

# COLONIAL TRADE AND PRICE GAPS IN FRENCH AFRICA

FEDERICO TADEI\*

A common explanation for current African underdevelopment is the extractive character of institutions established during the colonial period. Yet, since colonial extraction is hard to quantify, the magnitude of this phenomenon is still unclear. In this paper, I tackle this issue by focusing on colonial trade in French Africa. By using archival data on export prices, I provide new yearly-estimates of colonial extraction measured as the gap between prices to Africans and in the world market. The results show that African prices were substantially lower than world market prices: colonial trade dynamics was characterized by a considerable amount of extraction.

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\*IGIER- Bocconi University. Via Roentgen 1, Milan 20136, Italy. Email: federico.tadei@unibocconi.it. A previous version of this paper was circulated with the title *Extractive Institutions and Gains from Trade: Evidence from Colonial Africa*. I would like to thank my advisor Jean-Laurent Rosenthal for his guidance. I also thank Jonathan Chapman, Jean Ensminger, Phil Hoffman, Nathan Nunn, Erik Snowberg, Matt Shum, and the participants to the Caltech HSS Proseminar, Caltech Social Science-History Lunch, All-UC Economic History Workshop at UC Berkeley, UCLA Economic History Proseminar, European Economic Association Conference at Toulouse, African Economic History Workshop at LSE, and American Economic Association Meeting in Boston for their helpful comments.

## I INTRODUCTION

Many leading hypotheses about current African underdevelopment emphasize the role of colonialism. If the early literature underlined how colonial rule relegated Africa to exporter of primary commodities [Rodney, 1972], more recent works have instead focused on the long-term consequences of colonial extractive institutions [e.g. Acemoglu et al., 2001, 2002, Englebort, 2000, Herbst, 2000, Nunn, 2007].<sup>1</sup> Yet, to explain how colonial institutions affect *current* development, we need to understand the extent of extraction *during* the colonial period. Many of the institutions established by the colonizers were, in fact, maintained in the post-independence period. Moreover, the extent to which they were extractive in the colonial period affects how extractive they are after independence [Acemoglu et al., 2001, Bates, 1981]. However, since colonial extraction is hard to quantify and its exact mechanisms are unclear, we still do not know precisely how successful the colonizers were in extracting wealth from Africans.

The main reason for this shortcoming is a lack of data. On one hand, historians have collected information about colonial institutions, but they have not attempted to systematically quantify the level of extraction. On the other hand, economists have often overlooked the temporal variation in colonial extraction, increasing the risk of “compression of history” and making it difficult to understand how extractive institutions vary over time [Austin, 2008].<sup>2</sup>

In this paper, I tackle these issues by providing new estimates of colonial extraction. To do so, I exploit the peculiar structure of labor and trade policies employed by the French colonizers. The focus on trade in the French colonies offers two main advantages for un-

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<sup>1</sup>Extractive institutions can be defined as those arrangements “designed to extract incomes and wealth from one subset of society [masses, African populations] to benefit a different subset [elite, colonizers]” [Acemoglu and Robinson, 2012].

<sup>2</sup>Previous works by economists exploited spatial variation in some colonial policy or institution, observed at one point in time. Huillery [2009] studies the impact of colonial investments in education in French Africa. Gallego and Woodberry [2010] and Nunn [2010] analyze the effect of colonial missionary activity on schooling and religious conversion. Michalopoulos and Papaioannou [2011] estimate the effect of arbitrary colonial borders on civil war. Berger [2009] studies the modern impact of colonial policies on public good provision in Nigeria. Notable exceptions are Cogneau and Moradi [2014]’s analysis of colonial policies across the border between French and British Togo, Huillery [2014]’s study of the costs of colonization for France, and Frankema and van Waijenburg [2012]’s analysis of real wages in British Africa.

derstanding the magnitude of extraction in the colonial period. First, because of the low population densities of French Africa and the high cost of labor relative to land, the colonizers faced there powerful incentives to use coercive labor institutions and trade monopsonies.<sup>3</sup> Second, focusing on trade allows us to exploit price data in order to quantify colonial extraction. By using the gap between prices in Africa and world market prices, we can construct estimates of extraction in the different colonies and years.

The paper makes two contributions to the literature. The first contribution is to provide a new yearly dataset of prices in Africa and France for the main commodities exported from each French colony between 1898 and 1959. I collected information on prices from a variety of colonial publications, including statistical reports of the Ministry of the Colonies, customs statistics, and *Bulletins Economiques* of the different colonies.

The second contribution is to use these data to measure colonial extraction.<sup>4</sup> The main difficulty in answering this question is that, since extractive institutions were used in all colonies, we cannot observe colonial trade in absence of extraction. However, since in a competitive market the prices to African producers should be equal to the difference between world market prices and trading costs, we can use this measure as a counter-factual.

Building on this insight, I use my new price dataset to check whether extractive institutions implied a reduction in prices to African producers. I show that prices in Africa were much lower than world market prices and that this difference cannot be explained by trading costs. On average, prices to Africans were reduced by about 30% with respect to what they would have been in absence of monopsonies and coercive institutions.<sup>5</sup>

To interpret these estimates, it is important to remember which is the counter-factual at which we are looking. We are not comparing African prices to what they would have

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<sup>3</sup>When coercion is a feasible option, a higher land/labor ratio might not translate into higher wages, but in an increase of coercion of labor [Domar, 1969]. Fenske [2013] tests this hypothesis in the African context showing that lower population density is correlated to the extent of indigenous slavery.

<sup>4</sup>Trade monopsonies as a mechanism of rent extraction were first emphasized by Bates [1981] in his analysis of marketing boards in British Africa.

<sup>5</sup>This result complements the finding by Yeats [1990], who shows that in the post colonial period the former French colonies paid, for import from France, prices which were 20-30% higher than in the world markets.

been without colonization, but instead to what they would have been if colonizers had implemented non-extractive institutions. The results of the paper do not dismiss the fact that Africans might have benefited from the increased access to international markets brought by colonization, but underline that it was the colonizers (and not the colonies) who captured most of these benefits.

The paper is structured as follows. Section II provides some historical background about French colonies in Sub-Saharan Africa, monopsonistic trading companies, and labor institutions. Section III discusses how we can quantify colonial extraction and presents the data. Section IV provides and interprets the price gaps estimates of extraction. Section V offers concluding remarks and delineates directions of future research.

## II HISTORICAL BACKGROUND

Most of the military conquest of French Africa occurred between 1880 and 1900 and towards the end of 19th century more permanent institutions could be established [Coquery-Vidrovitch, 1969, Suret-Canale, 1971]. The French government organized the colonies in two federations: French West Africa (1895)—including Senegal, French Sudan (now Mali), Niger, Upper Volta (now Burkina Faso), Guinea, Ivory Coast, and Dahomey (now Benin)—and French Equatorial Africa (1908)—including Gabon, Congo, Ubangi-Shari (now Central African Republic), and Chad. After WW1, part of Togo and almost all of Cameroon were added to the French colonies in continental Sub-Saharan Africa (see figure I).

The extension of French possessions was reflected in the heterogeneity of their natural environment, including, from the coast towards the interior, tropical forests, savannas, and arid-desertic regions. The coastal forestry regions were suitable to produce bananas, coffee, cocoa, and rubber, while the drier interior areas were suitable for peanuts and cotton. In general, Western colonies were more prosperous than Equatorial colonies and, with the exception of the peanut-producing areas of Senegal, coastal regions were usually wealthier with respect to interior regions because of the higher value of their crops and lower transportation

costs [Hopkins, 1973].

Most of colonial economic activity revolved around trade. Exports were mainly based on African peasant production, while European trading companies limited themselves to collect crops from Africans at trade posts and resell them at higher prices in Europe.<sup>6</sup> The colonial government benefited from this trade by establishing customs duties and by taxing part of the companies' profit [Suret-Canale, 1971].

Nevertheless, given French Africa's low population densities and abundant cultivable land in the indigenous sector, African incentives to produce export crops were very limited. If the trading companies had been to pay free market prices, this would have greatly reduced their profit. For these reasons, they lobbied the colonial government to establish trade monopolies and coercive labor market institutions, such as compulsory cultivations and various forms of forced labor.<sup>7</sup>

Some monopolies were conceded *de iure* from the colonial government to specific companies, while others came into being *de facto* as a consequence of economic crises and protectionistic policies [Coquery-Vidrovitch, 1972, Manning, 1998, Suret-Canale, 1971, Thompson and Adloff, 1957]. Formal monopolies were established in the Equatorial colonies. Since the early XX century, the French government divided the territory of Equatorial Africa among concessionary companies with monopoly power. African laborers were forced to collect crops for the concessionaires who employed harsh coercive methods.

In West Africa, instead, *de facto* monopolies became the norm. At the beginning of the 20th century, trade in the Senegal/Mali region was controlled by a group of eight Bordeaux trading firms, while Guinea was in the hands of business houses from Marseilles or Paris. Smaller traders were allowed a share of exports as long as they respected the prices fixed by the main trading firms.<sup>8</sup> After WW1, the *de facto* monopoly of these compa-

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<sup>6</sup>After WW1, Europeans began to enter the productive sector, establishing plantations (e.g. coffee in Ivory Coast, bananas in Guinea) and exploiting forestry concessions, but this remained a minor activity.

<sup>7</sup>We can interpret these institutions as subsidies given by the colonial government to the European trading companies.

<sup>8</sup>The fact that smaller trading firms were able to operate show that *de facto* monopolies which appeared in West Africa resulted more from a political plan to prevent entry in the market than from a

nies grew stronger: economic crises eliminated competition from smaller companies, German business interests were canceled by the war, and protectionist measures were taken against British trade. Protectionist policies were not applied everywhere and did not completely eliminate non-French trade (especially in Guinea and Dahomey). Nevertheless, the number of the remaining trading firms became sufficiently small to allow agreement and ban entry into the African market [Suret-Canale, 1971]. As a result, at the beginning of WW2, fewer than a dozen companies monopolized almost all of trade from French West Africa and two French companies (Société Commerciale de l'Ouest Africain, Compagnie française de l'Afrique Occidentale) and a British one (Unilever) controlled between 50% and 90% of exports [Suret-Canale, 1971, p. 167].

In addition to creating monopsony power for the trading companies, the colonizers attempted to reduce prices to Africans by interfering with labor markets and implementing coercive institutions. One option was to introduce compulsory cultivations. In this case, quotas were set of produce that Africans had to cultivate and sell for a fix price to the colonizers. The most notable example of this institution were the cotton quotas established by Felix Eboué in Ubangi-Shari and Chad between 1924 and 1927 [De Dampierre, 1960]. Under this arrangement, every village had to produce amounts of cotton in proportion to its population and sell it to one of four trading companies with monopsony power over given territories. The costs for the recruitment of cotton producers were borne by the colonial government, and payments were often in the form of tax vouchers. Cotton quotas were abolished in 1956, just four years before independence.

Moreover, in addition to compulsory cultivations, the colonizers also used indirect methods such as poll taxes. Introduced to raise the revenue of colonial governments, they also served the function of forcing Africans to produce cash crops in order to earn the money needed to fulfill their fiscal obligations. In Equatorial Africa, for example, poll taxes were introduced in 1902 as a way to facilitate rubber collection for the concessionary companies.

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market structure with high fixed costs.

The French administration fixed the import prices in France by ministerial decree, following world market prices, and the prices to African producers, in accord with the trading companies, usually as a percentage of the world FOB price.<sup>9</sup> The price at the African exit port was determined by simply adding to the price to producer all costs which the trading companies faced in moving the goods from inland to the coast. The (usually positive) difference between world FOB price and price at the exit port was shared between the trading company and the colonial government.

It is easier to understand the mechanism by looking at a specific example. De Dampierre [1960] analyzes the process of price formation for cotton in Ubangi-Shari in 1950s. The price paid to farmers for cotton-grains was 15% of the FOB price of cotton-fibers in New York. The trading company (the *Compagnie Coloniale Cottoniere Ouham-Nana - Cotouna*- in the specific example) had monopsony power and was in charge of buying cotton from producers, ginning, and transporting to the ports in Bangui and Pointe-Noire. By adding all these processing and transport costs to the producer price, the exit price was determined.

Given the low level at which producer prices were fixed, the exit price calculated in this way was much smaller than the actual FOB price (price at the French port net of insurance and shipping costs). This difference generated revenue for both the colonial government and the trading company: the government benefited in the form of customs duties (about 15% of FOB price), while the trading company was granted a commission equal to 3% of the price at French port. In addition, the trading company also obtained 20% of the remaining difference between FOB and exit prices. The rest was left to the colonial government in order to accrue the reserves of the *Caisse de Soutien du Coton*, an organization with the formal goal of supporting cotton producers.<sup>10</sup>

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<sup>9</sup>The question is here whether this percentage reflects trading costs or colonial extraction.

<sup>10</sup>It is possible that at least part of this profit was used to finance public investments in Africa, but, as I will show in the next section, these investments were too small to justify the presence of large price gaps.

### III EMPIRICAL STRATEGY AND DATA

#### *III.1 How to Measure the Reduction of Producer Prices?*

Although both economists and historians agree on the importance of colonial institutions, the extent of extraction on trade has been difficult to assess. How much did colonial monopsonies and labor coercion reduce African prices? In order to answer this question, we need to identify the right counter-factual. Since in a competitive market the prices to African producers should be equal to the difference between world market prices and trading costs, we can check for the presence of colonial extraction by analyzing whether prices to Africans in the French colonies were lower than competitive prices.

Ideally, we would like to observe prices at the producer level. Nevertheless, the remaining records report only sparse information for some colonies/commodities and years and it would not be possible to use them in order to provide a general assessment of colonial extraction. To solve this problem, I compute price gaps between African and French port. Figure II summarizes the relationships among price to producers, price at the exit port, competitive price, and price in France. Without colonial extraction (panel A), the price at the exit port is equal to the competitive price. With monopsony and labor coercion (panel B), the colonizer are able to reduce the price to African producers in order to create a gap between competitive and exit price. This positive difference is a measure of both the colonizer's extra-profit and the extent to which the price to producers is reduced, even if we do not observe producer prices directly.

Two potential critiques could be made to this strategy. First, one might wonder about the comparability between French and world market prices. Historians have in fact claimed that the French firms enjoyed prices lower than world prices for raw materials from the colonies [Emmanuel, 1969, Samir, 1973]. It could be argued then that prices in France net of trading costs are not a good counter-factual for African prices in the absence of colonial extraction. Nevertheless, this actually makes the results even stronger. If French prices were lower than

world prices, then the gap between African and French prices is actually a lower bound of the gap between African and world prices.

Second, one might worry that prices at the African ports did not reflect prices to producers. Indeed, port prices included the costs that the trading companies had to face in order to move goods from the producers to the exit ports. Again, since prices at the port are larger than the actual prices to producers, this would work against finding price differentials between producer and world market prices. Proxying producer prices with prices at the ports and prices in the world market with prices in France thus make the results stronger. For these reasons, we should interpret the price gap estimates as a lower bound of the total extent of colonial extraction.

It is interesting to observe the correlation between producer and port prices in one case for which actual producer prices are available. Figure III shows how prices to cotton producers in Ubangi-Shari are related to prices at the African port between 1927 and 1955.<sup>11</sup> The two series closely follow the same pattern and prices at the port explain about 65% of the variation in prices to producers (over 93% if we do not deflate prices in 1900 francs).

### *III.2 Data*

To test for the presence of price gaps, I use newly-collected data on prices in Africa, France, and trading costs. I focus on four main agricultural commodities exported from French Africa between 1898 and 1959: peanuts, palm kernels, cotton, and cocoa. I include only commodities which were produced by African farmers. This is because, in the case of commodities produced under European plantations, the port price included also the profit of the concessionary company and it would not be a good measure of colonial extraction.

Nevertheless, the commodities in the dataset account for about two-thirds of the value of all exports from West and Equatorial Africa during the whole colonial period. Overall, the dataset includes over 1,200 observations (colony-commodity-year) and I have data on

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<sup>11</sup>The source for the producer price series is the *Annuaire Statistique de l'Obangui-Chari, 1940-55*.

prices in Africa, prices in France, and trading costs for 1050 of them. The years covered are: 1898-1914, 1920-1956, and 1958-59.

### Prices in Africa

Colonial customs statistics reported the total quantity and value of commodities exported from each colony every year. These statistics were registered at the local customs offices and then aggregated at the colony level. The reported values (*valeurs mercuriales*) were measured at the exit port and included the price paid to African producers together with processing, inland transport, warehousing and port costs.<sup>12</sup>

Using these customs statistics, I collected data on prices in Africa and quantities exported from each colony for the four main commodities between 1898 and 1959. I exploited numerous yearly issues of different colonial publications, including, but not limited to, statistical reports of the Ministry of Colonies, *Bulletins Economiques* of the various colonies, and *Annuaire Statiques* of West and Equatorial Africa.<sup>13</sup>

Given the variety of the sources and the length of the period considered, the names of the territorial units for which the customs statistics were registered changed over time and in some cases data were reported only for larger territorial units. To solve these issues, I first tracked the variation in the names of colonies. Then, I assigned the commodity price from the larger territorial unit to all colonies in the territory which produced that specific commodity.<sup>14</sup> I deflated all prices in 1900 French francs.<sup>15</sup>

### Prices in France

I collected prices in France from various issues of the *Statistiques Mensuelles du Commerce*

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<sup>12</sup>Values include also customs duties since 1945 for Cameroon, since 1947 for Equatorial Africa, and since 1950 for West Africa. To ensure comparability across observations, I subtract duties from all prices which include them. Data on export taxes on the different commodities in the considered years come from the *Annuaire Statistiques de l'AOF, 1950-54*, *Annuaire Statistiques de l'AEF, 1951-55*, and Thompson and Adloff [1957].

<sup>13</sup>See the appendix for more details on the sources.

<sup>14</sup>Territorial units involved are AEF, French Congo, AOF, and Senegal-Haut Senegal-Niger.

<sup>15</sup>Inflation data come from France-Inflation.com (2013).

*Extérieur de la France*, a monthly publication by the *Direction Générale des Douanes* reporting the total values and quantities of the commodities imported from the French colonies in every year. As a control, I also used different issues of the *Annuaire Statistiques de France* reporting similar information. I deflated all prices in 1900 French francs. Not all exports from French Africa went to France. Nevertheless, given the importance of the French market, using export prices in France is a good approximation. By 1949, France was the destination of about 80% of the total exports originating from its African colonies [Duignan and Gahan, 1975].

### Trading Costs

Since the values in Africa already include processing, inland transport, warehousing, and port costs, the relevant trading costs are shipping and insurance costs. Unfortunately, extensive data on shipping costs between Africa and France are not available. To solve this problem, I constructed estimates for each colony-commodity-year in my dataset according to the following procedure. First, I computed the distance to Marseilles from the closest African port for each colony.<sup>16</sup> Then, I used data on average freight rates from the West African coast to France for the main exports in 1938 to compute the average shipping cost per km for each commodity in 1938.<sup>17</sup> Finally, I multiplied this measure by the distance to Marseilles for each colony (both West and Equatorial Africa) and by an index of transportation costs between 1898 and 1959 with base 1938=1 from Mohammed and Williamson [2004].<sup>18</sup>

Marine insurance costs were computed as a percentage of the value of goods in France. As transportation technology improved over time, risk and insurance rates decreased. Studying transatlantic wheat trade, Persson [2004] reports rates of about 1% of the value since the 1920s and rates of 1.75% to 1.5% between 1850 and 1920. It seems thus a reasonable approximation to estimate insurance costs from Africa to France as 2% of the French price before 1920

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<sup>16</sup>The main ports are identified from the map reported at page 149 of Duignan and Gahan [1975]. The distance to Marseilles is computed by using <http://ports.com/sea-route>.

<sup>17</sup>Documents et statistiques - Ministère de la France d'Outremer, Service de statistique, 1949-52.

<sup>18</sup>I construct this index from the global real freight rate deflated by commodity prices.

and 1% after 1920. Direct data from French Africa show that this is likely to be even an overestimate at least for the later periods, as insurance rates for cocoa from Ivory Coast in 1958-59 amounted to about 0.6% [France, 1967].

#### IV PRICE GAPS ESTIMATES

Before measuring the extent of colonial extraction by using direct estimates of trading costs, let me show some preliminary evidence by comparing price gaps between Africa and France to those between US and UK. The idea is that if the Africa-France price gap was larger than the gap between the United States and Britain, this would suggest that the difference between prices in Africa and in France was not due exclusively to trading costs.

To check this, I collected yearly data on wholesale cotton prices in New York and Liverpool between 1903 and 1938.<sup>19</sup> Figure IV reports the (log) percentage price gap in the two markets over time. The results show that the relative price difference between France and the colonies was much larger than the difference between UK and US. Given its magnitude, the result is unlikely to be driven by differences in trading costs. It seems that at least for cotton the prices that colonizers paid to Africans were lower than competitive prices.

To test whether this applies also to other commodities and to take into account directly trading costs, I compare observed and competitive prices at the African exit port. The observed price at the exit port is the sum of price to producers, inland transport costs, and warehousing and port costs. The competitive price is the difference between price in France and trading costs, including shipping and insurance costs. Table I shows summary statistics.

The ratio between observed and competitive price at the exit port can be then taken as an estimate of colonial extraction

$$E = 1 - \frac{p_A + s}{p - t} \tag{1}$$

where  $p_A + s$  is the observed price at the port (including price to producer  $p_A$  and costs within

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<sup>19</sup>My sources are the *Historical Statistics of the United States* [1975] and the Mitchell's *Abstract of British Historical Statistics* [1988].

Africa  $s$ ) and  $p - t$  is the competitive price at the port computed as difference between price in France  $p$  and trading costs from Africa to France  $t$ .

Under the null hypothesis of no extraction  $E = 0$ ; under the alternative  $E > 0$ . Standard errors are clustered at the colony/commodity level. In addition, in order to take into account potential correlations across commodities and across colonies, I also use a more conservative specification, allowing for two-way clustering at the colony level and at the commodity level [Cameron et al., 2006].<sup>20</sup>

Table II presents the results. Panel A tests for the presence of colonial extraction considering the full sample:  $E$  is positive and statistically different from zero at 1% level. We can thus reject the null hypothesis of no colonial extraction. On average, prices at the port were only 76% of what they should have been in a competitive market, without monopsony and labor coercion. In panels B, I check whether this result depends on specific periods. In all samples  $E$  is positive and highly statistically significant. All periods were subject to some extraction, but there were differences in magnitude. Extraction was lower at the beginning of the colonial rule (18%), increased after WW1 (35%), and decreased again to 18% after WW2. In the 1930s, as a consequence of decreasing world market prices, gaps were temporarily lower.<sup>21</sup>

To get a sense of the magnitude of these estimates, it is interesting to compute the ratio between actual and competitive price for other markets not subject to colonial extraction. Persson [2004] estimates the wheat price gap between UK and US prices as 13.3% of the US price in 1900, shipping costs as 6.9%, and insurance and ports charges as 3%. Prices at the export port were thus about 97% of the competitive price.<sup>22</sup> In French Africa colonial markets, prices were a much lower percentage of competitive prices, ranging from about 60% to 80%.

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<sup>20</sup>Given the small numbers of clusters, this procedure is very conservative and tends to over-reject the null hypothesis. Nevertheless, the results are unaffected.

<sup>21</sup>In almost all cases, results hold also using double-clustered standard errors. The only exception is the pre-WW1 period, when the coefficient of colonial extraction is not statistically different than zero.

<sup>22</sup>The residual 3% can be explained by inefficient arbitrage.

#### *IV.1 Robustness Checks*

The results of table II show that there existed a large gap between prices at African ports and French prices which cannot be explained by trading costs. To be able to interpret this as evidence of colonial extraction, we need to make sure that we have not miss-measured prices or underestimated trading costs. In addition, we need to be able to rule out alternative explanations for price gaps.

##### **Measurement Errors in Prices**

Prices in Africa and in France might be measured with errors. First, prices are computed as unit values (total value divided by total quantity) and can be prone to errors especially in the case of low-quantity observations. To check the robustness of the results against this type of error, I test whether  $E > 0$  when we exclude price data coming from observations with total quantity of 100 tons or less. Doing so, the sample is reduced to 880 observations, but  $E$  is still positive and statistically significant (coeff.=0.23, st.err=0.02).

Second, one might worry that, since exports were taxed on value, the trading companies underreported prices in order to reduce taxes. Nevertheless, this cannot be the case since values were registered by customs offices on the basis of prices fixed by the colonial government. Since one of the objectives of the colonial administrators was to increase the value of trade from the colonies, if there were incentives to miss-report African prices, they had to be towards over-reporting. In fact, in some cases (7%), the reported price in Africa is larger than the price in France. Nevertheless, this is not a problem as it would bias downwards our estimates of colonial extraction.

##### **Unobserved and Underestimated Trading Costs**

Even if we had exact measures of prices, we might still find gaps just because we are not considering some of the trading costs between African and French port. However, many of these costs are either already included in the price at the African port or they are excluded

from the price at the French port and cannot explain the difference between the two. Inland transport costs, warehousing and port costs in Africa are already included in price at the African port, while port charges in France and possible import taxes are not part of the price at the French port. Customs duties, on the other hand, should not be included as a potential explanation of price gaps since they only are a measure of how the profit from gaps was shared between the trading company and the colonial government.

Another possibility is that we are considering all trading costs, but we are underestimating them. However, this is unlikely to be the case. First, consider that the average price in Africa is 68% of the average price in France and observable trading costs are about 8%: if price gaps were due to underestimated costs, we would be underestimating them by over three times (see table I). Second, it is important to remember that, since the price at the African port is the sum of price to producer and trading costs within Africa, measuring colonial extraction at the port  $E$  is actually a lower bound for extraction at the producer level  $(1 - \frac{p_A}{p-t-s})$  because  $\frac{p_A+s}{p-t} > \frac{p_A}{p-t-s}$ .

### Alternative Explanations for Price Gaps

The observed gaps in prices between African and French ports cannot be explained by omitted or underestimated trading costs. There are, however, potential alternative explanations of these price differences that do not need to assume colonial extraction. To interpret gaps as evidence of extraction, we need to rule them out.

- *Market Frictions.* One might argue that we observe price gaps just because prices in Africa did not respond immediately to variations in world prices. These frictions can be due the slowness of transmission of price information and inefficient arbitrage which characterized early twentieth century trade. In particular, if because of this market rigidities African prices tended to remain low when world prices increased, we would observe positive gaps between African and French prices which could not be attributed to colonial extraction.

To mitigate this concern, consider that if  $p_A = p - t$  at time 0 (no extraction) and African prices are “sticky”, gaps at time 1 should be positive when the world price increases, but negative when the world price decreases. Thus, if we limit our analysis to years in which world prices net of trading costs decrease and we still find positive gaps, we can be confident that this is not due to market rigidities, but instead to colonial extraction. In effect, when we reduce the sample to just those observations for which the competitive price at time 1 is lower than at time 0, the average price gap is still positive (22%) and statistically significant (E=0.22; st.err=0.01; N=664).

- *Insurance of African Producers.* Bates [1981] reports that, in the case of British colonies, trade monopsonies had the *de iure* aim to insure African producers against fluctuations of world market prices through the mechanism of marketing boards. Farmers had to sell their production to the government and were paid less than world prices when prices were high. The difference was collected by the marketing board and was used, in theory, to pay higher prices to farmers whenever world prices were low. Similar institutions were established in French Africa with the name of *caisses de stabilisation*. We could then think that the observed gap between prices in Africa and France might actually be an “insurance premium” which Africans had to pay in order to stabilize commodity prices.

This interpretation however is not likely. First, marketing boards did not fully reach their objective of insuring producers and soon became a way to transfer resources from farmers to urban sectors of the society in order to gain political support [Bates, 1981]. In effect, in my sample, prices at the African port are larger than prices in France net of trading cost only in 14% of cases. Moreover, marketing boards and *caisses de stabilisation* were established only late in the colonial period (since 1940 in British Africa and since 1954 in French Africa, Nabe [1999]) and cannot explain price gaps that we observe from 1900s to 1940s.

- *Investments in Africa.* Even if it is now clear the described price gaps do exist, one might still be skeptical about interpreting them as evidence of extraction. In particular, one might argue that price differentials were used for colonial investments in public goods (transports, education, health) that would benefit African populations.<sup>23</sup>

A closer look to colonial budgets shows, however, that this could not be the case. Colonial investments were very small with respect to the profit from price differentials. In her working paper, Huillery [2014] provides relevant information on French West Africa. Colonial public investments included education, health, infrastructure, and support to productive sectors. Investments in health and education were extremely low: in an average year between 1907 and 1956 there were about 1,000 teachers and 1,400 doctors covering a population ranging from 12 to 25 millions. Support to productive sectors was equally low, averaging 1.6 million 1914 francs per year. Investments for infrastructure represented the majority of public investments, with an average of 58 million francs per year between 1907 and 1956.

The profits from price differentials from West Africa in the same period amounted at about 74 million.<sup>24</sup> Even if the colonizers had used only price differentials to fund public investments, which is very unlikely, they would have still made a significant profit. It is clear that this difference is likely to be even higher since part of price differential was taken directly by the trading company and did not increase the colonial government's revenue.

#### *IV.2 Trends Over Time*

The large gaps between prices in Africa and in France cannot be explained by trading costs, market rigidities, insurance mechanisms, or public investments. Overall, the evidence suggests that the colonizers reduced prices to African producers with respect to competitive

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<sup>23</sup>The part of the colonizer's profit which was used to run the colonies and implement trade and labor institutions just decreases the net profit and must be still included when we measure colonial extraction.

<sup>24</sup>The estimate of colonizer's profit is constructed by multiplying the average ratio of colonizer profit on the value of goods at the African port by the average value of total trade at African prices.

prices. It is interesting to observe the trend of this price reduction over time.

Figure V shows the average colonial extraction across all commodities and colonies. At the beginning of colonial rule, in 1900, there is no evidence of extraction: prices at port were not statistically different than competitive prices. In the following years, as colonial rule became more established and trade monopsonies got stronger, we observe a steep rise in extraction, which reached 30% in 1910s. Similar levels persisted until the Great Depression, when the decline of world market prices reduced the gap between world and African prices to about 10-20%. After this period, colonial extraction went back to its previous levels until the end of WW2.

Following the war, it became more difficult for the colonizer to justify the use of coercive institutions in front of the public opinion both in France and in the colonies. Forced labor, for example, was abolished in 1946 in the entire French Africa. Compulsory productions in Equatorial Africa persisted for a little longer, but were also abolished in 1956. This trend was reflected in a reduction of colonial extraction: in the post-war period price gaps declined to about 20%. Despite this improvement, at the eve of independence prices in Africa were still lower than competitive prices. Even if the colonizers relied less on labor coercion during the post-WW2 period, trade monopsonies persisted and so did colonial extraction.

Was this general trend common to all colonies? Figure VI presents the extraction measure over time in each French territory. Equatorial colonies (Gabon, Congo, Ubangi-Shari, and since mid-1920s, Chad and Cameroon) followed the general trend very closely, with higher average extraction. From low levels in 1900, price gaps quickly rose to almost 60%, level which was maintained until the Great Depression. The rapid increase in colonial extraction can be linked to the intensifying of the operations of concessionary companies in the French Congo at the beginning of the century [Coquery-Vidrovitch, 1972]. In the late 1920s-early 1930s, price gaps decreased, consistently with both the abolition of the concession system and the 1929 crisis which reduced the profit margin of the trading companies [Suret-Canale, 1971]. Price differentials increased again to 40% in the late 1930s. The consolidation

of cotton compulsory cultivation in Ubangi-Shari and Chad can partly explain this rise [De Dampierre, 1960].<sup>25</sup> After WW2, as coercive institutions lost their prominence, colonial extraction gradually diminished, reaching 20% at the end of the colonial period.

In West Africa, the general trend was followed, but the colonies exhibited more heterogeneous specific patterns. Senegal and Ivory Coast experienced a rise in extraction in the early colonial period, similar to the one we observe in Equatorial Africa, but the drop from the high initial levels (40-60%) tended to happen way before the Great Depression, in 1910s. In other colonies, such as Dahomey, Togo and Guinea, we observe much lower price gaps (20-30%) since the early years. After the 1910s, a similar pattern was followed by all Western colonies, but variations over time in the level of extraction were less pronounced than in Equatorial colonies: price reductions oscillated around 20% and 30% until independence. The lower level of extraction in West Africa is consistent with historical accounts of the less prominent use of coercion in Western with respect to Equatorial colonies [Manning, 1998, Suret-Canale, 1971, Thompson and Adloff, 1957].

Observing extraction across territories, it is clear that, even if the general trend is common, there are important differences in the level and timing of variations. Did similar differences exist also across commodities? Figure VII shows the evolution of price reduction on cocoa, cotton, palm kernel, and peanut, pooling the different colonies together. Cocoa and palm kernels (and peanuts, if we take into account the large standard errors of the early years) follow the general trend. From low levels at the beginning of the period, price gaps rose to 30-40%. Then, after the temporary reduction during the Great Depression, extraction rates decreased to 20% near independence. Cotton, instead, experienced high levels of extraction already at the beginning of the colonial period (60%), which decreased to 40% after 1920 and to 20% in the post-war period. Interestingly, cotton was also the only commodity to experience an increase in extraction in 1950s, while for all other commodities extraction levels

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<sup>25</sup>This result is consistent with the historical evidence documenting the increase of rent extraction after the introduction of coercive labor institutions. Suret-Canale [1971, p.223], for example, reports that, after compulsory cultivations were established for cotton in Equatorial Africa, a rise in world prices would have implied an increase of profit for the trading companies which was twice as much as that for African farmers.

decreased after WW2 and remained low until independence.

## V CONCLUSIONS

Extractive colonial institutions are considered one of the main causes of current African underdevelopment [Acemoglu et al., 2001, Nunn, 2007]. Yet, since colonial extraction is hard to quantify and its precise mechanisms are not well understood, we still do not know exactly how successful the colonizers were in extracting wealth from Africans.

In this paper, I investigated this issue by exploiting the peculiar structure of monopsonistic trade and coercive labor policies employed by the French colonizers. By using a new dataset of export prices, I constructed yearly estimates of extraction at the colony/commodity level for almost the entire colonial period, as proxied by the gap between prices to Africans and in the world markets. The evidence suggests that African prices were substantially lower than world market prices and that this difference cannot be explained by trading costs. According to the estimates, African prices would have been about 30% higher if the colonizers had not employed extractive institutions.

Having quantified the extent of extraction through trade during the colonial period, the next step is to understand the details of the impact of colonial trade monopsonies and coercive institutions on current economic development. The level of extraction, in fact, varied greatly across colonies and commodities and this variation can help explaining the different paths of growth in African countries and regions. Moreover, there are reasons to believe that the extractive character of these specific institutions persisted in the post-colonial era. Coercive labor institutions were abolished by independence, but trade monopsonies persisted and post-independence governments kept practicing price policies that discriminated against agricultural producers [Bates and Block, 2009]. Our clearer understanding of extraction during colonialism calls now for future research aimed at examining how institutions established in colonial times still affect current agricultural trade policies and economic development.

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## VI FIGURES AND TABLES

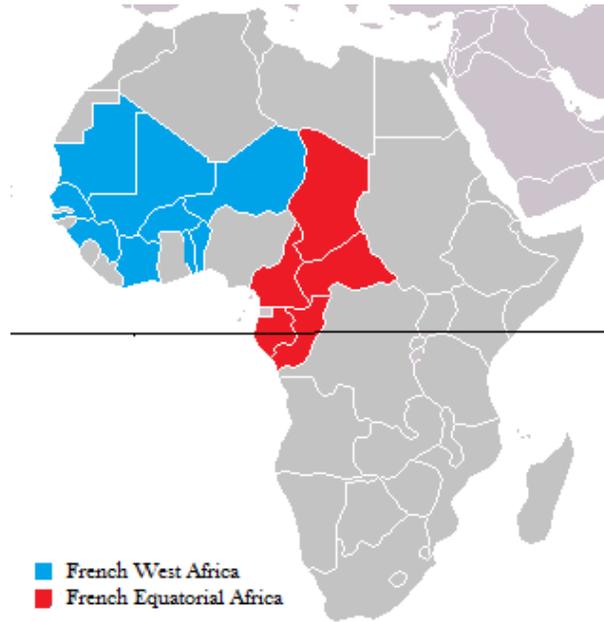
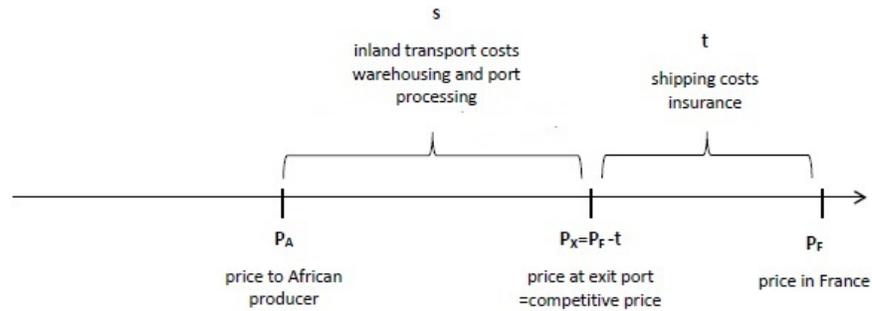
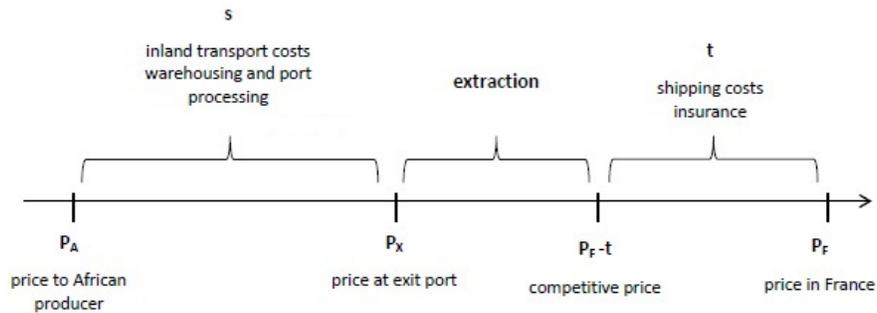


FIGURE I  
French West and Equatorial Africa

Togo and Cameroon were not formally part of the two main federations, but they were traditionally included in West and Equatorial French Africa, respectively.



(A) Without colonial extraction



(B) With colonial extraction

FIGURE II  
Price Formation

The top and bottom panel report the relationship between price to African producers, at the exit port, in France, and trading costs without and with colonial extraction.

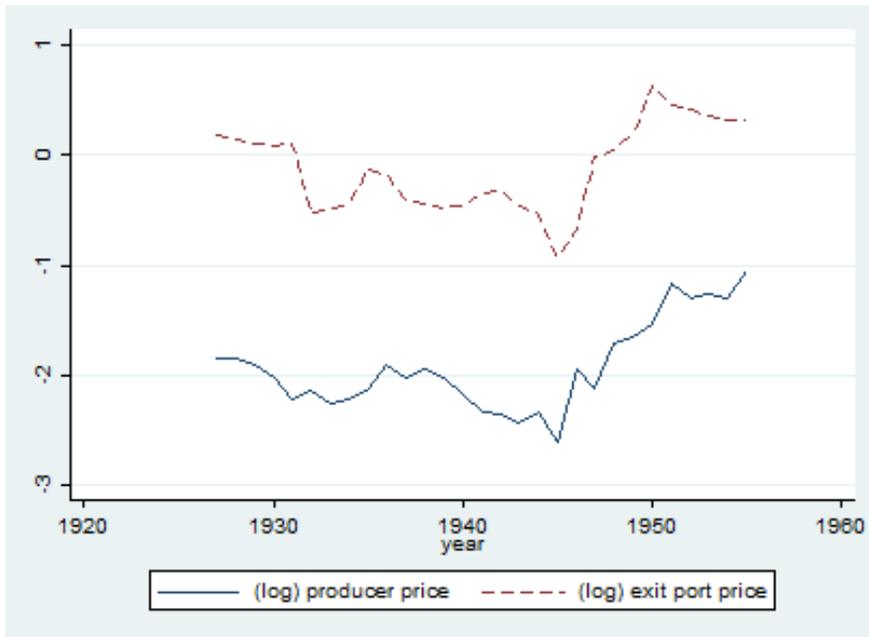


FIGURE III  
Cotton Producer and Port Price, Ubangi-Shari

The figure reports the trend (local mean smoothing) of (log) prices for cotton in Ubangi-Shari at the producer and port level. In (log) 1900 French francs.

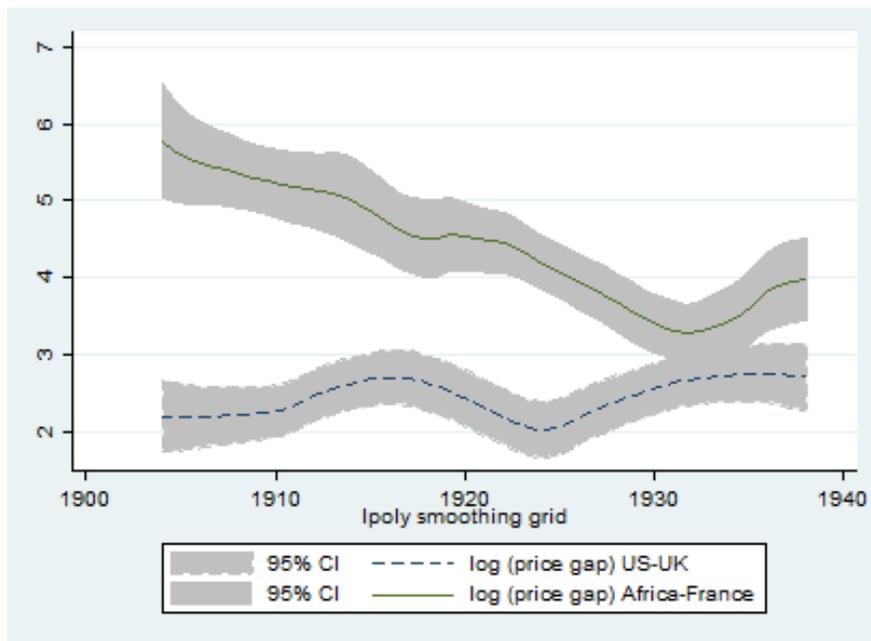


FIGURE IV  
Cotton Price Gap between UK and US vs. France and French Africa

The figure shows the trend (local mean smoothing) of (log) price gaps in the US-UK and in the Africa-France cotton markets. Price gaps are defined as the difference between price at destination and price at the origin, divided by price at the origin.

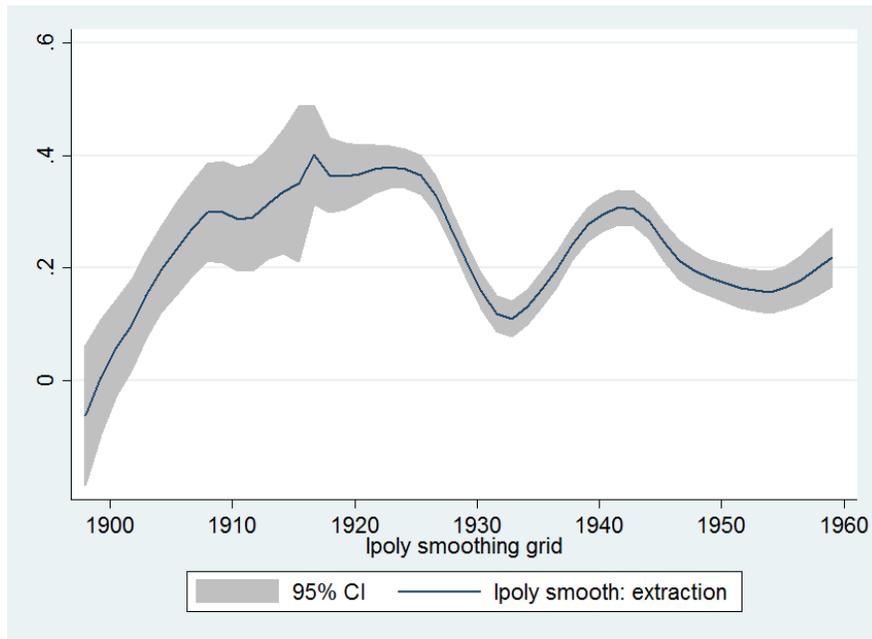


FIGURE V  
Colonial Extraction over Time

The figure shows the trend (local mean smoothing) of colonial extraction, defined as one minus the ratio between observed price at the African port and competitive price (price in France net trading costs). All colonies and commodities are pooled together.

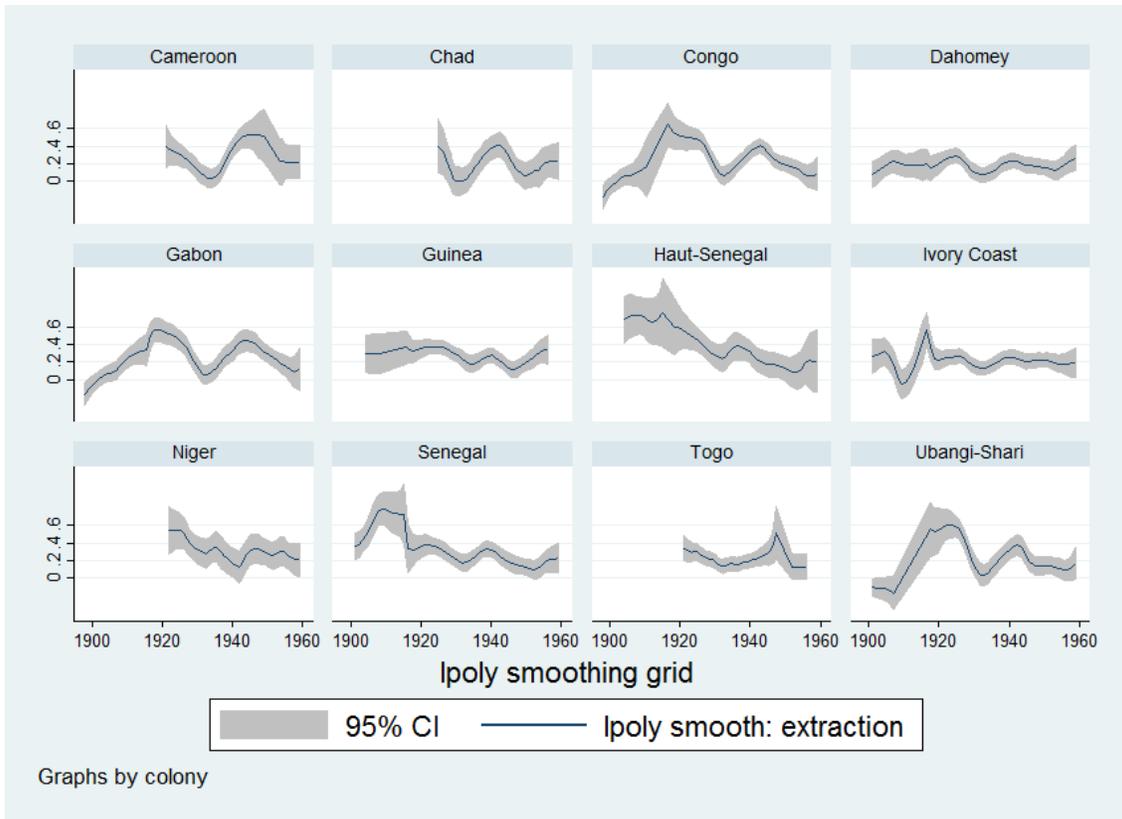


FIGURE VI  
Colonial Extraction over Time, by Colony

The figure shows the trend (local mean smoothing) of colonial extraction, defined as one minus the ratio between observed price at the African port and competitive price (price in France net trading costs). Graphs are presented separately by colony.

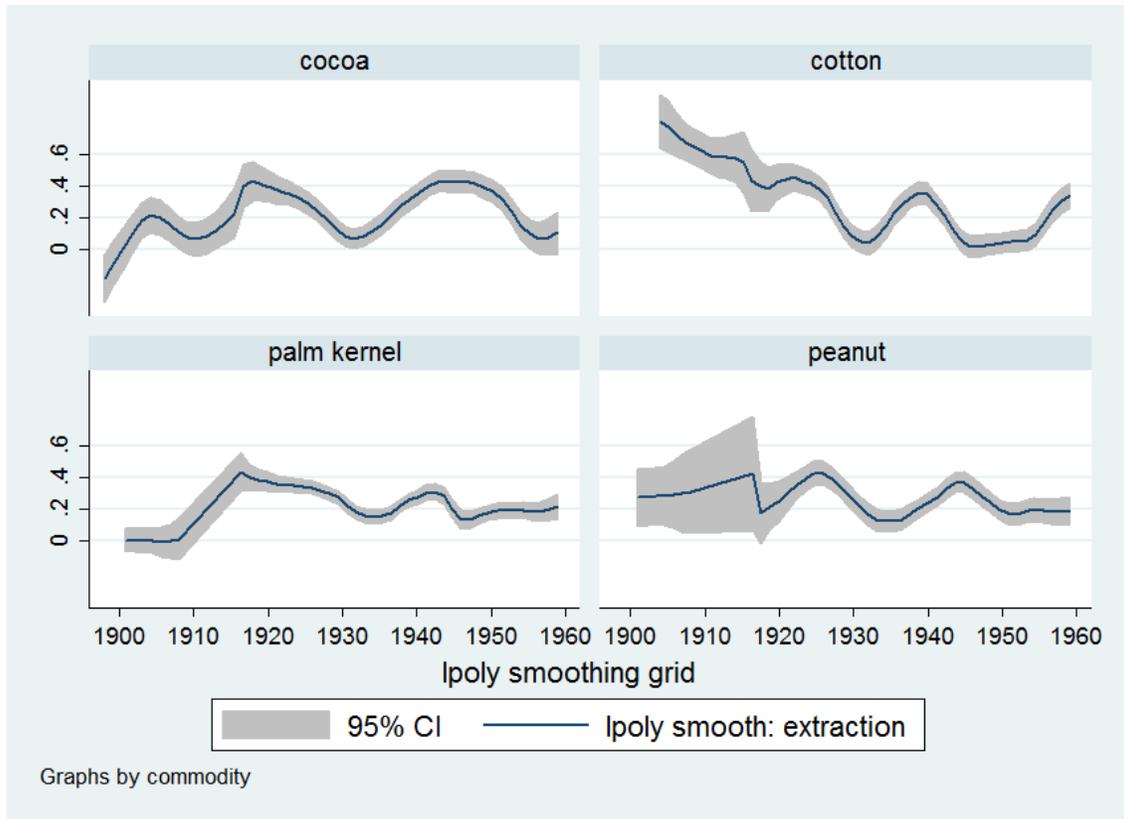


FIGURE VII  
Colonial Extraction over Time, by Commodity

The figure shows the trend (local mean smoothing) of colonial extraction, defined as one minus the ratio between observed price at the African port and competitive price (price in France net trading costs). Graphs are presented separately by commodity.

TABLE I  
Prices in Africa, Trading Costs, and Prices in France

variable	mean	% price at French port	sd	min	max
exit price at African port	0.51	68%	0.49	0.04	2.97
trading cost	0.06	8%	0.03	.01	0.15
price at French port	0.75	100%	0.62	0.10	3.19

Price per kg in 1900 French francs. N=1050.

TABLE II  
Testing for Presence of Colonial Extraction

	mean	st. err.	N
A overall	0.24***	0.01	1050
Pre-WW1	0.18***	0.06	89
Pre-Great Depression	0.35***	0.02	248
B Thirties	0.15***	0.02	293
WW2	0.33***	0.03	155
Post-WW2	0.18***	0.02	265

\*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% level with standard error clustered at the colony/commodity level.

## A DATA APPENDIX

This section describes the sources of the data on prices.<sup>26</sup>

**Prices in Africa.** Prices are in 1900 French francs per kg. I obtained them by dividing the total value by the total quantity of exports. Quantities are in tons. Values in Africa are either in French francs or in francs CFA (franc des Colonies françaises d’Afrique). The conversion rate is 1 franc CFA=1 FF before 1946, =1.7 FF between 1946 and 1948, =2 FF after 1949. Exchange rates between francs, pounds, and dollars come from Officer [2013]. To deflate prices in 1900 FF, I use data from France-Inflation.com, reporting inflation rates since 1901. For 1898-1900, I assume the same inflation as in 1901.

The sources are: *Statistiques coloniales. Commerce* volumes from 1898 to 1906; *Statistiques du commerce des colonies françaises*, volumes from 1907 to 1914 (excluding 1908); *Reinseignements généraux sur le commerce des colonies françaises et la navigation* volumes from 1920 to 1928; *Bulletin Economique de l’Afrique Equatoriale française*, volumes from 1931 to 1936; *Bulletin mensuel de l’Agence économique de l’Afrique Occidentale Française*, volumes from 1930 to 1939; *Bulletin mensuel d’information. Cameroun, Togo*, volumes from 1933 to 1937; *Annuaire statistique de France*, volumes from 1930 to 1935; *Annuaire Statistique de l’AOF, 1933-38*; *Chambre de Commerce du Cameroun. Statistiques Commerciales 1935-37*; *Statistique du Commerce Exterieur de l’AEF, 1936-47*; *Annuaire Statistique du Cameroun, 1938-45*; *Annuaire Statistique de l’AOF et du Togo* volumes 1949 and 1950-54; *Annuaire Statistique de l’AEF* volumes 1936-50 and 1951-55; *Bulletin de la Statistique Générale de l’AOF, 1956*; *Bulletin Statistique Mensuel du Togo, 1957*; *Bulletin Mensuel Statistique et Economique 1959-60*; *Ministère de la France d’Outremer. Documents et Statistiques, 1949-67*. For some colonies and years, sources are not available. In particular: 1922, 1945-55, 1957-59 for Togo; 1922-23, 1929-31, 1946-57 for Cameroon; 1908, 1915-19, 1954-55, 1957 for West Africa colonies; 1908, 1915-19, 1956-57 for Equatorial Africa colonies.

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<sup>26</sup>Details about the sources used for each specific colony, commodity, and year are available upon request.

**Prices in France.** In 1900 French francs per kg. I obtained them by dividing the total value by the total quantity of imports to France from the colonies. The sources are *Statistiques du commerce extérieur de la France*, volumes from 1902 to 1959, and various issues of the *Annuaire statistique de France*.