>16</sup>The best example is the textile industry, by far the largest manufacturing sector in pre-industrial times. India was the world leader in the production of cotton textiles up to the late 18th century, and Europeans did not produce them at all until the early 1700s. Cotton being much more appropriate for the African climate than Europe's linens and wools, Indian textiles constituted the single largest item of African imports as an exchange for slaves until the 1700s. But Indians were not buying the slaves. Europeans found it profitable to travel all the way to India to exchange silver for textiles which were then exchanged for slaves on the African coast.

the Trans-Atlantic slave trade by stating that "The causes of the forced emigration of Africans to the Americas are generally accepted to be economic, with major attention focused on the role of a high land/labour ratio". The Amerindian population had plummeted by at least two thirds (Maddison 2005) and perhaps by as much as 95% (Mann 2005), so there was simply not enough domestic labour to man the new plantations. Market forces would ensure that labour flows to its most productive use, which is where it is more scarce.

But a straight look at the data should make us abandon this explanation, at least in its simplest form. Slave labour did not flow to the parts of the Americas where land/labour ratios were the highest - quite the opposite - and Europe itself was more land abundant than certain parts of the Americas where slave imports concentrated. These simple facts are laid out in table 2, where land/labour ratios are calculated for two points in time, the years 1700 and 1750, for several regions of the Americas. We also report the total amount of African slaves imported over the following 50 years. In 1700, for instance, North America was the most land abundant region of the Americas with over 15 squared km. of land per inhabitant. On this measure it was followed by Brazil, Spanish America (without its Caribbean possessions) and, as the region with the least amount of land per capita, the Caribbean. During the next 50 years, however, the Caribbean imported over seven times more African slaves than North America, 1,074,917 against 145,975. A similar pattern can be observed if we consider land/labour ratios in 1750 and slave imports over the second half of the 18th century.

The failure of land abundant regions to attract more slaves would probably not disappear if we define regions differently, for example by considering only the south of the present-day United States instead of all of North America. This would indeed lead to a lower land/labour ratio for slave-owning North America, but the same principle could be applied to the Caribbean by considering specific parts such as Jamaica or Barbados. Barbados, for instance, had a land/labour ratio 90 times smaller than the Caribbean in

**Table 2**  
**Slave imports and land/labour ratios**

	<i>Land area (km<sup>2</sup>)</i>	<i>Population in 1700 (millions)</i>	<i>Land/labour ratio in 1700 (km<sup>2</sup> per person)</i>	<i>Slave imports 1701-1750</i>	<i>Population in 1750 (millions)</i>	<i>Land/labour ratio in 1750 (km<sup>2</sup> per person)</i>	<i>Slave imports 1751-1800</i>
North America	18,255,430	1.2	15.213	145,975	2.3	7.937	149,509
Spanish America except Caribbean	11,555,242	9.9	1.167	51,503	11.3	1.023	15,382
Brazil	8,459,420	1.4	6.042	891,852	1.87	4.524	1,097,166
Caribbean	226,950	0.5	0.454	1,074,917	1.1	0.206	2,176,009
Jamaica	10,830	0.05	0.217	323,199	0.17	0.064	534,003
Barbados	430	0.08	0.005	169,121	0.08	0.005	135,205
Europe	10,180,000	120	0.085	4,126	140	0.073	1,113
Netherlands	33,760	2	0.017	n/a	2	0.017	n/a

Sources: land areas are from the FAO ([www.faostat.fao.org](http://www.faostat.fao.org)); population from McEvedy and Jones (1978) – for Brazil and Spanish South America we have assumed a constant growth rate over the 18<sup>th</sup> century to estimate 1750 figures; slave imports from the Trans-Atlantic Slave Trade Database ([www.slavevoyages.com](http://www.slavevoyages.com)).

the year 1700. In fact, parts of the Caribbean had less land per capita than Europe itself: Jamaica was more densely populated than Europe by 1750 and Barbados was more densely populated than the Netherlands. To sum up, the flow of slaves from Africa to the Americas was not guided by land/labour ratios.

What was special about the Americas, or to be more precise, about the Caribbean, northeastern Brazil and to a lesser degree the south of the present-day United States, was not land - it was climate. Tropical climate, in fact, and the possibility of growing the crops that made so many European and American fortunes: tobacco, cotton, and, by far the most important, sugar cane. African slaves were used exclusively in the production of these cash crops, cash crops that for climatic reasons could not be grown in continental Europe.<sup>17</sup> The answer to our puzzle must then lie in the na-

<sup>17</sup>Sugar had been grown in Mediterranean islands such as Cyprus or Sicily since the Middle Ages and in the European islands of the Atlantic up until Columbus' times. But the climate of the Caribbean and northeastern Brazil was far more adequate for sugar

ture of sugar (and tobacco, and cotton) production. There must be good technological or institutional reasons that made slave labour unsuitable for European agriculture and manufacturing in the early modern period whereas the production of sugar and similar cash crops seemed perfectly fit for it.

An explanation along these lines was offered by Fenoaltea (1984), who draws a distinction between effort-intensive activities and care-intensive ones. In short, Fenoaltea (1984) asserts that the economic advantage of employing slave labour is greatest in effort-intensive activities such as sugar production, while in care-intensive activities such as manufacturing and temperate-climate agriculture slave labour would be less profitable - potentially to the point that free labour would be preferable.

It is surely correct to characterize sugar production during the early modern period as effort-intensive. The main tasks involve cutting, chopping and transporting the cane stalks followed by a crushing process to extract its juices. The time between cutting and juice extraction must be minimized in order to avoid dessication or fermentation. In tropical countries cane sugar grows almost continually throughout the year so that the labour-intensive process of harvesting and crushing actually takes place year-round (as opposed to what happens in temperate agriculture).

This was a far cry from the world of pre-industrial manufacturing, which was in the hands of artisans and masters whose craft no doubt required considerable care. Temperate-climate agriculture may also be argued to be care-intensive as it involves more complex operations than sugar production and it requires the maintenance of long-term assets in the form of animals and perennial plants (as opposed to the sugar cane, which grows to maturity and is ready to be cut in just a few months).

Fenoaltea (1984) then argues that effort can be extracted from a worker by means of pain incentives, whereas care requires the existence of rewards. 

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cane and quickly replaced these earlier places of production (Mintz 1985, Solow 1987).

Throughout history slaves have been used in care-intensive activities, as servants, concubines and even administrators, but such slaves typically enjoyed a much more comfortable living than their counterparts in mining or plantation agriculture. Rewards came not only in the form of access to goods and services but in a relatively high occurrence of manumission. It is thus cheaper to buy effort than to buy care through the slave market, which is why the advantage of slaves over free labour would be greatest in highly physical activities.

These arguments are sensible and we would expect them to play at least some role in explaining why African slave labour was employed only in the American plantations. But they are almost certainly not sufficient. The reason is that there was a huge cost advantage of African slave labour when compared to European free labour. The cost of inducing care would have reduced that advantage to some extent, but it seems implausible that it would have come close to eliminate it.

To put some specific numbers in this assertion, consider the price of a slave towards the end of the 17th century - when Britain started expanding its sugar industry in the Caribbean in earnest. Eltis et al. (2005, table 2) set the average price of an African slave over the period 1674-99 at £19.61. This price bought about 25 years of slave work. Using an annuity formula and a market interest rate for the period of 8% we obtain a price of slave labor of £1.84 per year.<sup>18</sup> To this we should add maintenance costs, which we estimate at about £1.70 per year based on Eltis et al. (2005).<sup>19</sup> A year of (effort only) slave labour could then be bought for about £3.54 per year.

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<sup>18</sup>See Eltis et al. (2005, p. 681) on the interest rate used and the number of years of work from a slave.

<sup>19</sup>The value of exports per slave in the Caribbean in 1770 is £6.8 per year (table 1), which can be equated to the value of production per slave. The share of labour in production was about 0.5 (Table 3) and Eltis et al. (2005) assume that maintenance costs are about half the marginal productivity of labour. With a Cobb-Douglas production function the marginal productivity of labour equals the production per worker times the share of labour, or £3.4 per year, which gives a figure of £1.7 per year per slave for maintenance costs.

Next to this, the wage of an agricultural labourer in England, as calculated by Clark (2007), was about 12d per day over the period 1650-1700. As in Angeles (2008), we may assume a working year of 260 days for pre-industrial England which results in a yearly wage of exactly £13 - quite close from four times the cost of slave labour. The gap would be reduced by the cost of inducing effort, but it somewhat stands to reason that it could be closed. Assume, for instance, that a slave can be fully motivated by an exchange of careful work against manumission after 12.5 years - half the time he could expect to work as a slave. This would take the cost of (care-intensive) slave labour to £5.24 per year, still a bargain for English standards. Price differences would have been smaller in other European countries, but they would have existed.

What we would argue is missing from the story is that manufacturing and agriculture in early modern Europe required more than just care, they required knowledge, expertise, in a word human capital. Factories and uniformized production are largely outcomes of the Industrial Revolution, until well into the 19th century most manufacturing was the work of craftsmen who had learned their trade through years of apprenticeship. A similar large amount of knowledge was necessary in temperate agriculture, for tasks such as plowing, planting, rotating crops, manuring, keeping animals and so on. The cost of acquiring the human capital needed for these types of production would probably render African slave labour uneconomical.

Not only that, but who would teach them? European manufacturing was in the hands of guilds, the grouping of all craftsmen in a particular industry, whose main purpose was to regulate entry and the level of production. In the words of Malamina (2009, p. 205), guilds were "a sort of collective monopoly". Apprenticeship places were tightly regulated and price competition was excluded. It is quite unthinkable that guilds would have allowed imported slaves to lower their margins and endanger their privileges. As for agriculture, the learning process usually took place within the family and it is difficult to see how foreign slaves would have taken part in it.

Thus, institutional features acted together with human capital requirements to render African slave labour incompatible with European agriculture and manufacturing. Sugar production in the Caribbean, on the other hand, offered an ideal environment. Its main input was raw labour, the little expertise needed for the cutting and crushing processes could be easily acquired, and no institutional equivalent of the European guild existed to constrain employment and production.

As expected, the above arguments may also be used to answer the first of our questions, namely why African slaves were essentially not employed in technologically-advanced Asia. As was the case in Europe, Asian manufacturing and agriculture required significant knowledge that African slaves simply did not have. It is also likely that institutional constraints to the expansion of manufacturing or agricultural production existed in Asia.

But the issue cannot be dismissed so easily, for there is the matter of Asia's sugar industry. Sugar was in fact an Asian invention, its refining process being probably invented in India sometime before the year 500 AD from where it spread to Muslim lands and China before finally reaching Europe after the eight century AD (Mintz 1985, p. 23). Longtime a luxury product reserved for medicinal uses, the consumption of sugar edged upwards over time - not just in Europe but in many parts of Eurasia. Mazumdar (1998, p.49) advances that the total production of sugar in China, most of which was internally consumed, was about the same (roughly 250,000 tons per year) as the entire output of sugar reaching the world market in the year 1800, which we may roughly equate to Europe's consumption. Indeed, the per capita consumption of sugar in pre-industrial China was about 2 pounds per year, roughly in line with that of France at 2.2 pounds per year.

Not only that, but sugar production in China was at least as much labour-intensive as in the Americas. Mazumdar (1998, p.138) tells us that the major labour-saving innovation in pre-industrial sugar production, the vertical-roller mill for crushing the cane, was most likely an American invention later adopted in China. Worthy of notice is the fact that China

employed cheaper and less advanced versions of this key piece of equipment, essentially choosing a more labour-intensive mix of production factors.<sup>20</sup> Why then did we not observe African slave labour being employed in Chinese, or in general Asian, sugar production?

The explanations may be numerous, but here we would like to stress two that appear to be of particular importance. First, although the technical aspects of sugar production were quite similar in Asia and in the Americas the same cannot be said about its institutional aspects. In China, "Sugar-cane was grown on thousands of small landholdings by producers who owned some, if not all, of the land on which they cultivated cane" (Mazumdar 1998, p.2).<sup>21</sup> This was a far cry from the plantation economy of the Caribbean and Brazil. The small scale production units in China would have found it difficult to make expensive and indivisible capital investments, such as the acquisition of a slave. Pooling resources among several producers to "share" a slave may imply large transaction costs rendering the whole operation uneconomical. Incidentally, this may also explain why China used smaller and less costly versions of mills in sugar production.

This line of explanation may also be applied to Asia at large, given that through much of the continent sugar could be produced locally whereas Europeans had to use overseas lands. The colonial process in the Americas was particularly conducive to the formation of large plantations, as all pre-colonial claims on the land could be dismissed and migration from Europe was costly and regulated. In Asia, on the other hand, sugar producing lands were available within all major empires and had been settled over many centuries or even millennia. Land fragmentation was a likely outcome, leading to the production choices described above.

A second explanation, which can be even more readily applied to all of

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<sup>20</sup>For instance, China used two-roller mills instead of the better performing three-roller ones and used animal power to operate them instead of water power (Mazumdar 1998, p.171-172).

<sup>21</sup>The data reported in Mazumdar (1998, p. 232) indicates an average plot size of just 5.38 mu, which equals 0.89 acres or 3589 squared meters. These plots would be used for the cultivation of a multitude of crops, sugar cane being just one of them.

Asia, would be the large differences in nominal price levels between Asia and Europe. During the early modern period Europeans were constantly amazed by the cheapness of products in Asia. Statements such as Father Diego de Pantoia's, a Jesuit visiting Beijing in 1602, are commonplace: "All things are very cheape, without comparison cheaper than in our Countrey".<sup>22</sup> Indeed, when transformed into silver, the basis of most pre-industrial monetary systems, Asian wages and prices are far below those observed in Europe. Allen (2005), reports wages for unskilled labour of 3.44 grams of silver per day for Northern Italy and 7.42 grams per day for England; both during the second half of the 18th century. Compare this with an unskilled wage of 1.55 grams of silver per day for China and 0.83 grams for India. Goods were similarly cheaper, so standards of living were not necessarily lower, but the Europeans' enthusiasm when encountering Asian markets seems easy to understand. Incidentally, Europe's higher prices were most likely another consequence of its American conquests - the largest silver mines in the world having been found in present-day Bolivia and Mexico.

What is important for us, however, is that these price differences offer a straightforward justification for the absence of African slaves through most of Asia: they were unaffordable. At 1.55 grams of silver per day, and considering that the British pound sterling was worth 120 grams of silver through most of the early modern period, a year's worth of Chinese unskilled labour could be bought for £3.36 - even cheaper than the £3.54 derived above for slave labour. And this is before considering the more considerable transport costs that transportation between African and China would entail.

Notice, however, that Asians would have been able to offer an attractive price for African slaves in terms of manufactures had the Europeans not been there. This, after all, is what the model of the previous section would predict given Asia's advanced manufacturing technology. But the situation changes in a world economy with at least 3 players and money. The Europeans could offer a much higher silver price than the Asians, so that selling slaves to the

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<sup>22</sup>Cited in Mazumdar (1998, p.53).

Europeans and using the silver received to buy Asian manufactures was much more profitable than engaging in a direct exchange with the Asians. This is arguably what took place, with Europeans acting as intermediaries for Asia's manufactures - as best exemplified by the importance of Indian textiles in Europe's commerce with Africa.

## **5 Why Africa? On the determinants of the supply of slaves**

Let us now turn back to the question that first motivated our analysis: why did Africa become the source of the world's slaves during the early modern period? The model from section 3 emphasizes productivity differences in manufacturing and predicts that high-productivity regions can offer a high price for a slave in terms of manufactures. Section 4 then argued that among the world's high-productivity regions of the early modern period only Europe had a use for slave labour. But that still leaves us with a puzzle since Africa was not the only region characterized by low productivity in manufacturing. Non-core areas of Eurasia such as Russia and Eastern Europe, Central Asia or Southeast Asia would also be potential slave exporters. Not only that, but as we move forwards in time we are confronted with the enormous technological advantage acquired by Europe during the Industrial Revolution. If differences in manufacturing technology were all that mattered, Industrial Europe would have been able to buy slaves even from the advanced parts of Asia such as India and China.

What is missing from the picture is an analysis of the supply side of the slave trade. As is well known, the African slave trade took place without Europeans making any territorial gains in Africa - colonialism in Africa took off several decades after the abolition of the slave trade. Europeans hardly ever ventured into Africa's interior before the 19th century; Africans themselves took care of capturing and transporting slaves to the ports and markets where Europeans and Muslims could buy them without further effort. They did this because of the large profits involved. The question,

then, is why this activity was particularly profitable in Africa.

It is reasonable to assume that Europeans would have been able to offer approximately the same price for an African, Asian or Eastern European slave. Transport costs were important, they constituted between a quarter and third of a slave's price in the Caribbean, but they were not necessarily in Africa's advantage. Taking into account that slave ships had to depart from Europe with the goods needed for buying slaves, transport costs would be minimized by buying slaves in Eastern Europe, then Africa and finally Asia. And even the advantage of Africa over Asia may disappear when we consider that much of the manufactures traded for slaves were actually acquired in Asia.

The differences between the potential suppliers of slaves was then not on the revenue side - that is, the amount of manufactures they could get per slave - but on the cost side. For some reasons that we wish to discuss below, Africans appear to have been able to "produce" slaves at lower costs than other regions in the world.

How were slaves obtained in Africa? By and large, through wars and slave raids - the dividing line between the two being far from clear since wars were increasingly fought with the main objective of obtaining slaves. While slave raids involved a few dozen people and can be thought of as a private operation, states of all sizes got involved directly into the slave trade and wars became their main method of production. As Klein (2003, p.504) put it, "slave trading and slave production became the most important economic activities for many African states".

A noteworthy aspect of this process is that slaves were mainly obtained from outside the society of the enslavers. This is a feature of the slave trade that has been regarded as critical in the literature. In the words of Finley (1980, p.143), "... the slave was always a deracinated outsider - an outsider first in the sense that he originated from outside the society into which he was introduced as a slave". Finley (1980) developed the concept of slaves

as "outsiders", a status usually reserved for foreigners and people who are not like us.

The concept of an outsider is a cultural one - a person who behaves differently, talks a different language, prays to different gods. Ancient Greeks would not enslave fellow Greeks, and this would apply to citizens of all Greek colonies throughout the Mediterranean, but all barbarians - whether European, African or Middle Eastern - were fair targets for enslavement. In a similar vein, both the Christian and the Muslim religions had provisions against the enslavement of fellow Christians and fellow Muslims, provisions that were sometimes overlooked when the slaves in question, though professing the "right" religion, were otherwise too culturally different. Thus the enslavement of African Muslims in the Sahel by North African Muslims.

How does this relate to the present question? We find no reason to believe that the costs of obtaining slaves were higher in Africa for strictly material reasons. By this we mean that the cost of arming a band of slave raiders and transporting, feeding and storing the captured slaves was probably similar throughout the Old World. If anything, Eurasia's higher population densities and better access to seas and navigable rivers would have made costs there lower than in Africa. What we would like to advance instead is that cultural factors made the process of slave capturing and trading less costly in Africa.

One aspect that set Africa aside from Eurasia during the early modern period was a higher degree of *cultural fragmentation*. By this we mean that cultural areas, regions within which people would share some essential cultural elements, were smaller in Africa as compared to Eurasia. How this translated into lower costs for obtaining slaves is not very difficult to see. If we assume, in accordance with Finley (1980), that the enslaving of one's own people was pretty much forbidden in all societies then would-be slave traders need to run their operations against societies other than their own. Eurasia's large cultural areas meant that this required long-distance operations and large-scale military actions, rendering the capture of slaves

very costly. Africa's cultural fragmentation, on the other hand, implied that raids of even a few dozen men attacking villages from a nearby region would be a cheap and acceptable way to obtain slaves.

It is impossible to calculate a measure of cultural fragmentation for pre-colonial Africa, but present-day measures clearly show Africa's more divided cultural landscape. Fearon (2003), for instance, estimates cultural fractionalization by using linguistic distance as a proxy for cultural distance and finds that average scores in Africa are the highest in the world. And as is well-known since Easterly and Levine (1997), the related concept of ethnic fractionalization is present to a particularly strong degree in Africa. The image of a highly fragmented cultural landscape in Africa is also supported by the historical forces that we can refer to in order to explain it - as we detail in what follows.

In short, we advance that Eurasia's comparatively large cultural areas are the result of two mutually reinforcing structures that have proved particularly efficient in giving vast and disparate peoples a common cultural background: the state and religion.

States are powerful forces for the spread of cultural elements from their core to the areas they conquer. Even short-lived empires could have long-lasting consequences on the culture of large areas: Alexander's empire did not survive his death in 323 BC but Greek culture was hugely influential from Egypt to Bactria for centuries to come. The Greek language became the lingua franca of western Asia and non-Greek cities such as Alexandria were home to some of the most brilliant intellectual achievements of Greek civilization. All of Eurasia's great empires, Rome, China or the Umayyad Caliphate, spread cultural elements through the provinces they conquered.

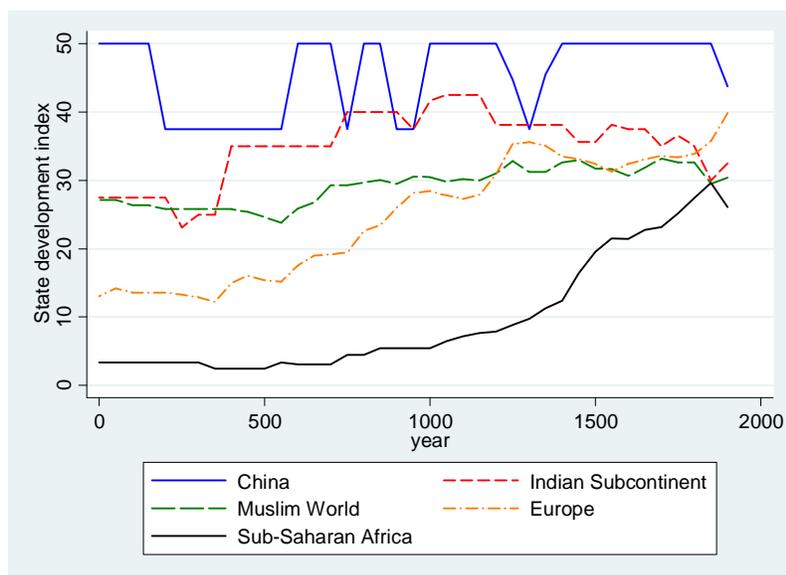
But the cultural consequences of state formation are not limited to what we may term high-level cultural practices like the arts and literature - they affected the everyday life of the common people. Sub-state political entities such as bands, tribes and chiefdoms encompass a limited number of people

and are in a constant state of warfare with each other. States, on the other hand, have an interest in ensuring a certain level of internal peace - if for no other reason than to guarantee the production on which taxes depend (Olsson 2000) and to better direct violence towards external enemies. Charles Tilly has made the point that, on a millennia perspective, deaths due to homicides (i.e. at the hands of civilians) have decreased enormously - and advances the rise of the state as a cause (Tilly 1990, p.67-68). It is thus the case that a given population of, say, a few million people, would experience much less internal violence if ruled by a single state than by a number of chieftaincies or tribes. In addition to this, trade and communication have always been among the first beneficiaries of state and empire formation. The surge in such peaceful types of interaction, and the decline in violent ones, would naturally lead large populations to see each other as being part of a whole, as "insiders".

As it turns out, states were much less prevalent in Africa south of the Sahara than in any of the core areas of Eurasia. By the year 1500 AD the vast majority of Eurasia's population lived within states, whereas much of Africa was ruled by sub-state entities or by very small states. Only along the Sahel and in the Ethiopian highlands could we find long-lasting political entities roughly comparable to their Eurasian counterparts, and no empire of the magnitude of Rome, China or the Umayyad Caliphate had ever existed in Africa. The historian of Africa John Thornton is unambiguous on this point: "one can say with confidence that political fragmentation was the norm in Atlantic Africa. [...] the "typical" Atlantic African probably lived in a state that had absolute sovereignty but controlled a territory not exceeding 1,500 square kilometers [...] it could control as many as 20,000-30,000 people" (Thornton 1998, p. 105).

The phenomenon can be illustrated with the help of Figure 2, which uses the index of state development put together by Bockstette et al. (2002). The index is calculated for every present-day country and every 50-year period since the year 0 AD until the year 1950 AD, and takes values between 0 and 50 - larger values denote that larger fractions of the territory in question

**Figure 2**  
**State Development in Africa and Eurasia, 0-2000 AD.**



are ruled by a state.<sup>23</sup> We compute simple averages for Sub-Saharan Africa and for the four main Eurasian regions of Europe (where we include Eastern Europe, Russia and the Caucasus), the Muslim World (from Morocco to Central Asia), the Indian Subcontinent and China. The overall pattern is, we believe, very clear. States are rare in Africa over the last two millennia, and particularly so in the 1500 years before the beginning of the Trans-Atlantic slave trade where the index is well below a value of 10 for most of the period. Most of Eurasia, on the other hand, has been ruled by states over this period - with China leading the way and Europe being the laggard given the relative retard of Eastern Europe.

<sup>23</sup>The data is available at [http://www.econ.brown.edu/fac/Louis\\_Putterman/](http://www.econ.brown.edu/fac/Louis_Putterman/). A value of 50 corresponds to the case where a domestic government rules more than 50% of the territory in question, a value of 0 would be obtained if there was no government above the tribal level, with all intermediate values being also possible. Note that Bockstette et al. (2002) focus on a "State antiquity index", which is the actualized sum of the index of state development described above.

But states are not the whole story. Some regions in Europe were divided among a myriad of very small states, like Germany and Italy before the 1870s, but slavery was absent in them like everywhere else in Europe. And in general we find that European states fiercely waged war against each other yet enslavement was not an acceptable treatment of conquered peoples or war prisoners. The reason was that Europeans belonged to a common cultural community which crossed political boundaries - Christianity.

The Christian world was just one of a few major cultural areas where religion or a system of philosophical thought provided a common world view to a large number of people. Islam was practiced in a continuum of lands from Marrakesh to Samarkand and gave them a common denominator: everywhere Muslims would find the Koran being recited in its original Arab language, people praying in the direction of Mecca five times each day and practices such as fasting and pilgrimage being observed. A comparable phenomenon characterized most parts of Eurasia; everywhere an elaborate religion or system of thought - Hinduism, Buddhism, Confucianism - gave millions of people a sense of common humanity and relatedness.<sup>24</sup>

Religion and the state reinforced each other: kings and emperors benefited from the legitimacy that only religious authorities could give while organized religions could expand and perpetuate themselves by becoming the official credo of a state. A people united by a common political entity and a common religion proved to be a remarkable military force, as best exemplified by the rise of Islam. It is perhaps precisely because of the paucity of states that none of the great Eurasian religions or belief systems managed to penetrate Africa beyond a belt of lands south of the Sahara and on its Indian ocean coast. Indeed, the regions of state formation and the regions adopting Eurasian religions overlap each other very well on African soil: Abyssinia and the Nubian kingdoms were Christian, while the many kingdoms of the Sahel and the trading emporiums of East Africa were all

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<sup>24</sup>Some regions, most notably China, combined beliefs in different systems of thought to create a distinct cultural package that unified the population as well as a single religion.

Muslim. The rest of Africa practiced traditional religions, none of which ever reached the scale of Eurasia's major religions.

States and religions give a common cultural background to people over large regions or continents, making them see each other as similar in some fundamental ways. Many things were tolerated vis-a-vis other members of these cultural communities, but slavery was not one of them. Africa did not have the benefit of such a unifying cultural background and provided a fertile ground for enslavement.

If cultural fragmentation results in low costs for obtaining slaves we may expect to see an active trade within Africa even before the arrival of an external demand from the part of the Europeans. In terms of our model from section 3, Europeans were able to offer a higher price for slaves than what would be available in Africa; but even the lower domestic price may be enough to sustain a slave trade if the costs of obtaining slaves were small enough.

As it turns out, historical evidence supports the case. As summarized by Thornton (1998, p. 97), when referring to Africa before the Trans-Atlantic slave trade, "The institution of slavery was widespread in Africa and accepted in all the exporting regions, and the capture, purchase, transport, and sale of slaves was a regular feature of African society". Europeans induced a large increase in the trade with the high prices they could offer, but the trade in slaves preceded them as far in time as we are aware of.

Furthermore, our argument is supported by the fact that slavery within Eurasia became increasingly rare during the millennium and a half preceding the Industrial Revolution - a period characterized by the progressive expansion of states and organized religions. This is well-documented for Europe, although a clear picture of the evolution of slavery in most of Asia is still difficult to come by. Overall, however, Africa's high degree of cultural fragmentation appears as a likely candidate in explaining the continent's capacity to supply Europe's increasing demand for slaves.

## 6 The fundamental causes of African underdevelopment

To summarize our arguments up to this point, we have advanced that Africans were bought as slaves by Europeans for two fundamental reasons. First, a technologically advanced society like Europe was able to offer a higher price for slaves in terms of manufactures than what could be obtained within Africa. Among the several technologically advanced regions of Eurasia only Europe had a need for slaves given the particularities of sugar (and other crops') production.

Second, Africa responded to this external demand because of the low costs of obtaining slaves within the continent. We have advanced Africa's cultural fragmentation as an explanation for this, which would in turn be the outcome of the paucity of large states and the limited penetration of any of the world's major religions (up to the year 1500 AD).

In this section we try to push the causal linkages even further and wonder about the reasons leading Africa into a situation where the expansion of the slave trade seemed almost a natural outcome. Why, first of all, was Africa's manufacturing technology in retard with respect to that of Eurasia? And even allowing for that, why did large enough regions of Africa - let alone the whole continent - never become unified under a large empire or a major religion?

This is where our initial discussion of the role of biogeographic factors in long-term development may be of relevance once again. While the direct linkages between biogeography and current economic development may be limited to the agricultural sector, indirect linkages could run much deeper and be of fundamental importance. It is not implausible to argue that Africa's technological retard and its cultural fragmentation were ultimately the result of the continent's climate and initial endowments.

Consider manufacturing technology. While the productivity of the agricultural sector does not directly constraint technological improvements in

other areas of the economy, it does constraint total population under a Malthusian regime. At the level of large regions or continents, a larger population is likely to result in technological progress for reasons that are clear for readers familiar with the endogenous growth literature: more people means more potential inventors and a larger pool of resources that can be invested in research and development. We know since Kremer (1993) that, on a global perspective and over the very long run, economic growth has been proportional to total population. It is therefore not unreasonable to suppose that Africa's less productive agriculture could only support small urban areas and a limited population - resulting in a slower rate of technological progress.

And the consequences of a less productive agriculture and a smaller population do not stop there. Diamond himself argues that "the size of the regional population is the strongest single predictor of societal complexity" (Diamond 1997, p. 284). Two key aspects of societal complexity would be precisely the existence of a state and organized religion.

It is natural to think of a certain level of agricultural development as a pre-condition for the existence of states. As noted by McNeill (1982, p.7), "Early civilizations existed by virtue of transfer of food from its producers to rulers and men of power who supported themselves, along with a following of military and artisan specialists, on the food so secured". One of the conditions used by anthropologists to distinguish states from chieftaincies and other sub-state organizations is precisely the existence of a class of non-food producing specialists (Flannery 1972). States required the existence of agricultural surpluses, and increases in state complexity and power were only possible through an increase in agricultural production that would sustain a larger army and a more specialized class of bureaucrats and artisans.

Agricultural development may be not just a necessary condition for the emergence of states - under evolutionary arguments it may also be a sufficient one. Societies that were able to generate agricultural surpluses may or may not chose to form states and to sustain an army. Those that do so, however,

will have an advantage in military operations and over time will absorb the societies choosing a different path. Evolutionary forces at the society level would thus ensure that states emerge wherever agricultural development make it possible.

An additional argument is the fact that low population density makes nation-building difficult. Austin (2008, p. 1005) emphasizes this point for Africa: "It is widely agreed in the literature on Africa, [...], that low population density made it hard to tie people down, and relatively easy for them to emigrate to avoid taxation or other state demands" (on this point see also Hopkins 2009, p. 174, and the literature cited therein).

The emergence of great organized religions may also be linked to agricultural development. It is quite probable that Africa had its share of highly inspired and charismatic philosophers and thought leaders; the equivalents of the Buddha, Confucius or Jesus. The development of Buddhism, Confucianism and Christianity, however, necessitated much more than a single inspired leader. It was the cumulative intellectual power of their successors that developed their initial insights into full-scale organized religions or systems of thought (notice that neither the Buddha nor Jesus wrote a single line during their life). The establishment of this mass of religious specialists was possible only in an environment of continual agricultural surpluses - once again a consequence of agricultural development.

We arrive then to an overall perspective in which the ultimate causes of the African slave trade are to be found in the continent's bad hand played by mother nature. The consequences of this handicap may still be looming large over Africa's present if we accept that the slave trade is a major cause of underdevelopment. Biogeographic endowments would have determined the initial conditions under which the different regions of the world interacted. The result were historical phenomena such as the slave trade or indeed colonialism which would have long-lasting consequences on the world at large.<sup>25</sup>

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<sup>25</sup>For more on the consequences of colonialism on present-day socioeconomic outcomes

## 7 Concluding remarks

It is perhaps no exaggeration to say that Africa was transformed by the Trans-Atlantic slave trade of the early modern period. It was, at any rate, one of the most remarkable events in African and indeed world history. While that should be enough to attract the attention of social scientists in general, economists and economic historians may feel particularly concerned by its analysis due to its potential role in present-day economic outcomes.

Overall, we have argued that the interplay between technological and cultural factors can offer a comprehensive explanation for the African slave trade. Differences in productivity meant that Europeans had a large price advantage for buying slaves from low-productivity regions such as Africa. If the level of demand can be measured by the price that buyers are ready to pay then Africans faced a large demand for their slaves.

To this we must add a description of the supply side of the market, the process of slave capturing. Our view is that cultural fragmentation made the costs of slave production lower in Africa, and that this explains both the endemic nature of slavery in pre-1500 Africa and the rise of this continent to its unenviable status as the source of the world's slaves.

Finally, we have pushed our questioning even further into the past by inquiring into the origins of those technological and cultural differences between Africa and Europe. This led us into the biogeographic differences between the continents that have been previously put forward to explain the development of agricultural societies. Socioeconomic forces such as the long term relationship between agriculture and population suggest that these initial disadvantages constrained the development of manufacturing technologies and cultural unifiers such as states and organized religions. This set the stage for the interplay between Europeans and Africans during the early modern period and thereafter.

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see Angeles (2007) on income inequality and Angeles and Neanidis (2009, 2010) on elite formation. As already mentioned, the large literature on institutions and development cited in the introduction has also emphasized the role of colonialism.

Let us end by noting that we do not believe that the overall vision we end up with is a discouraging one. Africa was severely handicapped by its endowments in plants and animals, tropical climate, and unyielding geography. But in the world of today there are less and less reasons why these characteristics will constrain economic production. Not only that, but the world of today is no longer tolerant of the past forms of intercourse between Europe and Africa, the slave trade and colonialism. With neither nature nor man imposing unconquerable barriers to its development, Africa is probably in the best position to reach its own economic development than at any time in its history.

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