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Abstract: Sub-Saharan Africa is home today to some of the most unequal countries in the world, in Southern and Central Africa, as well as others that are close to the world average, in Western Africa. Yet, there is no consensus regarding the historical factors that led to such a situation. Given limited data on income distribution during colonial times, we do not know whether present-day inequality patterns can be traced back to the colonial period and which role was played by colonial institutions. Most of our knowledge comes from information on British colonies, while territories subjected to other colonial powers are much less well known. To address this gap, we analyze trends in income inequality for colonies in French West Africa, building social tables for Senegal and Ivory Coast during the last decades of colonial rule. We find that income inequality was high during the colonial period, because of the huge income differential between Africans and European settlers (especially in Senegal) and of high inequality within the African population (especially in the Ivory Coast). Nevertheless, it tended to reduce during colonial rule – but the trend inverted after independence. Our findings cast in a new light the connection between colonialism, extractive institutions, high inequality and inequality extraction ratios.

JEL Codes: N17, O43.

Keywords: Africa, Inequality, Income Distribution, Colonization, Extractive Institutions, Social Tables.

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1. Introduction

Africa is currently one of the most unequal regions in the world. But regional averages hide a high heterogeneity of inequality patterns, with Southern Africa being the most unequal area of the world and Western Africa being close to the global average. Indeed, Africa is the world region where we have the greatest heterogeneity in income inequality across countries Yet there is no general consensus about the historical factors that led to this situation. While some argue that sub-Saharan African societies became unequal as a consequence of colonization, others suggest that they were characterized by relatively very high inequality also in earlier epochs. This might still be due to contact with the Europeans through the slave trade, but in such case colonialism played at most a secondary role in enrooting inequality as well as under-development (for a synthesis of the debate, Acemoglu and Robinson 2010; Bolt and Hillbom 2016)

A quickly-expanding, recent literature on African economic history has gone a long way towards providing better estimates of key economic variables, like per-capita GDP, for many parts of the continent. Although much remains to be done, these studies are beginning to change the very empirical basis upon which discussion of the "African divergence" takes place (Prados de la Escosura 2012; Austin and Broadberry 2014; Broadberry and Gardner 2016). Long-term distributive dynamics, however, have been relatively neglected by this renaissance in African economic history, hence the debate about the origins of high inequality rages on. We aim to contribute to such a debate by investigating whether the current high levels of African inequality can be traced back to colonial rule. Indeed, extractive institutions established by the colonizers in Africa have often been blamed as one of the causes of current underdevelopment (Acemoglu, Johnson, and Robinson 2001; Acemoglu and Robinson 2012; Nunn 2008). In addition, by favoring the interests of European companies and settlers with respect to those of the majority of the African population, government institutions are frequently thought to have heavily affected the distribution of income and wealth in African societies (Acemoglu, Johnson, and Robinson 2005; Bolt and Hillbom 2016). If similar extractive institutions persisted over time, we may be able to identify the roots of current inequality by looking at patterns of income distribution during the colonial period.

The main difficulty in answering these questions is that we have very limited data about inequality during colonial rule. The main exceptions are Ghana, for which we have some information since 1891 (Aboagye and Bolt 2018), Kenya since 1914 (Bigsten 1987), Botswana

since 1921 (Bolt and Hillbom 2016), and Zimbabwe since 1945 (Adelman and Morris 1972). If we look at a level below current states, we have some information on income distribution in the Dutch Cape Colony between 1700 and 1753 (Fourie and Von Fintel 2011). If we focus on top incomes instead of on the full distribution, it is important to cite the work by Atkinson (2014) who analysed top incomes in 15 British African colonies from tax records.[1] Nevertheless, from this review, it is clear that most of our knowledge of inequality during colonial rule refers to British colonies in Eastern and Southern Africa.

The other main colonial empire in Africa, the French, has largely been ignored by recent studies of colonial inequality[2]. We contribute to filling in this gap, by focusing on two colonies in West Africa, Senegal and Ivory Coast, from the late 1930s to the 1950s: a crucial period, as it was the run-up to independence, gained by both colonies in 1960. There are two main reasons why these are particularly important case studies. First, Senegal and Ivory Coast were among the richest and most dynamic territories of French Africa, which makes them not only good candidates to study pre-industrial inequality, but also ensures a relative abundance of historical documentation and secondary literature. Second, they are the only two ex-French colonies of Sub-Saharan Africa for which we have relatively complete Gini series for the post-independence period, which allows us to fully explore the relevance of our findings by placing our own inequality estimates into a long-term perspective.

To reconstruct income distributions, we use the method of social tables. This technique has been extensively used by recent literature on modern societies (Milanovic, Lindert and Williamson 2011; Milanovic 2018; Allen 2019) as well as on preindustrial (Lindert and Williamson 1983; Lindert 2000; Broadberry et al. 2015; Saito 2015; Allen 2019) and even ancient ones (Scheidel and Friesen 2009; Milanovic 2017). Social tables have also been employed to study distribution in African societies in periods close to the one we focus on (e.g. Bolt and Hillbom 2016; Aboagye and Bolt 2018). Social tables allow us to estimate overall inequality by dividing the society into a range of properly-defined classes, for each of whom population size and average income must be known. To implement this methodology, we collected new data from colonial statistical publications, qualitative sources, and anthropological records. This approach allows us to shed light on several

[1] Some other studies focus on wealth inequality, for example Galli and Rönnbäck (2019) and Galli (2019) on Sierra Leone in 1831 and Fourie and Von Fintel (2010) on the Cape Colony (South Africa) in 1663-1757. For a synthesis of earlier works on wealth/land inequality in Sub-Saharan Africa as well as for additional insights, see Frankema (2010).

[2] A notable exception is the work by Alvaredo, Cogneau, and Piketty (2016), who report information on income inequality from tax records in Algeria, Tunisia, and Cameroon between 1920 and 1960.

questions. What was the overall level of inequality during the colonial period? What were its main drivers? Did inequality patterns change after independence? Moreover, reconstructing social tables not only helps us to understand inequality, but provides us with new information on famers' standards of livings, which are notably difficult to measure (De Haas 2016), on role and composition of African rural elites, wage levels, and poverty rates. Finally, we produced new population estimates at the local level, which could prove useful to scholars interested in African development in the long run.

Overall, our results show that income inequality in colonial Senegal and Ivory Coast was very high (although for partly different reasons). Nevertheless, over time income inequality tended to decrease with a trend starting before independence, casting doubts on simple explanations linking high inequality to colonial extractive institutions – especially considering that the declining trend in inequality tended to invert immediately *after* independence. However, colonial institutions might have had a different impact on distribution, not by leading to higher inequality levels, but to higher inequality extraction ratios – i.e., by making colonial societies as unequal as they could have been. This method of analysis, recently introduced by Branko Milanovic (Milanovic 2013; 2018; Milanovic, Lindert and Williamson 2011) allowed us to dig deeper into the historical evidence – indeed, contributing to reinforce the idea that maybe the colonial period *was not* the point of origin of high inequality in Africa.

The paper is structured as follows. Section 2 provides a brief overview of French colonization in sub-Saharan Africa and offers some key information about Senegal and Ivory Coast. Section 3 begins by providing some general data on inequality in sub-Saharan Africa in a global perspective, thereafter it discusses the method of social tables and applies it to our case study. Section 4 analyzes the results by presenting Gini indexes and discussing potential explanations for inequality patterns. Section 5 places the results in a longer time frame and further discusses them by looking at inequality extraction ratios. Section 6 provides concluding remarks and directions for future research.

2. The French colonization of Sub-Saharan Africa: the case of Senegal and Ivory Coast

The French colonized large parts of Africa between the mid-1800s and 1960, starting from a few bases established much earlier (for example in Senegal, the first French settlement was the port city of Saint-Louis, founded in 1659). In West Africa, they controlled the territories corresponding to

current Senegal, Mauritania, Mali, Niger, Burkina Faso, Guinea, Ivory Coast, Benin, and Togo.[3] Senegal and Ivory Coast were two of the richest territories of French West Africa. Scarcely populated (2-3 million people overall), their economic structure was based on agriculture and most colonial activity relied on buying agricultural goods in Africa and reselling it at higher prices in Europe. A small number of large trading companies monopolized commerce and had great influence in determining the prices that the African producers could receive (Tadei 2018, 2019). Most agricultural production was in the hands of African farmers and if in some cases European settlers established plantations, this remained a small proportion of total production, the Europeans accounting for a tiny percentage of the population. Important productions were peanuts and millet in Senegal, yams and cocoa in Ivory Coast.

Forced labor practices were widespread: the inhabitants of French West Africa were compelled to work for a fixed number of days every year, for the colonial government until 1946 and for private enterprises at least until the ratification by France in 1937 of the 1930 International Labor Organization Convention, which focused on abolishing forced labor (Fall 1993). The colonial power invested very little in public goods. On average, between 1907 and 1956 there were only 1,000 teachers, 1,400 doctors and 300 schools serving the entire territory of French West Africa (Huillery 2014). After the Second World War, under political pressure in the colonies and in France, the colonial system began to change. Forced labor was abolished, investments in public goods increased, and forms of political representation of Africans were established.

The two colonies obtained formal independence in 1960. The process leading to this change was generally peaceful, but did not necessarily lead to democratic regimes. In Ivory Coast the rule of Félix Houphouët-Boigny (1960-1993) and Henri Konan Bédié (1993-1999) guaranteed a certain stability to the country until the late 1990s. After that, Ivory Coast experienced a long period of political instability, brought about by General Guéï's coup in 1999 and the two civil wars during Laurent Gbagbo's government, in 2002-2007 and 2010-2011 (Daddieh 2016). Senegal's post-colonial period, on the contrary, was characterized by peaceful political transitions. The only attempted coup in 1962 was repressed without bloodshed. Yet, in the almost 60 years since independence, Senegal had only four presidents: Leopold Senghor from 1960 to 1980 (with one legal party only from 1965 to 1975), Abdou Diouf from 1981 to 2000, Abdoulaye Wade from 2000 to 2012, and Macky Sall thereafter (Clark and Philips 1994).

[3] The historical background of this section relies on Coquery-Vidrovitch (1972), Duignan and Gahan (1975), Hopkins (1973), Manning (1998), and Suret-Canale (1971).

3. Constructing Social Tables for French West Africa

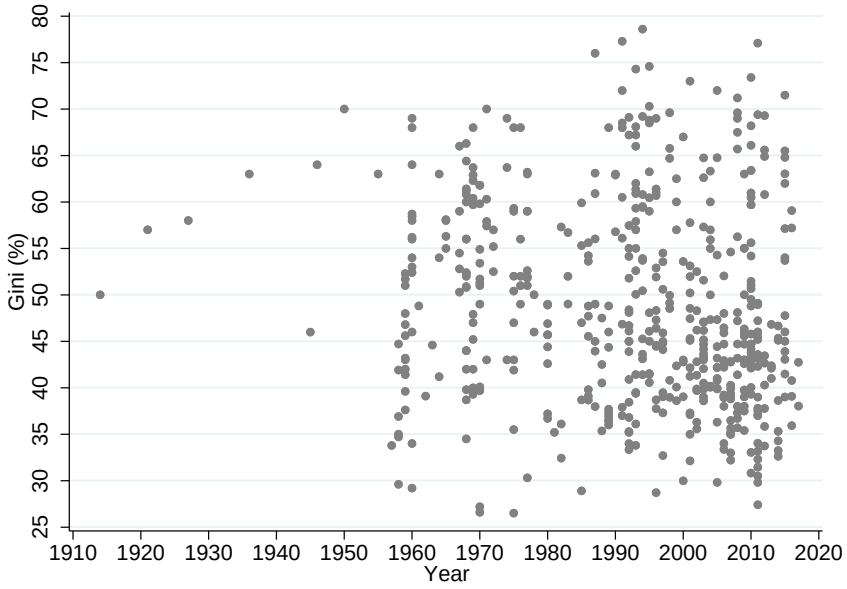
According to United Nations estimates, the average Gini index for Sub-Saharan African countries is 0.43, while the world average is 0.39. Even compared with other developing regions, Africa's inequality is stark: Asian and Middle-Eastern countries' inequality is lower than the world average and only Latin America presents levels of inequality that are similar to those we find in Sub-Saharan-Africa (see table 1). Moreover, it is in Africa that we have the largest heterogeneity in income inequality across countries, as shown by the largest coefficient of variation among all world regions. This diversity of experiences makes Africa an ideal laboratory to study patterns of inequality and the differential impact of colonial rule. However, for the pre-1950 period we have Gini estimates for just four sub-African countries: Botswana, Ghana, Kenya, and Zimbabwe. The situation can be grasped from Figure 1, which reports the scatter-plot of Gini indexes over time for all countries and years included in the last version of the UNU-WIDER database (December 2018). Each point represents a country/year. The contrast between the wealth of information available before and after independence is clear.

Table 1. Gini in World Regions, 2008-2017

	average	**st. dev.**	**coeff. variation**	**min**	**max**	**# countries**
East Asia and the Pacific	0.38	0.05	0.13	0.29	0.48	27
Europe and Central Asia	0.33	0.04	0.12	0.25	0.41	46
Latin America & the Caribbean	0.47	0.04	0.09	0.38	0.52	23
Middle East and North Africa	0.35	0.06	0.16	0.28	0.46	16
North America	0.40	0.04	0.11	0.37	0.43	2
South Asia	0.36	0.04	0.12	0.29	0.43	8
Sub-Saharan Africa	**0.43**	**0.08**	**0.18**	**0.31**	**0.67**	**45**
World	0.39	0.05	0.13	0.25	0.67	167

Average Gini across countries, 2008-2017. To calculate regional averages, we first calculated the average Gini index for each country in the period 2008- 2017 and then we produced an average across countries in each region. *Source:* elaborations from UNU-WIDER (December 2018).

Figure 1. Missing Gini during the Colonial Period in Sub-Saharan Africa



Source: elaboration from UNU-WIDER (December 2018).

This situation, however, could be overcome by making good use of the information available in colonial archives. While, generally speaking, such information does not allow us to reconstruct complete distributions of income and/or wealth, it allows us to build social tables of sufficiently high quality and detail. Social tables divide the population of a given country or society into more or less homogenous groups or "classes", and provide information about the size (number of individuals or households) and the average income of each class. As a method to study economic inequality, they are fairly popular, especially when more detailed information about the actual distributions is missing. This is particularly true for colonial Senegal and Ivory Coast, for which tax tabulation records did not survive. The first known example of a social table is Gregory King's *A scheme of the income, and expense, of the several families of England; calculated for the year 1688* (see Lindert and Williamson 1983), but many more recent social tables have also been produced. Milanovic, Lindert and Williamson (2011) as well as Milanovic (2018), for example, made an extensive use of this methodology in their seminal articles on inequality extraction[4] and more recently, social tables have become a popular tool in the study of long-term inequality trends in preindustrial Asian (Saito 2010; 2015) and European (Scheidel and Friesen 2009; Broadberry et al.

2015; Milanovic 2017; Allen 2019) societies, mainly due to their high comparability and relative ease of construction (see Alfani 2019b for a commented synthesis). Social tables have also been elaborated to study inequality in a few British colonies in Sub-Saharan Africa, such as Kenya (Bigsten 1987), Botswana (Bolt and Hillbom 2016), and Ghana (Aboagye and Bolt 2018).

In order to estimate inequality with acceptable precision, social tables should strive to follow two principles. First, overlap between classes should be limited as much as possible (i.e., every individual from a lower class should be poorer than any individual from a higher class). Otherwise, social tables will tend to overestimate inequality. Second, classes should be homogenous, i.e. inequality within each class should be minimal. If this is not true, inequality will tend to be underestimated, as it would only include inequality between classes and not within. Although these two principles might seem somewhat contradictory, the practical solution (which is in line with both principles) is to build social tables as detailed and disaggregated as is allowed by the available data. To these two guiding principles, we will add a third: the division in classes must make sense, based on the historical context, for the societies under study. In other words, it should reflect meaningful characteristics of such societies and their real socio-economic stratification. In the following paragraphs, we detail the statistical sources we used to build our social tables for French West Africa, as well as the methods we used to estimate size and average income for each class composing such tables.

Data

To reconstruct income distributions, we mainly use information from two editions of the *Annuaire Statistique de l'Afrique Occidentale* (1949; 1955). These yearbooks were published by the *Service de la Statistique Générale* of French West Africa and include a wealth of information on climate, population, production (agriculture, livestock, fisheries, forest, industries, and mines), transport, imports and exports, prices and wages, and public finance. Overall, the yearbooks are the expression of the efforts that the colonial governments had made since the 1930s to provide a detailed picture of the economic and social situation of the colonies. The first volume of the *Annuaire Statistique de l'Afrique Occidentale* was published in 1936 and covered the years 1933-34. Two other volumes were published in 1937 and 1939, by the *Service de la Statistique Générale de la France* and the Ministry of Colonies. After the establishment of the *Service Colonial de Statistique* in 1943, local statistical offices were created in most territories. In 1945, the first statistical office of French West Africa was established in Dakar. This institution undertook the enormous task of gathering and

standardizing all the reports and statistical documents which had been produced by each territory. The main fruits of these efforts were three new volumes of *Annuaire Statistiques*, published in 1950 (covering 1939-49), in 1955 (covering 1950-54), and in 1957 (covering 1955-56). By using information in these *Annuaires Statistiques*, we construct social tables every five years from 1939 to 1954 for Ivory Coast and Senegal. In total, eight different social tables are elaborated to evaluate income inequality in French West Africa.[5]

Definition of classes

To reconstruct income distributions, we divide the population of each colony into an active and an inactive class. The active class is then subsequently divided between farmers and wage workers. We further categorize wage earners according to their occupation: heads of firms and colonial administrators, employees, skilled workers, and unskilled workers. The first subcategory includes European governors and high-level administrators of the colonies, African chiefs, and heads of firms and plantation owners. Employees include administrative staff, public and private sector employees in agriculture, forestry, mining, industry, transport, public works, and commerce. Skilled workers include army, police, and technical and qualified workers in both public and private sector. Unskilled workers are laborers and apprentices. Moreover, each subclass can be composed of either Africans or Europeans.

We divide African farmers into four sub-classes: subsistence farmers, lower-class commercial farmers, middle-class commercial farmers, and rural elite. The main activity of subsistence farmers is small scale agriculture which simply covers the household's needs. Lower-class farmers engage in commercial agriculture, but they do not own land. They instead rent it from a class of larger land-owner (the rural elite) in exchange for a share of the crop. Middle-class farmers own land and receive income from sales of agricultural production. The rural elite' income is derived from both direct sales of own production and the share obtained from the land rented to the lower class.

While we have information at colony level only for wage workers and subsistence farmers, for commercial farmers we are able to gather data at the district level. In total, we have 40 distinct classes in Senegal and 25 distinct classes in Ivory Coast, a number which is significantly higher than

[5] Our social tables focus on labor and land income inequality. Other components of capital income are impossible to measure given the available information and are not included in the analysis, while land rents are estimated for the African rural elite.

in previous studies on African inequality based on social tables: 5 for Kenya (Bigsten 1987), 8 for Botswana (Bolt and Hillbom 2016), and 17 for Ghana (Aboagye and Bolt 2018).

Population

The first step to construct social tables is to estimate the total population. Colonial publications report the number of Africans and Europeans living in the colonies. We estimate the European population at the colony level, starting from information in 1936, 1945, 1948, 1951, and 1955 available in the *Annuaire Statistique de l'Afrique Occidentale*. We obtain population figures for our four benchmark-years by interpolation using the growth rate of European population in each colony. As the Europeans were a very small percentage of the population (1-2%), extending the analysis to the district level makes little sense.

For the African population instead, we need data at the district level. We estimate population for 11 districts in Senegal and 16 districts in Ivory Coast, by using population estimates in 1948 and 1955 from the *Annuaire Statistique* and interpolating with each the growth rate of each district in order to obtain population figures for our four benchmark years. Since population estimates from colonial publications tend to be biased downwards (at least for the African component), we correct our figures. Specifically, we increase the population of each district proportionally to the ratio between the sum of the population of all districts as reported in the colonial yearbooks and the more precise estimate of population provided by Frankema and Jerven (2014), excluding Europeans. We compute a different ratio for every year and we then apply it to all districts. On average, the corrected population estimates are between 20% and 30% larger than the original ones.

From population totals, we identify the active population by subtracting children (less than 15 years old), elderly (above 65), and unemployed from the total population of both Africans and Europeans in each year. In 1951, the European active population is reported to be 52% of the total number of Europeans in Senegal and 59% in Ivory Coast. We use the same ratios to estimate the European inactive population in other years. Similarly, we estimate 54% of the total African population to be active. We obtain these estimates by using the World Bank (2018) estimates for 1960 of 43.5% of children and 2.5% of elderly people. Applying these percentages to other years is justified by the fact that they are very stable over time (e.g. the percentage of children in Senegal is 44% in 1960 and 43% in 2017). Obviously, it is likely that in the African context children started working at a much younger age than 15. However, we can assume that they gave a marginal contribution to their

parents' income and we do not consider them as individual earners in the income distribution (i.e. the income produced by working children just increases their parents' income). In the same way, the assumption that elderly do not receive any income is a strong one, but, given their very low population share, this is unlikely to affect the results significantly. The last assumption that we make is that all African adults work, which is reasonable as most of the population engaged in at least some subsistence farming.

Wage workers

To estimate the size of the wage-earner classes, we start with data from 1947 and 1954. For 1947, colonial publications report numbers of African employees, skilled, and unskilled workers for both Senegal and Ivory Coast. To include also the top wage category of heads of firms/colonial administrators, we use their proportion relative to all other wage workers at the federation level and we apply it to both our colonies, for Europeans and Africans. For 1954, colonial publications report the number of Senegalese wage workers in the private sector for each of the four sub-classes in 1954. To include public sector workers, we increase each category by applying, for Europeans and Africans separately, the average proportion of public vs. private sector workers in the whole of French West Africa, by job category. For Ivory Coast, we have information on the total number of African and European workers, but we lack direct information on the number of workers in each sub-category. To solve this problem, we estimate them by applying the proportion of French West Africa to the total number of African and European workers in Ivory Coast. Finally, to estimate the number of workers in each category in 1939, 1944, and 1949, we compute the proportion of each category with respect to the active population in each colony for Africans and for Europeans in 1947 and 1954 and apply them to total active population figures in the other years. We use 1947 for 1939 and 1944 and we use the average of 1947 and 1954 for 1949.

Colonial publications report the average salary of each wage earner category. We transform all hourly or daily wages into monthly wages, by using information from the *Annuaires Statistiques* indicating a 40-hour / 5-day work-week after 1953 and a 48-hour / 6-day work-week before then.[6] In case of missing data, we proceed in the following way. If available, we use ratios of wages in other French colonies, keeping the year and origin (Africans vs Europeans) constant. The reason for

[6] These assumptions are similar to those used in Frankema and Van Vaijenburg (2012)'s analysis of real wages in British Africa (25-26 working days per month and 48-54 hours per week with a six-day week).

doing so is that we want to correctly compare the level of inequality across years and origin, before comparing it across colonies. For example, to estimate the wage of African employees in Senegal in 1939, we compute the ratio of the employees' wage vs. skilled workers' wage in Ivory Coast in 1939 and multiply it by the wage of Senegalese skilled workers in the same year. Alternatively, we use information from the same colony and year, but different origin. For example, the wages of African heads of firms are computed by applying the wage ratio of heads of firms vs. employees and skilled workers among Europeans to the wage of African employees and skilled workers in each colony and year. Overall, we estimate in this way 21 out of 56 cases (2 colonies x 7 African/European /job category x 4 years).

Farmers

We estimate the number of farmers as the difference between active population and total number of wage workers. To divide farmers into sub-classes, we exploit two sources of variation, across and within districts. First, we use differences in land productivity and value of crops suitable for cultivation to measure variation in income across districts. Second, we rely on qualitative sources to identify the class structure in each district and measure variation in income within each district.
More specifically, we proceed in the following way. First, we estimate the rural African active population of each district by subtracting the active urban population, as reported by the *Annuaires Statistiques*, from the total active African population in each district. To estimate urban population, we interpolate with district-specific growth rates computed on data from 1945 and 1955.
Second, for each district, we estimate the number of people working in commercial agriculture based on the total number of hectares cultivated. The *Annuaires Statistiques* report cultivated hectares for each crop in each district in 1954 and 1949-1950. We interpolate data to get estimates of cultivated land for the other years. Assuming 0.8 hectares per worker in Senegal and 1.4 hectares in Ivory Coast, we estimate the total number of commercial farmers in each district and year. The estimate of hectares per worker in Senegal is derived from a 1960-61 agricultural survey finding an average of 1.5 ha per capita (Diarassouba 1968), which implies 0.8 ha per worker assuming an active population share of 54%. This estimate is also confirmed by Bosc et al. (2018, p.185), who report a current estimate of 0.82 ha per working member. For Ivory Coast, we use Rassam (1990) estimate of 5-10 ha per farm in the early 1980s, which, assuming 10 members per household (USAID Land and Urban Office, 2017) and a 54% active share, implies an average of 1.4 ha per worker. To make

sure that we are not overestimating the number of commercial farmers, we subtract the land cultivated by seasonal migrant laborers, the so-called *navetanes* in Senegal. Their number was significant, ranging from 21 to 81 thousand workers in our period. They were almost exclusively employed in the cultivation of peanuts. We gather information on the total number of migrant workers at the colony level from Péhaut (1961) and David (1980, p. 461) and we interpolate to estimate the missing years. Then we redistribute them across districts, proportionally to each district's share of the total value of peanut production.

Third, we compute the total value of agricultural production in each district. As the name of districts changed over time, we reconstructed areas for which we can get consistent information. For Senegal, data are available in 1954 and 1949 on total quantities produced in each of 11 districts for 8-9 main crops. We compute the total value of production by multiplying each quantity by the corresponding price in Dakar. For 1944 and 1939 we only have production values for peanuts. We then estimate total district value by applying the share of value from peanuts, the main Senegal commodity, in 1949-54 to peanut production in 1944 and 1939. For districts that did not produce peanuts (3 out of 11), we interpolate back the production values in 1949 by using the colony's average growth rate. For Ivory Coast, we have information on total production in 1954, 1949 and 1944 for 16 districts and 13-17 commodities. If a commodity is not reported in any one year, we estimated it by using the share of this commodity in the next year in which it is reported and applying it to the total value of commodities reported in both years. By using prices in Abidjan, we compute the total value of production in each district. For 1939, we estimate district values by applying the colony growth rate of agricultural production between 1939 and 1944 to each district's value in 1939.

Fourth, since not all productions are reported at the district level (e.g. livestock), we increase district production by using the ratio total colony level production / total production reported by districts. Farmers' income is thus increased on average by 60% in Senegal and by 110% in Ivory Coast. Colonial statistics report colony-level production for the main agricultural commodities (12 different crops in Senegal and 23 in Ivory Coast). Each crop could be produced for local consumption (food crop), destined for export (cash crop), or both. However, sometimes only commercialized production is recorded. To take into account the entire production, we increase by 1/3 food-cash crops for which only the commercialized part is reported, and we increase by 100 times food crops for which only the commercialized part is reported.[7] In some cases, specific

[7] We derive these estimates from a few cases in which we have both the production for consumption and the production for export.

commodities are not reported in every year. To estimate missing data, we construct an index of the yearly variation of the total agricultural production and apply it to the production of that commodity in the closest year for which we have information. Total livestock production is computed from slaughterhouse data, which report the total number of heads of cattle which are slaughtered. For each category of animals (cows, pigs, goats), we take the average weight and the proportion of the edible part to compute the amount of meat which is produced. Total fish production is also included. Agricultural total income is then computed by multiplying the total production of each item by its price in Dakar or Abidjan. Missing prices for some commodities/years are estimated by applying an index of general price variation to years for which we have information.

Fifth, after computing the value of the production by using prices in Dakar or Abidjan, we evaluate it at rural prices, by applying the ratio of farm-gate to urban prices from a sample of commodities (66% in Senegal, 48% in Ivory Coast). The choice between urban or rural prices is not straightforward. Evaluating farmers' income at urban prices would facilitate comparison of standard of living between urban and rural workers, taking into account the different cost of living between cities and countryside. On the other hand, evaluating production with farm gate prices might be better in order to estimate the farmers' purchasing power of imported goods, such as textiles.

Finally, we compute the income of the average farmer in each district by dividing the total production value by the total number of commercial farmers. As we do not divide classes by gender, we are not concerned by the risk of including inactive women in the farmers class, thus underestimating the farmers' income. Both (inactive) men and women are included in the inactive population class. Note that, although it is true that farmers generated part of their income from activities other than farming or animal husbandry, such as handicraft, this was a very small portion of their total income.[8]

Having estimated average income differences across districts, we turn our analysis to differences within each district. Following the *Ethnographic Atlas* (Murdock 1967), we classify African ethnic groups into three main categories, according to their social structure: complex, dual, and egalitarian ethnic groups. Complex and dual ethnic groups have one lower non-landowning class and one higher land-owing class ('nobles /free men'). The lower class pays a "tax" (share of crop) to a subset of the higher class – which we define 'elite' for clarity- in exchange for the rights to cultivate land (Sow 1992, Bloch 1993). Among ethnic groups without class structure, land is owned equally

[8] For example, a 1944 budget for a family belonging to the Wolof - the main ethnic group of Senegal- lists only agriculture and livestock as sources of income (Diop 1971, p. 98).

among households. In complex groups, 'nobles /free men' constitute "a large majority of the population" (Conrad and Frank 1995). In dual groups, the 'nobles' are fewer: among the Soninké, for example, an ethnic group classified as dual, 40% of the populations are 'nobles/free men' (Boch 1993). The main part of the 'tax', e.g. the *waref* among the Wolof (Lagacé and Skoggard 1999, Salau 2010) or the *diaka* among the Soninké, usually amounts to 10% of the value of crop (Bloch 1993). Several other payments might also be required: for example, among the Soninké, the *ninagumankande* (a small crop share paid to the landowner), the *muso* (a variable crop share), and the *debigumankande* (a small crop share paid to the village chief) (Boch 1993).

To estimate income differences within districts, we first identify the main ethnic groups residing there. In Senegal most ethnic groups are either dual or complex, while Ivory Coast has a more egalitarian social structure. The Wolof, the main ethnic group of Senegal, accounting for almost 40% of the population (CIA 2019), are a complex ethnic group. Their three main classes are the *geer* /free men, who are farmers and religious and political leaders and constitute most of the population, the *neeno,* an artisan class, and the lower class of *jaam*, a servile class, both without land rights (Gomez 2002, pp. 24-25; Irvine 1978, Thiam 2013, pp. 98-99). Other main ethnic groups are the Fula (about 25% of the population), the Serer (15%), and the Mandinka (5%), all classifiable as dual groups, and the Jola/Diola (5%), characterized by an egalitarian social structure (CIA 2019, Murdock 1967).

In Ivory Coast, the Mandes (20% of the population, CIA 2019), living in the north-west (Northern Mandes, e.g. Malinke) and in the west (Southern Mandes, e.g. Tourandan) are a dual ethnic group. Their social structure is composed of two main classes: the higher class *Horon* (nobles/freemen), farmers and shepherds, and the lower class *Jonow*, descendants of slaves (Hoffman 2001, p. 280). The largest ethnic group of Ivory Coast, the Akan, living in the east-center region of the country and accounting for almost 30% of the population (CIA 2019), can instead be classified as an egalitarian society (based on information on the Baoulé, the largest Akan group, from the *Ethnographic Atlas*). Voltaique groups (15% of the population) in the north-center and northeast, such as the Senufo, and Kru groups (10% the population) in the south-west, and the remaining ethnic groups, can also be classified as egalitarian.

Having identified the main ethnic groups in each district, we estimate the size of elite, middle-class, and lower class, and we increase or reduce their income proportionally to the "tax". Following anthropological and historical records, we estimate the size of the elite and middle-class as 40% of the population in dual groups and 67% of the population in complex groups. The rest of the population is assigned to the lower class. To estimate the size of the elite subset of the upper class, we use information on land distribution in Senegal in 1960-61 (Diarassouba 1968) to estimate how

many land-owning households are necessary to provide the land rented by the lower class. In doing so, we first compute the total population belonging to the lower class (43% of the population of Senegal in 1954). Assuming a minimum of 0.5 ha per farmer, the lower class requires 158 thousand hectares. The top category of households (owning more than 15 ha) are 2.5% of the population and, assuming a minimum of 2.4 ha per household (0.5 ha/worker x 9 members per household x 54% active share), they have 184 thousand ha available to rent. We can thus estimate that land is rented from the top 86% of the richest households (158/184=86%), which is equivalent to 2.2% of the population (86%*2.5%). The tax is estimated at 20% of the crop value. Members of the lower class receive then 80% of the average income, members of the middle class receive the average income, and members of the elite receive 3.8 times the average income in complex ethnic groups and 6.25 times in dual groups. In this way, the elite's income includes land rents.

To evaluate per capita income for European farmers, we use data from Ivory Coast reporting the total production from European cocoa and coffee plantations. We compute European farmers income by dividing the total value of such production by the total number of European farmers, which we obtain by subtracting wage workers from the estimates of European active population. The average European farmer made about 5.3 times more than the average African farmer. We use this proportion and information on African average farming income to estimate European farmers' income in Senegal.

The difference between total rural active population and commercial farmers is included in the subsistence farmers category. To measure their income, we use a subsistence basket approach. We use the basket from table 2 of Frankema and Van Waijenburg (2012), but we increase the quantity of the staple crop to reach 2100 calories per basket. The cheapest staple crop was maize or millet in Senegal and cassava in Ivory Coast.

4. Results

Tables 2 to 9 show our social tables. Before discussing income distribution, let us point out some basic descriptive statistics. Senegal and Ivory Coast were characterized by relatively small populations: about 2.1 million people in 1939 and 2.9 million in 1954. In our period of analysis, more than 90% of the population worked in agriculture. Europeans accounted only for a small minority, ranging from 0.8% to 1.4% of the total population in Senegal and from 0.2% to 0.4% in Ivory Coast. In Senegal, on average 24% of European workers were employed in the top category

as colonial administrators or heads of firms (14% in Ivory Coast), compared to only 0.1% of African workers. The vast majority of Africans (around 95% of all workers) were either farmers or employed as unskilled workers. Subsistence farmers made about one fifth of working population in Senegal in 1939 and declined to just 2% in 1954. In Ivory Coast, their number is constant around one third of the working population.

To evaluate income differences among classes and their evolution over time, we compute welfare ratios by dividing the income by the value of the subsistence basket described in the previous section. In 1939, among African wage workers welfare ratios ranged from 4.5 to 25.0 in Senegal and from 3.4 to 23.6 in Ivory Coast, depending on the job category. By 1954, welfare ratios tended to decline for the top wage category (18.4 in Senegal and 23.2 in Ivory Coast), while they increased for unskilled workers (5.2 in Senegal and 6.1 in Ivory Coast). On average, the wage of the top category was about 4.5 times that of the unskilled workers in Senegal and 5.2 times in Ivory Coast. In terms of skill premium, the wage of unskilled workers was about 40% of the skilled wage.

Commercial lower and middle-class farmers tended to be poorer than wage workers. In Senegal, lower-class African farmers produced enough to afford from a minimum of 1.0 to a maximum of 2.6 subsistence baskets depending on the district in 1939, but by 1954 their welfare ratios had declined to the 1.0-1.7 range. Middle-class farmers enjoyed higher welfare ratios of 1.0 to 4.5 in 1939, but they also saw their standard of living decline over time reaching the 1.0-2.1 range in 1954. Welfare ratios of the rural elite were substantially higher: 4.5-20.1 in 1939 declining to 1.7-13.3 in 1954. In Ivory Coast, farmers tended to be richer and class distinctions are relevant only in a few districts. On average in 1939 commercial farmers produced 1.0 to 19.2 subsistence baskets, depending on the location. Contrary to what happened in Senegal, their income increased over time, reaching welfare ratios of 3.4-28.1 in 1954.

European wage workers enjoyed much higher welfare ratios than Africans in 1939, ranging from 167.9 to 354.9 in Senegal and from 150.4 to 335.0 in Ivory Coast. Ratios declined over time, reaching 42-133 in Senegal and 47-86 in Ivory Coast in 1954, but remained much higher than those of Africans.

Table 2. Income distribution in Senegal, 1939

	people	monthly income (francs CFA)	household adjusted-monthly income	share workers	share income	welfare ratio
African administrators/heads of firms	705	1,068	288	0.07%	0.35%	25.0
African employees	10,408	875	236	0.97%	4.29%	20.4
African skilled workers	13,204	505	136	1.23%	3.14%	11.8
African unskilled workers	37,539	192	52	3.50%	3.40%	4.5
African rural elite						
Dakar-Bas Senegal	572	248	130	0.05%	0.07%	5.8
Diourbel	2,119	772	404	0.20%	0.77%	18.0
Kaolack	4,912	849	444	0.46%	1.96%	19.8
Kédougou	401	268	140	0.04%	0.05%	6.3
Linguère	223	861	450	0.02%	0.09%	20.1
Louga	1,529	498	260	0.14%	0.36%	11.6
Matam	1,786	459	240	0.17%	0.39%	10.7
Podor	855	435	227	0.08%	0.18%	10.2
Tambacounda-Bakel	676	460	240	0.06%	0.15%	10.7
Thiès	3,475	345	181	0.32%	0.57%	8.1
Ziguinchor	1,044	194	101	0.10%	0.10%	4.5
African rural middle class						
Dakar-Bas Senegal	16,856	65	34	1.57%	0.52%	1.5
Diourbel	36,415	123	65	3.40%	2.12%	2.9
Kaolack	84,403	136	71	7.88%	5.39%	3.2
Kédougou	6,892	43	22	0.64%	0.14%	1.0
Linguère	3,833	138	72	0.36%	0.25%	3.2
Louga	45,038	131	69	4.20%	2.78%	3.1
Matam	30,679	73	38	2.86%	1.06%	1.7
Podor	14,691	70	36	1.37%	0.48%	1.6
Tambacounda-Bakel	19,913	121	63	1.86%	1.13%	2.8
Thiès	102,356	91	48	9.55%	4.38%	2.1
Ziguinchor	46,404	194	101	4.33%	4.24%	4.5
African rural lower class						
Dakar-Bas Senegal	8,584	52	27	0.80%	0.21%	1.2
Diourbel	57,802	99	52	5.40%	2.69%	2.3
Kaolack	133,973	109	57	12.51%	6.85%	2.5

Kédougou	10,939	43	22	1.02%	0.22%	1.0
Linguère	6,084	110	58	0.57%	0.32%	2.6
Louga	22,936	105	55	2.14%	1.13%	2.4
Matam	48,697	59	31	4.55%	1.35%	1.4
Podor	23,319	56	29	2.18%	0.61%	1.3
Tambacounda-Bakel	10,141	97	51	0.95%	0.46%	2.3
Thiès	52,126	73	38	4.87%	1.79%	1.7
African subsistence farmers	201,497	43	22	18.81%	4.06%	1.0
European administrators/heads of firms	1,848	15,182	7,062	0.17%	13.22%	354.9
European employees	3,513	12,439	5,786	0.33%	20.59%	290.7
European skilled workers	2,364	7,184	3,342	0.22%	8.00%	167.9
European farmers	575	606	282	0.05%	0.16%	14.2
African inactive	1,003,745	0	0			
European inactive	7,662	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 3. Income distribution in Senegal, 1944

	people	**monthly income (francs CFA)**	**household adjusted-monthly income**	**share workers**	**share income**	**welfare ratio**
African administrators/heads of firms	777	1,752	423	0.07%	0.22%	10.3
African employees	11,472	1,260	304	0.99%	2.33%	7.4
African skilled workers	14,554	994	240	1.25%	2.33%	5.9
African unskilled workers	41,378	326	79	3.56%	2.17%	1.9
African rural elite						
Dakar-Bas Senegal	779	644	337	0.07%	0.08%	3.8
Diourbel	2,275	1,061	555	0.20%	0.39%	6.3
Kaolack	5,460	4,058	2,123	0.47%	3.57%	23.9
Kédougou	524	1,061	555	0.05%	0.09%	6.3
Linguère	434	1,061	555	0.04%	0.07%	6.3
Louga	1,671	914	478	0.14%	0.25%	5.4
Matam	1,691	1,774	928	0.15%	0.48%	10.5
Podor	1,141	1,412	738	0.10%	0.26%	8.3

Tambacounda-Bakel	837	1,665	871	0.07%	0.22%	9.8
Thiès	3,693	928	485	0.32%	0.55%	5.5
Ziguinchor	2,043	848	443	0.18%	0.28%	5.0
African rural middle class						
Dakar-Bas Senegal	22,933	170	89	1.97%	0.63%	1.0
Diourbel	39,094	170	89	3.37%	1.07%	1.0
Kaolack	93,820	649	339	8.08%	9.80%	3.8
Kédougou	9,011	170	89	0.78%	0.25%	1.0
Linguère	7,455	170	89	0.64%	0.20%	1.0
Louga	49,206	241	126	4.24%	1.91%	1.4
Matam	29,052	284	148	2.50%	1.33%	1.7
Podor	19,610	226	118	1.69%	0.71%	1.3
Tambacounda-Bakel	24,645	438	229	2.12%	1.74%	2.6
Thiès	108,762	244	128	9.36%	4.27%	1.4
Ziguinchor	90,817	848	443	7.82%	12.39%	5.0
African rural lower class						
Dakar-Bas Senegal	11,679	170	89	1.01%	0.32%	1.0
Diourbel	62,054	170	89	5.34%	1.69%	1.0
Kaolack	148,921	519	271	12.82%	12.44%	3.1
Kédougou	14,304	170	89	1.23%	0.39%	1.0
Linguère	11,833	170	89	1.02%	0.32%	1.0
Louga	25,059	192	101	2.16%	0.78%	1.1
Matam	46,114	227	119	3.97%	1.68%	1.3
Podor	31,127	181	94	2.68%	0.90%	1.1
Tambacounda-Bakel	12,551	351	183	1.08%	0.71%	2.1
Thiès	55,388	195	102	4.77%	1.74%	1.2
African subsistence farmers	148,319	170	89	12.77%	4.05%	1.0
European administrators/heads of firms	2,515	21,590	10,043	0.22%	8.74%	127.3
European employees	4,780	15,890	7,391	0.41%	12.23%	93.7
European skilled workers	3,217	11,875	5,524	0.28%	6.15%	70.0
European farmers	782	2,087	971	0.07%	0.26%	12.3
African inactive	1,127,615	0	0			
European inactive	10,426	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 4. Income distribution in Senegal, 1949

	people	monthly income (francs CFA)	household adjusted-monthly income	share workers	share income	welfare ratio
African administrators/heads of firms	1,630	10,413	2,440	0.13%	0.82%	19.5
African employees	13,056	7,039	1,650	1.04%	4.42%	13.2
African skilled workers	23,377	5,961	1,397	1.85%	6.70%	11.2
African unskilled workers	46,521	3,037	712	3.69%	6.79%	5.7
African rural elite						
Dakar-Bas Senegal	447	2,108	1,102	0.04%	0.05%	3.9
Diourbel	2,410	7,952	4,159	0.19%	0.92%	14.9
Kaolack	6,005	10,033	5,247	0.48%	2.90%	18.8
Kédougou	275	3,343	1,749	0.02%	0.04%	6.3
Linguère	572	3,343	1,749	0.05%	0.09%	6.3
Louga	1,817	4,841	2,532	0.14%	0.42%	9.1
Matam	1,594	5,733	2,998	0.13%	0.44%	10.7
Podor	1,255	4,161	2,176	0.10%	0.25%	7.8
Tambacounda-Bakel	1,031	3,413	1,785	0.08%	0.17%	6.4
Thiès	3,855	2,994	1,566	0.31%	0.55%	5.6
Ziguinchor	3,615	962	503	0.29%	0.17%	1.8
African rural middle class						
Dakar-Bas Senegal	13,153	555	290	1.04%	0.35%	1.0
Diourbel	41,404	1,271	665	3.28%	2.53%	2.4
Kaolack	103,169	1,604	839	8.18%	7.95%	3.0
Kédougou	4,725	535	280	0.37%	0.12%	1.0
Linguère	9,829	535	280	0.78%	0.25%	1.0
Louga	53,532	1,274	666	4.24%	3.28%	2.4
Matam	27,386	917	479	2.17%	1.21%	1.7
Podor	21,556	665	348	1.71%	0.69%	1.2
Tambacounda-Bakel	30,377	898	470	2.41%	1.31%	1.7
Thiès	113,555	788	412	9.00%	4.30%	1.5
Ziguinchor	160,710	962	503	12.74%	7.43%	1.8
African rural lower class						0.0
Dakar-Bas Senegal	6,698	535	280	0.53%	0.17%	1.0
Diourbel	65,721	1,017	532	5.21%	3.21%	1.9
Kaolack	163,760	1,283	671	12.99%	10.10%	2.4

Kédougou	7,500	535	280	0.59%	0.19%	1.0
Linguère	15,601	535	280	1.24%	0.40%	1.0
Louga	27,262	1,019	533	2.16%	1.34%	1.9
Matam	43,469	733	384	3.45%	1.53%	1.4
Podor	34,217	535	280	2.71%	0.88%	1.0
Tambacounda-Bakel	15,470	719	376	1.23%	0.53%	1.3
Thiès	57,829	630	330	4.59%	1.75%	1.2
African subsistence farmers	120,879	535	280	9.59%	3.11%	1.0
European administrators/heads of firms	3,700	46,550	21,653	0.29%	8.28%	87.1
European employees	5,977	31,467	14,637	0.47%	9.04%	58.9
European skilled workers	3,578	26,649	12,396	0.28%	4.58%	49.9
European farmers	2,572	5,907	2,748	0.20%	0.73%	11.1
African inactive	1,253,709	0	0			0.0
European inactive	14,610	0	0			0.0

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 5. Income distribution in Senegal, 1954

	people	**monthly income (francs CFA)**	**household adjusted-monthly income**	**share workers**	**share income**	**welfare ratio**
African administrators/heads of firms	2,574	13,696	3,981	0.18%	1.14%	18.4
African employees	20,077	9,625	2,798	1.40%	6.27%	12.9
African skilled workers	41,605	7,510	2,183	2.91%	10.15%	10.1
African unskilled workers	74,639	3,856	1,121	5.22%	9.34%	5.2
African rural elite						
Dakar-Bas Senegal	1,157	2,835	1,483	0.08%	0.11%	3.8
Diourbel	2,580	6,950	3,635	0.18%	0.58%	9.3
Kaolack	6,692	9,959	5,209	0.47%	2.16%	13.3
Kédougou	618	7,469	3,906	0.04%	0.15%	10.0
Linguère	704	4,667	2,441	0.05%	0.11%	6.3
Louga	2,028	4,682	2,449	0.14%	0.31%	6.3
Matam	1,536	5,971	3,123	0.11%	0.30%	8.0
Podor	1,302	5,822	3,045	0.09%	0.25%	7.8

Tambacounda-Bakel	1,286	3,051	1,596	0.09%	0.13%	4.1
Thiès	4,041	3,506	1,834	0.28%	0.46%	4.7
Ziguinchor	5,312	1,273	666	0.37%	0.22%	1.7
African rural middle class						
Dakar-Bas Senegal	34,076	746	390	2.38%	0.83%	1.0
Diourbel	44,325	1,111	581	3.10%	1.60%	1.5
Kaolack	114,977	1,592	833	8.04%	5.94%	2.1
Kédougou	10,623	1,194	625	0.74%	0.41%	1.6
Linguère	12,098	746	390	0.85%	0.29%	1.0
Louga	59,729	1,232	644	4.18%	2.39%	1.7
Matam	26,396	955	499	1.85%	0.82%	1.3
Podor	22,363	931	487	1.56%	0.68%	1.2
Tambacounda-Bakel	37,886	803	420	2.65%	0.99%	1.1
Thiès	119,014	923	483	8.32%	3.56%	1.2
Ziguinchor	236,125	1,273	666	16.51%	9.76%	1.7
African rural lower class						
Dakar-Bas Senegal	17,354	746	390	1.21%	0.42%	1.0
Diourbel	70,357	889	465	4.92%	2.03%	1.2
Kaolack	182,503	1,274	666	12.76%	7.55%	1.7
Kédougou	16,862	955	500	1.18%	0.52%	1.3
Linguère	19,203	746	390	1.34%	0.47%	1.0
Louga	30,418	986	516	2.13%	0.97%	1.3
Matam	41,898	764	399	2.93%	1.04%	1.0
Podor	35,497	746	390	2.48%	0.86%	1.0
Tambacounda-Bakel	19,294	746	390	1.35%	0.47%	1.0
Thiès	60,609	746	390	4.24%	1.47%	1.0
African subsistence farmers	31,565	746	390	2.21%	0.76%	1.0
European administrators/heads of firms	5,664	64,500	30,002	0.40%	11.86%	86.4
European employees	5,723	45,327	21,084	0.40%	8.42%	60.7
European skilled workers	2,434	35,369	16,452	0.17%	2.80%	47.4
European farmers	6,983	6,252	2,908	0.49%	1.42%	8.4
African inactive	1,406,136	0	0			
European inactive	19,205	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 6. Income distribution in Ivory Coast, 1939

	people	monthly income (francs CFA)	household adjusted-monthly income	share workers	share income	welfare ratio
African administrators/heads of firms	769	823	546	0.07%	0.44%	23.6
African employees	5,688	610	405	0.50%	2.44%	17.5
African skilled workers	7,766	369	245	0.69%	2.02%	10.6
African unskilled workers	53,245	117	78	4.70%	4.38%	3.4
African rural elite						
Abengourou	381	485	253	0.03%	0.13%	13.9
Abidjan	756	637	333	0.07%	0.34%	18.2
Grand Bassam -Aboisso	618	448	234	0.05%	0.19%	12.8
Agboville	626	165	86	0.06%	0.07%	4.7
Bondoukou	597	35	18	0.05%	0.01%	1.0
Bouaké	1,967	133	70	0.17%	0.18%	3.8
Daloa	480	669	350	0.04%	0.23%	19.2
Dimbokro	2,028	102	53	0.18%	0.15%	2.9
Gagnoa	799	207	108	0.07%	0.12%	5.9
Grand Lahou	996	66	34	0.09%	0.05%	1.9
Katiola	947	35	18	0.08%	0.02%	1.0
Man	455	254	133	0.04%	0.08%	7.3
Korhogo-Odienne	2,408	35	18	0.21%	0.06%	1.0
Sassandra	316	67	35	0.03%	0.01%	1.9
Séguéla	603	308	161	0.05%	0.13%	8.8
Tabou	238	35	18	0.02%	0.01%	1.0
African rural middle class						
Abengourou	16,932	485	253	1.49%	5.77%	13.9
Abidjan	33,628	637	333	2.97%	15.05%	18.2
Grand Bassam -Aboisso	27,476	448	234	2.43%	8.65%	12.8
Agboville	27,810	165	86	2.45%	3.23%	4.7
Bondoukou	26,530	35	18	2.34%	0.65%	1.0
Bouaké	87,454	133	70	7.72%	8.18%	3.8
Daloa	21,331	669	350	1.88%	10.03%	19.2
Dimbokro	90,140	102	53	7.96%	6.47%	2.9
Gagnoa	35,511	207	108	3.13%	5.16%	5.9
Grand Lahou	44,281	66	34	3.91%	2.05%	1.9
Katiola	42,086	35	18	3.71%	1.03%	1.0

Man	13,400	73	38	1.18%	0.69%	2.1
Korhogo-Odienne	107,028	35	18	9.45%	2.63%	1.0
Sassandra	14,026	67	35	1.24%	0.66%	1.9
Séguéla	17,769	89	47	1.57%	1.11%	2.5
Tabou	10,565	35	18	0.93%	0.26%	1.0
African rural lower class						
Man	6,824	53	28	0.60%	0.26%	1.5
Séguéla	9,049	65	34	0.80%	0.41%	1.9
African subsistence farmers	416,818	35	18	36.79%	10.23%	1.0
European administrators/heads of firms	210	11,697	9,138	0.02%	1.73%	335.0
European employees	513	8,674	6,777	0.05%	3.13%	248.5
European skilled workers	156	5,250	4,102	0.01%	0.58%	150.4
European farmers	1,706	800	625	0.15%	0.96%	22.9
African inactive	936,432	0	0			
European inactive	1,797	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 7. Income distribution in Ivory Coast, 1944

	people	**monthly income (francs CFA)**	**household adjusted-monthly income**	**share workers**	**share income**	**welfare ratio**
African administrators/heads of firms	837	1529	830	0.07%	0.24%	9.4
African employees	6,194	995	540	0.51%	1.16%	6.1
African skilled workers	8,457	744	404	0.69%	1.18%	4.6
African unskilled workers	57,984	299	162	4.75%	3.26%	1.8
African rural elite						
Abengourou	373	989	517	0.03%	0.07%	6.1
Abidjan	936	2,079	1,087	0.08%	0.37%	12.8
Grand Bassam -Aboisso	673	1,660	868	0.06%	0.21%	10.2
Agboville	706	591	309	0.06%	0.08%	3.6
Bondoukou	776	162	85	0.06%	0.02%	1.0
Bouaké	2,737	387	203	0.22%	0.20%	2.4
Daloa	721	1,798	940	0.06%	0.24%	11.1

Dimbokro	2,158	388	203	0.18%	0.16%	2.4
Gagnoa	909	734	384	0.07%	0.13%	4.5
Grand Lahou	1,061	250	131	0.09%	0.05%	1.5
Katiola	982	162	85	0.08%	0.03%	1.0
Man	591	219	114	0.05%	0.02%	1.3
Korhogo-Odienne	3,054	162	85	0.25%	0.09%	1.0
Sassandra	359	238	124	0.03%	0.02%	1.5
Séguéla	893	244	127	0.07%	0.04%	1.5
Abengourou	235	162	85	0.02%	0.01%	1.0
African rural middle class						
Abengourou	16,561	989	517	1.36%	3.08%	6.1
Abidjan	41,602	2,079	1,087	3.41%	16.27%	12.8
Grand Bassam -Aboisso	29,930	1,660	868	2.45%	9.35%	10.2
Agboville	31,384	591	309	2.57%	3.49%	3.6
Bondoukou	34,488	162	85	2.82%	1.05%	1.0
Bouaké	121,692	387	203	9.96%	8.87%	2.4
Daloa	32,065	1,798	940	2.63%	10.84%	11.1
Dimbokro	95,929	388	203	7.85%	7.00%	2.4
Gagnoa	40,426	734	384	3.31%	5.58%	4.5
Grand Lahou	47,144	250	131	3.86%	2.22%	1.5
Katiola	43,648	162	85	3.57%	1.33%	1.0
Man	17,420	219	114	1.43%	0.72%	1.3
Korhogo-Odienne	135,757	162	85	11.11%	4.14%	1.0
Sassandra	15,967	238	124	1.31%	0.71%	1.5
Séguéla	26,316	244	127	2.15%	1.21%	1.5
Tabou	10,469	162	85	0.86%	0.32%	1.0
African rural lower class						
Man	8,871	159	83	0.73%	0.27%	1.0
Séguéla	13,401	177	93	1.10%	0.45%	1.1
African subsistence farmers	364,389	162	85	29.83%	11.11%	1.0
European administrators/heads of firms	276	21,590	16,867	0.02%	1.12%	133.2
European employees	673	14,050	10,976	0.06%	1.78%	86.7
European skilled workers	205	10,500	8,203	0.02%	0.41%	64.8
European farmers	2,239	2,675	2,090	0.18%	1.13%	16.5
African inactive	1,032,622	0	0			
European inactive	2,358	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 8. Income distribution in Ivory Coast, 1949

	people	monthly income (francs CFA)	household adjusted-monthly income	share workers	share income	welfare ratio
African administrators/heads of firms	1,297	9,458	4,732	0.10%	0.49%	19.8
African employees	9,851	6,393	3,199	0.74%	2.51%	13.4
African skilled workers	16,994	4,586	2,295	1.28%	3.11%	9.6
African unskilled workers	63,920	1,958	980	4.80%	4.99%	4.1
African rural elite						
Abengourou	363	14,112	7,381	0.03%	0.20%	29.5
Abidjan	1,026	8,595	4,495	0.08%	0.35%	18.0
Grand Bassam -Aboisso	731	8,038	4,204	0.05%	0.23%	16.8
Agboville	794	3,004	1,571	0.06%	0.10%	6.3
Bondoukou	915	1,296	678	0.07%	0.05%	2.7
Bouaké	2,924	1,429	747	0.22%	0.17%	3.0
Daloa	783	2,697	1,410	0.06%	0.08%	5.6
Dimbokro	2,293	1,583	828	0.17%	0.14%	3.3
Gagnoa	1,033	2,720	1,423	0.08%	0.11%	5.7
Grand Lahou	952	2,181	1,141	0.07%	0.08%	4.6
Katiola	1,017	478	250	0.08%	0.02%	1.0
Man	715	3,014	1,576	0.05%	0.09%	6.3
Korhogo-Odienne	3,203	478	250	0.24%	0.06%	1.0
Sassandra	408	1,352	707	0.03%	0.02%	2.8
Séguéla	966	2,040	1,067	0.07%	0.08%	4.3
Tabou	232	478	250	0.02%	0.00%	1.0
African rural middle class						
Abengourou	16,121	14,112	7,381	1.21%	9.08%	29.5
Abidjan	45,617	8,595	4,495	3.43%	15.65%	18.0
Grand Bassam -Aboisso	32,480	8,038	4,204	2.44%	10.42%	16.8
Agboville	35,305	3,004	1,571	2.65%	4.23%	6.3
Bondoukou	40,657	1,296	678	3.06%	2.10%	2.7
Bouaké	130,004	1,429	747	9.77%	7.41%	3.0
Daloa	34,789	2,697	1,410	2.61%	3.74%	5.6
Dimbokro	101,921	1,583	828	7.66%	6.44%	3.3

Gagnoa	45,910	2,720	1,423	3.45%	4.98%	5.7
Grand Lahou	42,333	2,181	1,141	3.18%	3.69%	4.6
Katiola	45,201	478	250	3.40%	0.86%	1.0
Man	21,060	871	456	1.58%	0.73%	1.8
Korhogo-Odienne	142,369	478	250	10.70%	2.72%	1.0
Sassandra	18,145	1,352	707	1.36%	0.98%	2.8
Séguéla	28,466	590	308	2.14%	0.67%	1.2
Tabou	10,324	478	250	0.78%	0.20%	1.0
African rural lower class						
Man	10,725	635	332	0.81%	0.27%	1.3
Séguéla	14,496	429	225	1.09%	0.25%	0.9
African subsistence farmers	398,272	478	250	29.94%	7.60%	1.0
European administrators/heads of firms	784	46,550	36,367	0.06%	1.46%	97.4
European employees	1,270	31,467	24,584	0.10%	1.60%	65.8
European skilled workers	442	26,649	20,820	0.03%	0.47%	55.7
European farmers	3,270	11,875	9,277	0.25%	1.55%	24.8
African inactive	1,136,096	0	0			
European inactive	4,007	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Table 9. Income distribution in Ivory Coast, 1954

	People	**monthly income (francs CFA)**	**household adjusted-monthly income**	**share workers**	**share income**	**welfare ratio**
African administrators/heads of firms	2,635	11,226	6,244	0.17%	0.62%	23.2
African employees	20,552	8,301	4,617	1.31%	3.55%	17.1
African skilled workers	42,591	6,398	3,559	2.71%	5.68%	13.2
African unskilled workers	76,407	2,944	1,637	4.86%	4.69%	6.1
African rural elite						
Abengourou	377	7,956	4161	0.02%	0.06%	16.4
Abidjan	585	8,935	4673	0.04%	0.11%	18.4
Grand Bassam -Aboisso	852	6,775	3543	0.05%	0.12%	14.0

Agboville	858	3,524	1843	0.05%	0.06%	7.3
Bondoukou	1,697	3,294	1723	0.11%	0.12%	6.8
Bouaké	3,809	4,548	2378	0.24%	0.36%	9.4
Daloa	1,084	3,017	1578	0.07%	0.07%	6.2
Dimbokro	1,705	5,095	2665	0.11%	0.18%	10.5
Gagnoa	853	3,778	1976	0.05%	0.07%	7.8
Grand Lahou	619	4,841	2532	0.04%	0.06%	10.0
Katiola	737	3,483	1822	0.05%	0.05%	7.2
Man	1,527	10,910	5706	0.10%	0.35%	22.5
Korhogo-Odienne	3,874	1,731	905	0.25%	0.14%	3.6
Sassandra	236	2,998	1568	0.01%	0.01%	6.2
Séguéla	1,323	13,619	7123	0.08%	0.38%	28.1
Tabou	47	1,640	858	0.00%	0.00%	3.4
African rural middle class						
Abengourou	16,744	7,956	4161	1.06%	2.78%	16.4
Abidjan	25,987	8,935	4673	1.65%	4.84%	18.4
Grand Bassam -Aboisso	37,871	6,775	3543	2.41%	5.34%	14.0
Agboville	38,142	3,524	1843	2.43%	2.80%	7.3
Bondoukou	75,441	3,294	1723	4.80%	5.18%	6.8
Bouaké	169,334	4,548	2378	10.77%	16.04%	9.4
Daloa	48,201	3,017	1578	3.07%	3.03%	6.2
Dimbokro	75,795	5,095	2665	4.82%	8.04%	10.5
Gagnoa	37,932	3,778	1976	2.41%	2.99%	7.8
Grand Lahou	27,524	4,841	2532	1.75%	2.78%	10.0
Katiola	32,763	3,483	1822	2.08%	2.38%	7.2
Man	44,990	3,154	1649	2.86%	2.96%	6.5
Korhogo-Odienne	172,198	1,731	905	10.95%	6.21%	3.6
Sassandra	10,479	2,998	1568	0.67%	0.65%	6.2
Séguéla	38,973	3,937	2059	2.48%	3.20%	8.1
Tabou	2,096	1,640	858	0.13%	0.07%	3.4
African rural lower class						
Man	22,911	2,297	1201	1.46%	1.10%	4.7
Séguéla	19,847	2,867	1500	1.26%	1.19%	5.9
African subsistence farmers	505,252	485	253	32.13%	5.10%	1.0
European administrators/heads of firms	2,084	64,500	50391	0.13%	2.80%	133.1
European employees	2,106	47,694	37261	0.13%	2.09%	98.4
European skilled workers	896	36,762	28721	0.06%	0.69%	75.9

European farmers	2,570	20,432	15963	0.16%	1.09%	42.2
African inactive	1,317,312	0	0			
European inactive	5,320	0	0			

Sources: elaborations from *Annuaire Statistique de l'Afrique Occidentale Française* 1949-51 and 1950-1953 and other sources (see text).

Social tables can be used to produce measures of overall inequality. We compute two different Gini measures. The first one refers to the distribution of income among individual income earners (hence excluding the inactive), while the second one considers differences in household composition between classes (including the inactive, who are assigned to households in which at least some members were active: see below). The individual Gini allows us to compare our results with the literature on pre-independence African inequality which focused on this indicator (Bolt and Hillbom 2016). The household-adjusted Gini allows for comparisons with the estimates available from UNU-WIDER (2018), which uses household data, and to obtain consistent long-run series of inequality measures.

To produce our estimates we consider three types of households: African farmers, African wage workers, and Europeans. For each household type, colony, and year, we divide each worker's income by a coefficient which takes into account the household composition. To compute this coefficient, we estimate the average number of dependents (children, elderly, and other inactive people) that each worker needs to provide for. For example, among African rural households, each adult worker needs to provide on average for 0.81 children and 0.05 elderly. Then, given Allen's (2015) assumptions of four consumption baskets for a family of two adults and two children (i.e. 3160 calories per adult male, 2057 calories per woman, and 1591 calories per children) we give a weight of 1.25 to each adult and of 0.75 to each child. The four-year average coefficient for African farmer households is 1.9, the one for African wage workers is 3.9 in Senegal and 1.8 in Ivory Coast, and the one for European households is 2.1.

Table 10 shows Gini indexes for the colonies under analysis in the two decades before independence, from 1939 to 1954. Considering the distribution among income earners, Senegal had the highest level of inequality, with a Gini index ranging from about 0.62 to 0.49.[9] Ivory Coast, on the other hand, shows Gini indexes from 0.57 to 0.47. Household-adjusted Gini indexes range from

[9] The Gini index has been standardized to vary between values 0 and 1. A value of 0 corresponds to perfect equality, i.e. all individuals have the same income, while 1 corresponds to perfect inequality, i.e. one individual earns the entire national income.

0.59 to 0.45 in Senegal and from 0.59 to 0.49 in Ivory Coast. Looking at the trend between 1939 and 1954 we observe that inequality tends to decline in both colonies and at both the individual and the household level.

Table 10. Gini, 1939-1954

	Individuals		household-adjusted	
	Senegal	**Ivory Coast**	**Senegal**	**Ivory Coast**
1939	0.62	0.57	0.59	0.59
1944	0.53	0.49	0.52	0.50
1949	0.49	0.56	0.49	0.56
1954	0.52	0.47	0.45	0.49

Sources: calculations from tables 2-9.

While Gini indexes give us an overall measure of inequality, we can obtain a much more precise picture of income distribution by looking at income shares. Table 11 shows the results. The richest 5% of individual earners received on average 44% of total income in Senegal and 27% in Ivory Coast, while the poorest quartile only 7%. In Senegal, the richest quartile got relatively poorer over time with their share of income declining between 1939 and 1954, while all three poorest quartiles became relatively richer. In Ivory Coast instead, both top and bottom quartile became relatively poorer to the advantage of the middle-class. This suggests that different forces might be at play in explaining the reduction of inequality during the late colonial period in the two colonies: an increase in the standard of living of the bottom half of the population in Senegal and an improvement in the conditions of the middle-class in Ivory Coast.

Table 11. Income Shares

a. Individual Incomes

	top 5%	**top 10%**	**IV quartile**	**III quartile**	**II quartile**	**I quartile**
Senegal						
1939	54%	60%	70%	14%	10%	6%
1944	38%	46%	65%	17%	10%	8%
1949	40%	47%	61%	17%	13%	8%
1954	42%	52%	64%	15%	12%	9%
Ivory Coast						
1939	32%	49%	70%	16%	7%	7%

1944	26%	43%	64%	17%	10%	9%
1949	31%	47%	67%	20%	6%	6%
1954	19%	30%	54%	28%	14%	4%

b. Household-Adjusted Incomes

	top 5%	**top 10%**	**IV quartile**	**III quartile**	**II quartile**	**I quartile**
Senegal						
1939	51%	57%	68%	15%	11%	6%
1944	40%	46%	63%	18%	11%	8%
1949	34%	40%	55%	21%	14%	10%
1954	37%	45%	58%	18%	14%	10%
Ivory Coast						
1939	32%	53%	71%	15%	7%	7%
1944	28%	44%	64%	18%	9%	9%
1949	33%	48%	68%	19%	7%	6%
1954	22%	33%	55%	31%	10%	4%

Sources: calculations from tables 2-9.

In any case, with the household-adjusted Gini ranging from 0.45 to 0.59, it is undeniable that inequality in the colonial period was very high, especially considering that today's average world Gini is 0.39. We explore two possible explanations for this phenomenon. The first is that the high inequality depended on income differentials between the modern urban sectors of the society and the traditional rural sector. The second is that it depended on the much higher standards of living of European settlers with respect to those of the African majority.

Table 12 explores the rural-urban income gap. Overall, it was larger in Senegal than in Ivory Coast. In both colonies, wageworkers accounted for less than 7-8% of the working population and received 44% of income in Senegal and 15% of income in Ivory Coast. Senegalese urban workers received about six times their proportional income share, while in Ivory Coast they received only twice their proportional share – a difference that can be attributed to the smaller number of highly paid European workers in Ivory Coast. In short, even though we observe an income gap between wage earners and farmers, this does not seem to be large enough to account for the very high levels of inequality that we find in both colonies. Interestingly, this is generally true also for post-colonization societies, as suggested by a study of a group of Sub-Saharan African countries in the 1980s and early 1990s (Cogneau et al. 2007, pp. 27-28). This study includes Ivory Coast where in 1985-88, even though the income ratio of non-agricultural to agricultural households was 2.4, inequality

between farmers and the rest accounted for no more than 15% of overall inequality (decomposition obtained by means of Theil index: see later).

Table 12. Inequality between Wage Workers and Farmers: The Share of Wage Workers

	share workers	share income	share income/ share workers
Senegal			
1939	6.5%	53.0%	8.2
1944	6.8%	34.2%	5.0
1949	7.8%	40.6%	5.2
1954	10.7%	50.0%	4.7
Ivory Coast			
1939	6.0%	14.7%	2.4
1944	6.1%	9.1%	1.5
1949	7.1%	14.6%	2.1
1954	9.4%	20.1%	2.1

Sources: calculations from tables 2-9.

Another possibility is that high inequality came from the income differential between Africans and Europeans. Table 13 explores this hypothesis. In Ivory Coast, Europeans were between 0.2% and 0.5% of the working population and received between 4% and 7% of total income (on average 18 times their proportional share). In Senegal, inequality was even larger: despite accounting for only 0.8-1.5% of the working population, European settlers received from 23% to 42% of the total income (on average 29 times their proportional share).

Table 13. Inequality between Europeans and Africans: The Share of Europeans

	share workers	share income	share income/ share workers
Senegal			
1939	0.8%	42.0%	54.2
1944	1.0%	27.4%	28.2
1949	1.3%	22.6%	18.0
1954	1.5%	24.5%	16.8
Ivory Coast			
1939	0.2%	6.4%	28.0
1944	0.3%	4.4%	16.0
1949	0.4%	5.1%	11.7

1954	0.5%	6.7%	13.7

Sources: calculations from tables 2-9.

One might wonder whether this huge income differential came from Europeans' employment in more lucrative professions with respect to Africans. Indeed, about one fourth of Europeans worked as colonial administrators or heads of firm, compared to just 0.1% of African workers. It is unclear whether this pattern depended on the difference in education and skills between Africans and Europeans or on the fact that the colonial economy offered better job opportunities to European workers. However, even though it is true that the proportion of Europeans with high-paying jobs was higher than the proportion of Africans, wage gaps existed at all levels. Table 14 shows that within the same occupation, the wages of Europeans were between 5 and 14 times higher than those of Africans. Other sources from the secondary literature confirm this finding: Europeans received higher wages and benefits in both the private and the public sector (Berg 1957).

Table 14. Ratio of European vs African Wages

	1954	**1949**	**1944**	**1939**
Senegal	4.7	4.5	12.3	14.2
Ivory Coast	5.7	4.9	14.1	14.2

Reported ratios are the average of ratios of European and African wages within the same job category.
Sources: calculations from tables 2-9.

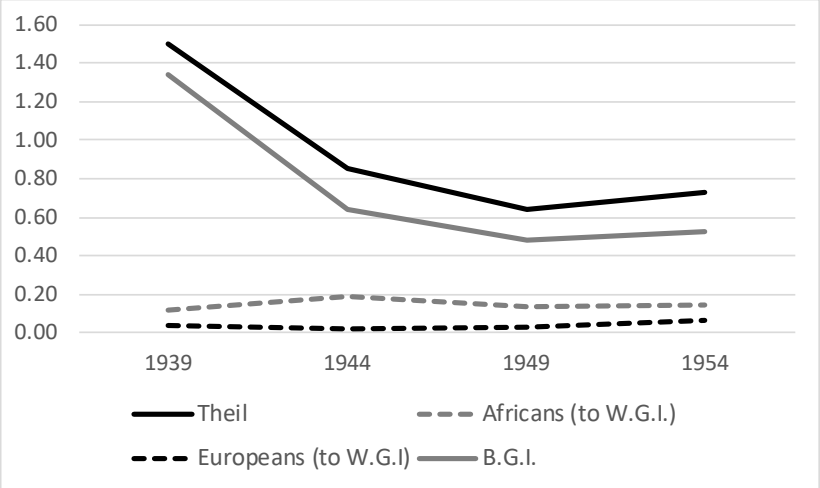
The Europeans, however, were few and this somewhat limited the potential impact of African-European wage differentials on overall inequality levels. To explore this further, we made use of Theil indexes, which can be perfectly decomposed into "between" and "within" group inequality. Thus, they allow us to discover whether, for example, changes in inequality levels were shaped by changes in the number of Europeans in the colonies (as Europeans earned much larger wages, inequality is expected to increase/reduce in unison with their prevalence in the overall population), or by changes in inequality "within" Europeans or Africans.[10] In Figure 2, we charter the trends of the Theil indexes and of its components: B.G.I. (Between Group Inequality) and W.G.I. (Within Group Inequality). The latter is further subdivided into the contribution to W.G.I. of the Africans and the Europeans respectively. So for example, in 1939 Senegal a B.G.I. of 1.34 and a W.G.I. of 0.16 (0.12 due to inequality among the Africans, and 0.04 among the Europeans) added up to a Theil

[10] For examples of the use of the Theil index to study inequality in past societies, see Alfani (2010) and Santiago-Caballero (2011). About the characteristics of the Theil index, see Shorrocks (1980; 1984).

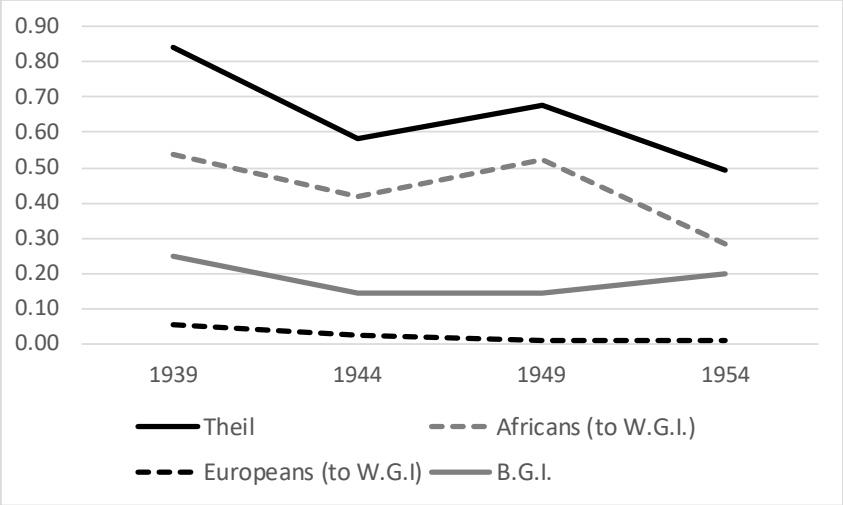
index of 1.5. By 1954 the composition of inequality had significantly changed. While W.G.I. remained almost unchanged at 0.2 (0.14 among Africans, 0.06 among Europeans), the B.G.I. had declined dramatically, to 0.52. The different components added up to a Theil of 0.73, much lower than that found in 1939.

Figure 2. Inequality Decomposition: Theil indexes

a. Senegal



b. Ivory Coast



Sources: calculations from tables 2-9, using household-adjusted incomes.

In Senegal, then, the overall decline in inequality in the period 1939-54 was mostly due to a reduction in Between Group Inequality. This is the combined consequence of the reduction in the

ratio of European to African wages (Table 14) and of the related reduction in the share of income absorbed by the Europeans, which counter-balances a certain increase in their prevalence (Table 13). This process seems to connect with a progressive change in the nature of the European (mostly French) presence in the colony. In fact, since the 1930s, political movements in France and in the colonies had begun to demand better conditions for workers and after World War 2 the colonial governments tended to employ less extractive policies, for example by abolishing forced labor (Cooper 1996; Fall 1993).

While, generally speaking, this story also relates to the Ivory Coast, there in the late colonial period inequality between Africans and Europeans was never the largest component of overall inequality. It was, instead, within the Africans that we find the main forces for inequality decline, with a contribution to the W.G.I. declining from 0.54 to 0.28 during 1939-54. In the same period, in the Ivory Coast the B.G.I. (which was much lower than in Senegal to begin with) declined only by a fifth, from 0.25 to 0.2. Indeed, after having touched a minimum of 0.14 in 1944 and 1949, in the Ivory Coast the B.G.I. grew again during 1949-54, which is coherent with a share of income earned by Europeans that reached the maximum observed value in 1954 (at 6.7%: compare Table 13). Notwithstanding these important differences in the dynamics affecting Senegal and Ivory Coast, it must be underlined that in both colonies over time inequality within the Africans tended to become more and more important to define overall inequality levels. This provides a hint about the underlying causes of the processes which occurred in the following decades, as discussed in the next section.

5. Discussion: Inequality Extraction and Extractive Institutions

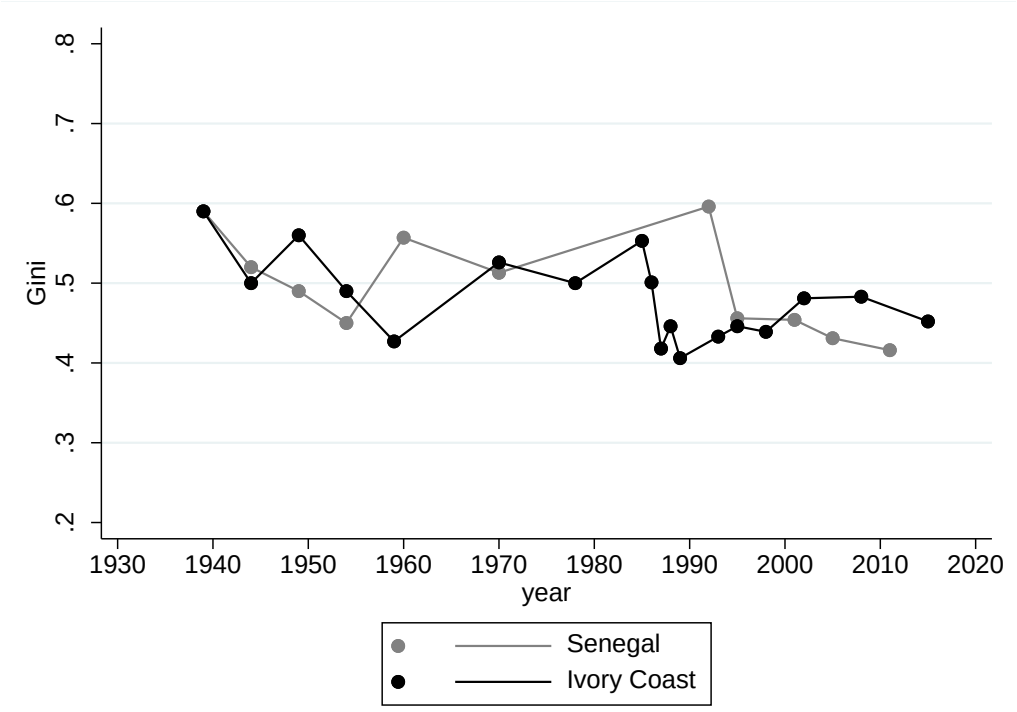
The significance of the time trends which we reconstructed for the period 1939-54 can be fully understood only if we place them into a broader perspective. This means not only assessing the potential impact of institutions on inequality levels as well as on inequality change in time, but also extending our time series to incorporate the most recent observations available.

A Long-Term View on Inequality

In Figure 3, we piece together the Gini indexes computed from our social tables with those available in the post-independence period from the UNU-WIDER (2018) database. To be consistent with the

more recent estimates, we use household-adjusted Gini. One issue faced when constructing these long-terms inequality trends is that for more recent estimates (in Ivory Coast since 1986 and in Senegal since 1992), UNU-WIDER reports consumption Gini, while previous estimates and our own for the colonial period measure income inequality. To solve this problem, we convert consumption Gini into income Gini, by applying the average ratio between these two measures computed from a sample of almost 300 countries/year from UNU-WIDER reporting both measures. On average, income Gini are about 10% higher than consumption Gini. With these adjustments, we uncover a clear tendency towards inequality reduction from colonial times until today. In both colonies the Gini index decreased from 0.6 or more in the late 1930s to around 0.45 in the 2010s.

Figure 3. Inequality Trends in The Long-Run



Sources: calculations from tables 2-9 (using household-adjusted incomes) for 1939-1954 and from UNU-WIDER (2018) thereafter. If necessary, Gini indexes are converted to measure income (not consumption) inequality (see text).

A first and crucial question to answer is whether this reduction in inequality was an effect of independence. This would be coherent with a large part of the literature, which argues that Europeans introduced extractive institutions in their African colonies. Considering that in Senegal the high level of colonial inequality we measured for 1939 was mostly driven by the income differential between Europeans and Africans and that also in the Ivory Coast this was a major

component of overall inequality, this might seem a plausible hypothesis. However, our data suggest differently. Inequality started to decrease during the colonial period. Both colonies acquired independence in 1960, but between 1939 and 1954 the Gini index had already diminished from 0.59 to 0.45 in Senegal and from 0.59 to 0.49 in Ivory Coast. In both colonies, income inequality between Africans and Europeans decreased since the 1930s. In 1939 the share of income of European workers in Senegal was 54 times more than their proportional share, while in 1954 it was 17 times. In Ivory Coast, this share was 28 times in 1939 and 14 times in 1954 (see table 13).

As revealed by the decomposition of inequality using the Theil index (Figure 3), Between Group Inequality (B.G.I.) declined steadily in this early period. There are good reasons to think that, especially in Senegal where B.G.I. was still high in the 1950s, the process of convergence in wages between Africans and Europeans continued also in the following years, fueled by independence. Additionally, the prevalence of the population with European origins declined. In Senegal, the 40,010 Europeans were 1.4 % of the total population in 1954. Today, the population with non-African origins is about as large but this accounts for just 0.3% of an overall population which increased seven-fold from 1954, to 13.5 million. However, if truly in Senegal the B.G.I. continued to decline after 1960, then a considerable growth in inequality within the Africans must have occurred from the same date, given that in this country we find an inversion of the trend in inequality (from decline to growth) immediately following independence.

Our overall conclusion is that while in the pre-independence and (to some degree) in the immediately post-independence period the reduction of African-European wage differentials and demographic factors (quicker growth of African vs European population) shaped the trend in inequality change, in the later period it was affected almost exclusively by inequality change among the Africans. It is important to underline this factor, which is not the sole result of the end of colonization. As a matter of fact, the original (pre-colonization) African society might have had relatively very high inequality levels – especially in areas like the coasts of West Africa, where the native population was actively involved in the slave trade and seems to have had relatively hierarchical societies with a very uneven distribution of power and access to resources. Slavery was a common practice: some estimates report that in the nineteenth century slaves accounted for more than one third of the total population of West Africa (Lovejoy 2000). Private enterprise was often restricted by the State, e.g. in Asante (Wilks 1979) and Dahomey (Law 1977; Manning 2004), and the systems of land allocation based on chiefs generated inefficient ownership structures and limited

the possibility of economic development (Goldstein and Udry 2008).[11] In other words, it is possible that African societies had a relatively marked extractive character, in terms of their ability to concentrate resources and redistribute them unequally. This is an aspect on which further research would be needed – after all, even for early modern Europe it has been argued that inequality growth was due to a significant degree to the development of "extractive" states that redistributed resources unequally (Alfani 2015; Alfani and Ryckbosch 2016; Alfani and Di Tullio 2019). Consequently, at present we cannot be sure that pre-colonization African states were exceptionally extractive in absolute terms, although this seems to be a reasonable hypothesis.

Inequality and Extractive Institutions

Until now, we have used the word "extraction" when referring to institutions allowing to concentrate (more or less forcefully) resources in few hands and consequently, to increase inequality. Recently, however, the concept of "inequality extraction ratio" has been introduced, which aims to measure how much inequality is "extracted" in a society, relative to the maximum feasible inequality which can be derived by taking into account that everybody needs to receive subsistence (Milanovic 2006; 2013; 2018; Milanovic et al. 2011). The maximum feasible inequality increases as a society becomes able to generate greater surplus (as reflected in per-capita GDP levels). Formally,

$$G^* = 1 - \frac{s}{m}$$

where G* is the maximum attainable Gini, m is the mean income in the economy, and *s* is the subsistence minimum. The inequality extraction ratio (IER) can then be expressed as the ratio between the actual measured Gini (G) and G*:

$$IER = \frac{G}{G^*}$$

While we might expect that the inequality extraction ratios change in unison with inequality levels (as measured by Gini indexes), this depends in fact on the relative movement of per-capita GDP (which can

[11] The above account of extractive institutions in precolonial Africa is based on James Robinson's lecture on "Why is Africa Poor?", given at the University of Groningen on April 8, 2013.

be used as an estimate of *m*) and inequality. As shown by recent applications to European history, we can have, for example, periods of economic decline coupled with inequality increase and a sharp rise of inequality extraction ratios, or trends in inequality change which are similar between countries but which correspond to dissimilar trends in inequality extraction ratios (Alfani 2015; Alfani and Ryckbosch 2016; Alfani 2019b).

Sub-Saharan African countries tend to have the double record of being both the most unequal, and the most extractive (in terms of inequality extraction ratios) of contemporary societies.[12] Surely, the countries which today are characterized by exceptionally high inequality extraction ratios are concentrated in this area (see Milanovic et al. 2011, pp. 263-4). In Figure 4 we provide these measures for our two African states. As can be seen from Figure 4a, inequality extraction ratios declined in the post-independence period (with societies moving further away from the Inequality Possibility Frontier), but analogously to what we found when analyzing the trend in Gini levels, this process began before independence. In Senegal, the inequality extraction ratio was close to the frontier in 1939 (83.9%), but on the eve of independence (in 1959) it had declined by almost 14 percent points (70.3% in 1960) as the result of both a significant reduction of the Gini level (see above) and of an increase in per-capita GDP of about 40% from 1939 to 1960. In fact, per-capita GDP peaked immediately before independence (1,445 International 1990 GK$[13]) but declined in the second half of the twentieth century, so that inequality extraction ratios stagnated and even grew a bit in some phases. Only since the mid-1990s has the process of decline in inequality extraction resumed.

The case of Ivory Coast is only partially similar and is singled out in Figure 4b. Here, too, most of the reduction in inequality extraction occurred before independence (obtained in 1960), as in the period 1939-59 it declined from 92% to 57.2%. The overall trend was still oriented towards the development of a less extractive society in the following decades, with a minimum of 51.1% reached in 1989.[14] This was mostly due to a large decline in the Gini index (from 0.53 in 1970 to 0.41 in 1989), as per-capita GDP, which grew in the immediately post-independence decades peaking at

[12] Sub-Saharan African countries also tend to have the lowest levels of human development in the world: see Prados de la Escosura 2013; 2015.

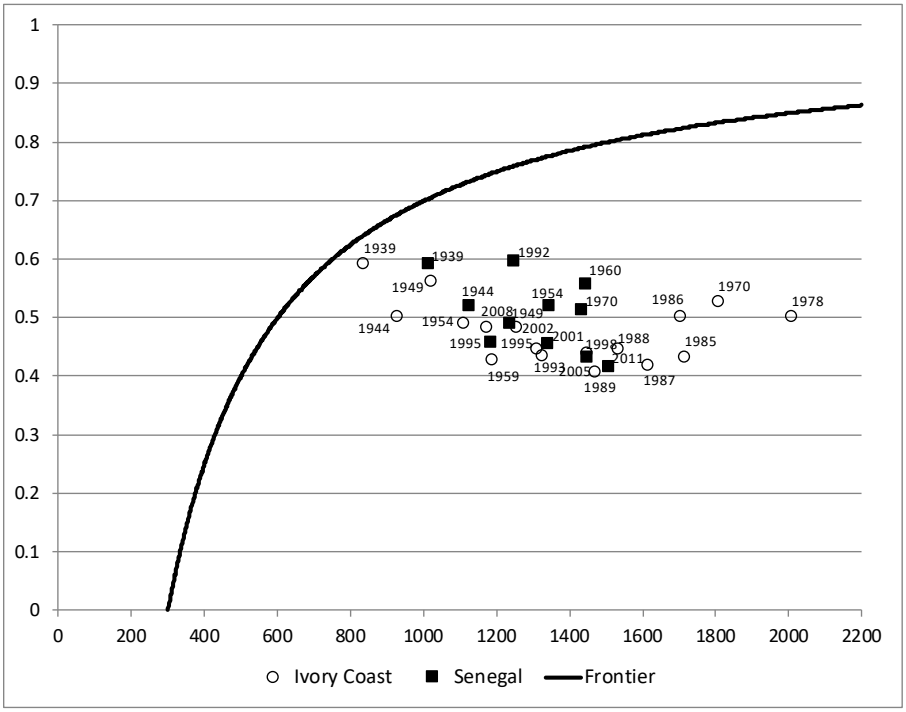
[13] All the measures of per-capita GDP used throughout the article (including for calculating inequality extraction ratios) come from The Maddison-Project, http://www.ggdc.net/maddison/maddison-project/home.htm, 2013 version (for details, see Bolt and Van Zanden 2014). For Senegal and Ivory Coast before 1950, we used Prados (2012) estimates of per-capita GDP in 1938 and hypothesized linear change during 1938-50.

[14] The relatively favourable conditions of Ivory Coast in the early 1990s is confirmed by Cogneau and Mesplé-Somps' study of "inequality of opportunity for income" covering a sample of sub-Saharan African countries (Cogneau and Mesplé-Somps 2008). The data they use for Ivory Coast related to the period 1985-88.

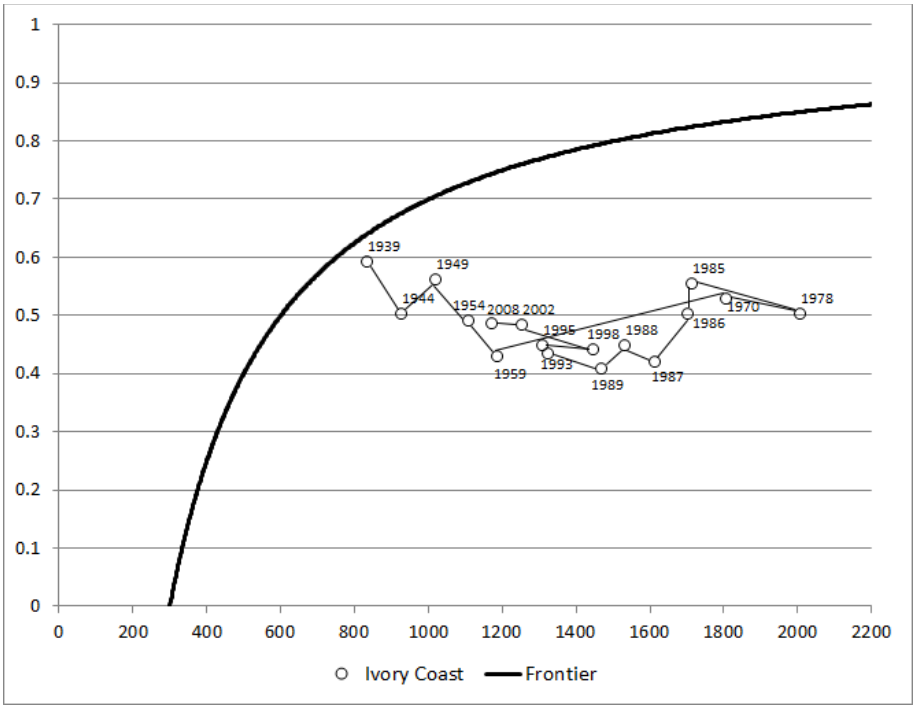
2,041 International 1990 GK$ in 1980, has been declining ever since (1,174 International 1990 GK$ in 2008). Since the 1990s, overall inequality as measured by the Gini index has been growing again (the Gini was 0.48 in 2008). So for about twenty years now, Ivory Coast has been experiencing the worst-possible scenario, of growing inequality with declining per-capita income, which has resulted in a quickly growing inequality extraction. By 2008, at 64.9%, it was higher than the immediately pre-independence level. A recent study of human development in Africa confirms this unfortunate halt in the process of social and economic development in Ivory Coast (Prados de la Escosura 2013). It would seem plausible to attribute this growth in inequality extraction to the phase of political instability triggered by General Robert Guéï's coup d'état in 1999 and by the two civil wars which ravaged the country during 2002-07 and 2010-11. Recently, Milanovic (2013, pp. 20-3) has argued that a high inequality extraction ratio is a good predictor of civil war, as it "conveys the information about the relative «rapaciousness» of the elite and combines in its formulation two aspects that are often found important for the explanation of civil conflict: the average level of development of a country (its GDP per capita) and its income distribution" (p. 20). However, the story of Ivory Coast does not fit this trend, as there inequality and inequality extraction had been declining, and per-capita GDP growing, before the beginning of the civil war. Indeed, it seems probable that in this country it was civil war itself that inverted the positive tendencies in growth and distribution of GDP whose origins can be traced back to colonial times.

Figure 4. Inequality Extraction Ratios

a. Ivory Coast and Senegal compared



b. The path of Ivory Coast



Sources: GINI calculations from tables 2-9 (using household-adjusted incomes) for 1939-54, and from UNI-WIDER (2018) thereafter. GDP from Bolt and Van Zanden (2014) and Prados (2012).

At least in the two ex-colonies of Ivory Coast and Senegal, it seems that the economic growth which occurred in the late period of colonial rule was coupled with processes of distribution of the growing income which resulted in an altogether less extractive society. Also, although they were very high, the levels of inequality extraction ratios characterizing Ivory Coast and Senegal in the late 1930s (92% and 83.9% respectively in 1939) were similar to those found for European societies immediately before the onset of the Industrial Revolution. For example, in 1750 the Florentine State and the Sabaudian State in Italy had an inequality extraction ratio of 98% and 91% respectively, while the southern Low Countries (nowadays Belgium) had 87% (Alfani and Ryckbosch 2016, p. 4). In these areas, however, inequality extraction ratios had been growing during the early modern period (in the Sabaudian State the inequality extraction ratio was "just" 75% ca. 1500). So we need to be careful about assuming that the levels of inequality extraction ratios characterizing sub-Saharan countries in the first half of the twentieth century were "normal" for preindustrial societies – indeed, they might have higher than the European norm at comparable levels of economic development and standards of living. On this issue, more research is surely needed.

Comparing French Africa to Other Colonies

In the literature on Africa, differences in development paths are often attributed to the identity of the colonial power. It has been argued that the British, more aware of the disadvantages of excessive exploitation of the colonies, implemented less extractive institutions, while the French made larger use of trade monopolies and forced labor practices (Brett 1973; Duignan and Gahan 1975). These policies were particularly effective in extracting wealth from the African populations: for example, Tadei (2019) finds that thanks to trade monopsonies and labor coercion, the French colonizers were able to pay to African agricultural producers much below world market prices. In addition to the identity of the colonizer, another important determinant of institutions established by the colonial power was the type of colonies. Austin (2010) highlights in particular the distinction between *settler* and *peasant* colonies. In the first type of territories, Europeans settled in large numbers, expropriated land and employed African labor in European-owned plantations. In the second type of colonies instead, European presence was much more limited: the land remained mostly in African hands and the colonizers focused on trade with the African populations.

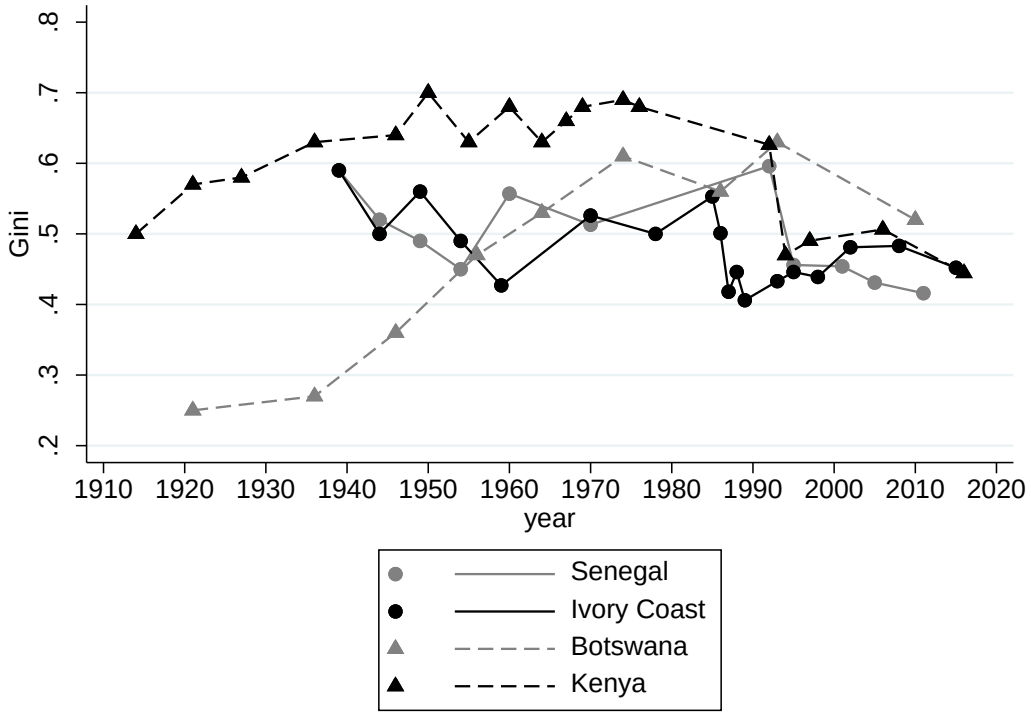
Can differences in the type of colony or the identity of the colonial power help to interpret our findings on inequality and extraction? Our analyses suggested that the income differential between Europeans and Africans was a major determinant of inequality, so it seems plausible that the distinctions between peasant and settler colonies or between more-extractive French and less-extractive British have some explanatory power. To give a preliminary answer to this question, we compare French Africa with other African colonies. Figure 5 shows the evolution of inequality since colonial times in our two French territories (Ivory Coast and Senegal) and in two British colonies for which we have information (Kenya and Botswana).[15] The comparison with Kenya is particularly interesting as it was one of the main examples of settler colonies in Africa, while Senegal, Ivory Coast, and Botswana were peasant colonies.

At the beginning of the period we cover, Kenya had higher levels of inequality, while income distributions in Ivory Coast, Senegal, and in particular Botswana were more egalitarian. Nevertheless, these colonies experienced different trends. In Senegal and Ivory Coast, inequality decreased even during the colonial period. In Kenya, it was stable at high levels from the 1940s to the 1960s, and started to decrease only after independence in the 1970s. Botswana, on the other hand, experienced an almost continuous increase in inequality. For Kenya, Milanovic et al. (2011, pp. 263-4) calculated an inequality extraction ratio of 100% in 1927, which declined to 57.2% by 1998. The overall decline in inequality extraction during the second half of the twentieth century is very similar to that of Senegal, which moved from 83.9% to 58.5% between 1939 and 2001.

The classic distinction between peasant and settler colonies seems thus to have only limited explanatory power: if it can account for the persistence of high inequality in Kenya, a settler colony, it is not able to account for the similar inequality extraction ratios in Kenya and Senegal, a peasant colony. The identity of the colonial power seems to be even less important: within the same colonial empire, Kenya and Botswana follow different paths and even between Senegal and Ivory Coast we found relevant (although less dramatic) differences. Overall, this analysis highlights the complexity of inequality patterns in colonial Africa. Kenya, a British settler colony in East Africa, followed a pattern not too dissimilar from Senegal, a French peasant colony in West Africa. The conclusion is that if we want to understand inequality in colonial Africa, we need to adopt more complex and context-specific frameworks: exactly as has recently been advocated for Western societies (Lindert and Williamson 2016; Alfani 2019a).

[15] We use Gini from UNU-WIDER (2015) for Kenya and for Botswana post-1960. For Botswana, in 1921, 1936, 1946, 1956, we use Ginis published in Bolt and Hillbom (2016), p. 1283.

Figure 5. Comparing with Other Colonies



Sources: Senegal and Ivory Coast: calculations from tables 2-9 and UNU-WIDER (2018); Botswana: Bolt and Hillbom (2016), appendix IV; Kenya: Bigsten (1987) and UNU-WIDER (2018)'s World Bank estimates.

6. Conclusions

This study attempted to discover whether the high heterogeneity of income inequality levels in modern-day sub-Saharan Africa, as well as the general pattern of high inequality extraction rates, has colonial origins. By constructing social tables for Senegal and Ivory Coast during the last decades of French rule in West Africa, we found that income inequality was very high in the colonial period. Nevertheless, in the last decade of colonial rule inequality tended to decrease over time. By using Theil indexes, we uncover that inequality reduction was, in both colonies but especially in Senegal, the consequence of changes in the institutional structures of the colonies, reflected in a progressive reduction in the African-European wage differentials. However, in the Ivory Coast, the main factor leading to inequality decline was the reduction in inequality within the African population, as economic growth and the expansion of commercial agriculture provided new opportunities for the middle-class.

To better understand the significance of our findings, we placed them into a broader picture, both chronologically (extending our analysis of inequality changes to the post-colonial period) and geographically (comparing our French colonies with the British colonies in Africa for which information about inequality in colonial times is available). The use of the concept of the "inequality extraction ratio" allowed us to go deeper and to unearth differences in the paths followed by each colony which would have been hard to notice, had we relied solely on more traditional measures of inequality. We found that independence did not lead to lower inequality – indeed, in Senegal independence marked the inversion of the trend in inequality, which from 1960 resumed growing rapidly. The Ivory Coast followed the same path from the mid-1960s. But if we look at inequality extraction ratios, some improvements in per-capita GDP after independence did allow for these African societies to grow less extractive. In the Ivory Coast, political instability and civil wars from the late 1990s destroyed these achievements, bringing the country back to levels of development (as measured by per-capita GDP) and extractiveness analogous to those found towards the end of the colonial period.

Our overall conclusion is that to fully understand inequality in colonial Africa, as well as the post-colonial developments, we need to apply complex analytical frameworks – as colonies belonging to the same broad categories well established in the literature (for ex., British vs French colony; peasant vs settler colony), and even those placed in the same broad geographical area and having the same colonial ruler, might have followed very different paths.

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