African Economic Growth 1900-50: Historical National Accounts for British Colonial Africa

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African Economic Growth, 1900-50: Historical National Accounts for British Colonial Africa

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The study of growth in African economies during the 20th Century is hampered by the lack of historical GDP estimates. There has been some backward projections, and country case studies, but despite the available data historical national accounts has not yet been assembled. This paper provides GDP estimates for some former British colonies between 1900 – 1950. The estimates indicate faster growth and economic expansion compared to the previous estimates that have been based on backward extrapolations. It further brings support to the argument that if we observe economic growth in many economies from the 1890s to the 1970s and then only interrupted from 1975s to 1995s, writing about the 20th century for Africa as a growth tragedy may be a mistake, caused by lack of data. New time series data on economic growth may foster a research agenda devoted to the study of different growth trajectories on the continent.

INTRODUCTION

The chief constraint for studying the history of economic growth in African economies is data availability. Because the history of economic growth has been constructed using data from databases, the year 1 in economic growth in Africa has been 1960 (as per the World Development Indicators) or 1950 (as per the Madison Database and part of the Penn World Tables). This has meant that the history of economic growth in Africa has been typically written from the year of the starting date of the database. As a result, studies of economic growth have either focused on the period after 1960 or on the GDP per capita today as an outcome, thus not using time-series data at all, as the second generation of growth literature does (Jerven 2015).

The availability of data has shaped the literature on African economic growth. For example, when Artadi and Sala-i-Martin (2003) address the "the economic tragedy of the twentieth century,"

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the data they marshal to investigate that tragedy covers only 1960 to 2002. It is plausible that if the authors had stepped outside their own dataset, they could easily have found ways to figure out that "economic tragedy" is not an appropriate way to describe growth in African economies across the twentieth century. The problem is that scholars who depend on databases act like anything that is outside their database does not exist. Of course, many studies of economic growth go farther back. For example, some colonial statistical offices produced national account estimates as early as the late 1940s. One example is the rudimentary yet official estimates that were made for Rhodesia and Nyasaland from 1945 onward. In addition, many scholars have provided estimates for parts of the colonial period (e.g., Okigbo 1962; Szereszewski 1965; Deane 1953; Bigsten 1986).

Recently there has been some efforts to make new estimates, such as the ones provided by Jerven (2014), for the Gold Coast. [i]That study underlined that growth in the Gold Coast was strong since the 1890s, as supported by other evidence on real taxation, real wages and heights for the same period (Albers, Jerven and Suesse, 2018, Wajenburg and Frankema, 2012 and Moradi, 2008). Morover, the data showed stronger periods of growth in the interwar period, than the simple backward polation as implied by the making use of the Maddison 1950 estimates, and the single year estimates provided by Szereszewski (1965). De la Escosura (2012) made use of econometric techniques to estimate growth backwards for the African continent from 1950 to 1850 and guesstimated that growth was observable, yet modest. This exercise makes use of the colonial archive data to assemble new time series data on GDP growth for a selection of former British Colonies in Africa. The paper proceeds by describing the data and the methodology by which the estimates are arrived at, and then presents the results.

DATA AND METHODOLOGY

Today, the national accounts for the United Kingdom are recorded in the "Blue Books". This convention has deep roots, extending to the British colonies in the nineteenth and twentieth centuries. These Blue Books recorded a great deal of data for each colony on an annual basis and have been used extensively by economic historians, particularly recentely (Frankema and van Waijenburg 2012).

GDP can be calculated using the expenditure, income and output approaches. Each approach has different demands in terms of data. The data recorded in the Blue Books are most relevant to the output approach, which is calculated as the sum of value added in agriculture (A), industry (I) and services (S):

$$GDP = A + I + S \quad (1)$$

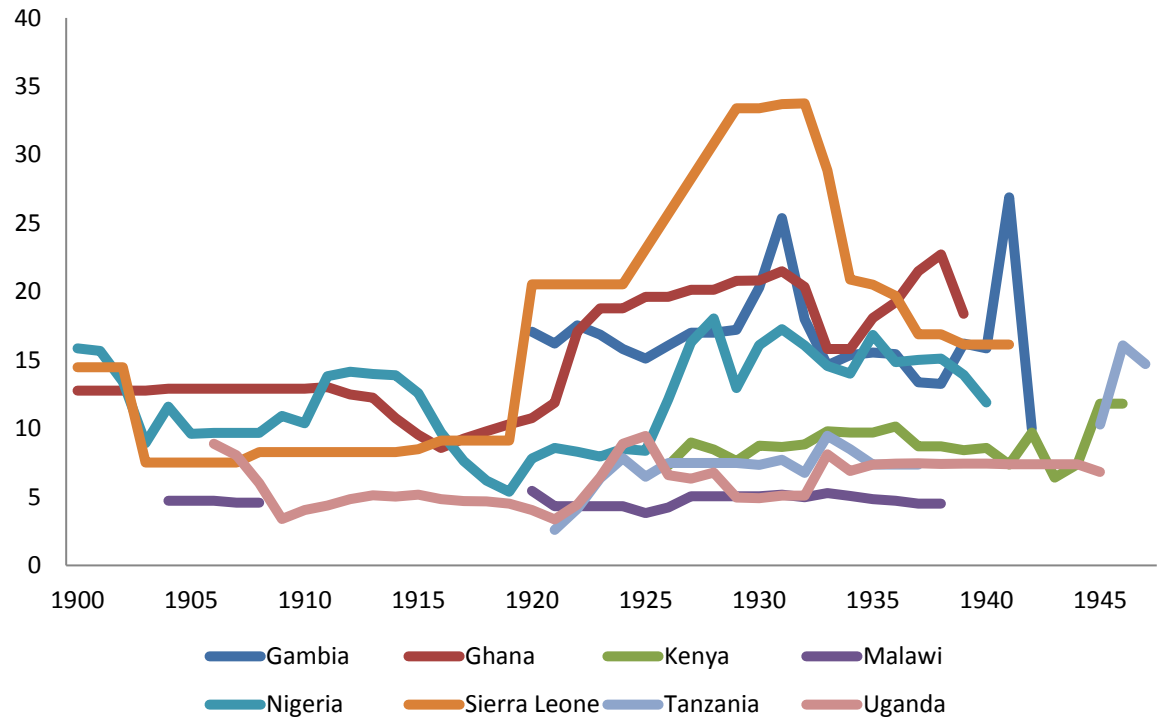
The output approach has been used extensively in the construction of historical national accounts. Simplified versions, based only on an agricultural and non-agricultural sector, have been applied to the cases of Italy between 1270 and 1850 (Malanima 2011) and Spain between 1300 and 1913 (Álvarez-Nogal and Prados de la Escosura 2013). More complex versions, which expand the non-agricultural sector into industry and services, are also common, such as Broadberry et al. (forthcoming) for China between 980 to 1840, Broadberry et al. (2015) for England and Great Britain between 1270 and 1870, Fourie and van Zanden (2013) for the Dutch Cape Colony between 1701 and 1795, Schön and Krantz (2012) for Sweden between 1560 and 1800 and van Zanden and van Leeuwen (2012) for Holland between 1347 and 1807.

Wages, Prices and Population

The output approach requires information on wages, prices and population. Using the Blue Books, the wage index is comprised of a representative wage in agriculture (a predial laborer, for example), industry (such as a builder) and services (for example, a domestic servant) and weighted according to the sector's share in total employment, which are derived from the censuses discussed in the appendix.[2] Wages were recorded on either an annual, monthly, weekly or daily basis. In each case, the wage in question was annualized by assuming 312 working days or 52 working weeks per year following Frankema and van Waijenburg (2012). When a minimum and maximum wage was documented, we recorded the average. The new index builds upon Frankema and van Waijenburg (2012), who constructed separate series for rural unskilled, urban unskilled and urban skilled males, by aggregating these individual wage rates to yield a representative index. The series are plotted in figure 1.

[2] There is sometimes missing information in the underlying sources. In these instances, we linearly interpolate if the gaps are relatively short.

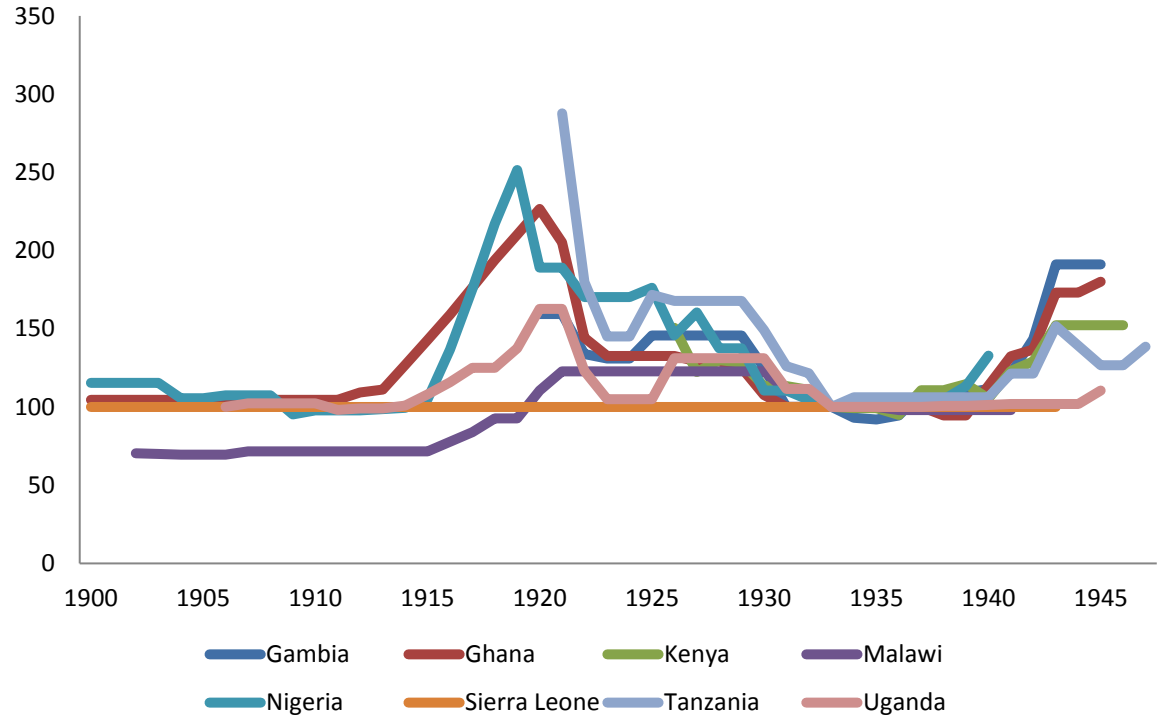
Figure 1: AFRICAN REAL WAGES, 1900-47 (1933 £)



We also construct indices of agricultural, non-agricultural and consumer prices. Using data from Frankema and van Waijenburg (2012), which is based on information recorded in the Blue Books, we collect the median price change from the basket of retail prices and cumulate the inflation rates into indices. The agricultural price index is based on the agricultural goods in the consumption basket, such as maize, rice and wheat. The non-agricultural price index is based on the non-agricultural goods in the consumption basket, such as coal, kerosene and soap. Our classification of agricultural and non-agricultural goods is shown in table A1. The consumer price index is based on all of the goods listed in the table.

The median consumer price index is preferred over a standard index weighted by consumption. The Federal Reserve Bank of Cleveland produces a median consumer price index, arguing that it provides a clearer signal of inflation. In historical contexts, this is likely to be amplified, as the consumption baskets, where they are available, are likely to be based on a small sample of households and for a single snapshot in time. Economic historians have also embraced median consumer price indices, such as Andersson and Lennard (forthcoming) in the case of Ireland in the nineteenth and early-twentieth centuries. The new indices are shown in figure 2.

AFRICAN CONSUMER PRICE INDICES, 1900-48 (1933 = 100)



Source: See text.

Population data is from Frankema and Jerven (2014).

Agriculture

Agriculture was the largest sector in the African economy. Unfortunately, it is not possible to directly calculate agricultural output using the Blue Books. However, a common approach in output-based historical national accounts is to estimate agricultural production using a consumption function for agricultural goods (Álvarez-Nogal and Prados de la Escosura 2013; Malanima 2011; Schön and Krantz 2012), which is sometimes adjusted for net trade in food to yield agricultural production. Following Allen (1999), we calculate:

$$Q = aP^{e}I^{g}M^{b}N$$

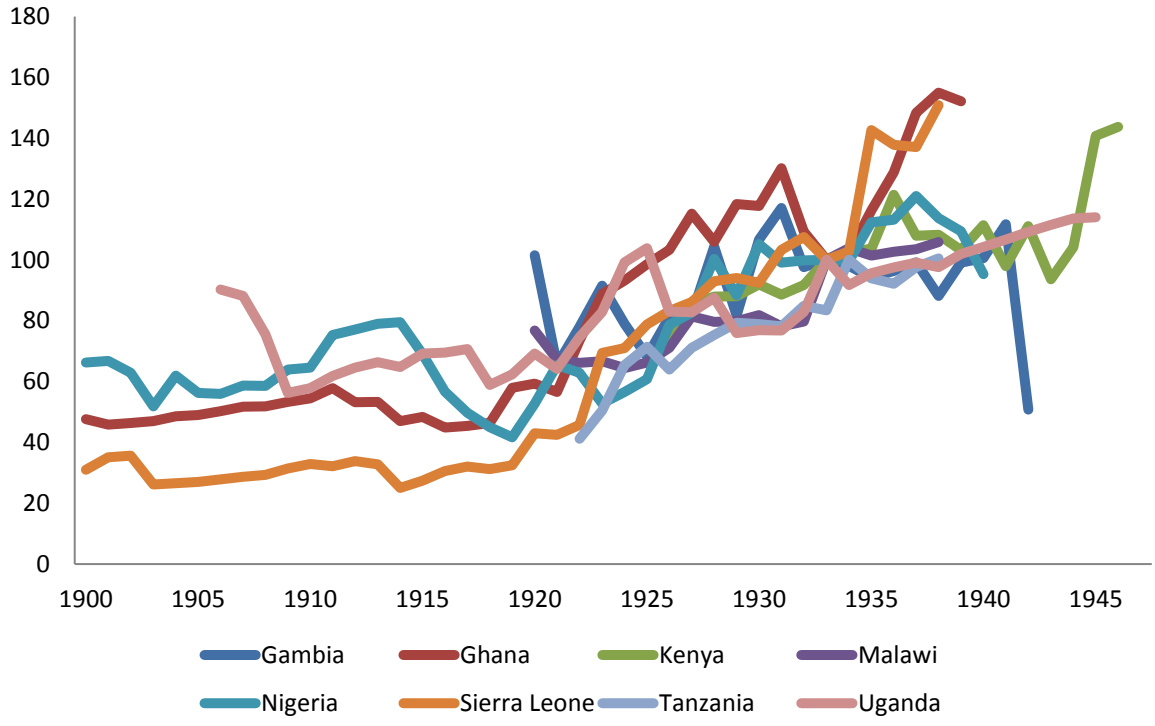
(2)

where Q is the volume of agricultural consumption, P is the real price of agricultural goods, I is real income per head, M is the real price of non-agricultural goods and N is the population. a is a constant, e, g, b are own-price, income and cross-price elasticities. P, I and M have all been deflated by the consumer price index. Following Allen (2000), we set $a = 1$, $e = -0.6$, $g = 0.5$ and $b = 0.1$. This assumes that agricultural consumption is a positive function of income and the relative price of non-agricultural goods and a negative function of the relative price of agricultural goods.

In a closed economy, agricultural consumption is equal to production but in an open economy, trade should be taken into account. In most studies, closed economies are assumed for simplicity (Álvarez-Nogal and Prados de la Escosura 2013; Broadberry et al. 2015; Malanima 2011) or Q is multiplied by the ratio of agricultural production to consumption that is either constant or changes infrequently (Allen 2000).

In this paper, we add net exports of agricultural goods to our series of agricultural consumption to yield agricultural production, which captures the fact that an important part of African economic activity was the production of cash crops for the export market. The Blue Books recorded the import and export of agricultural goods under classes 1 ("food, drink and tobacco") and 2 ("raw materials and articles mainly unmanufactured"). The aggregates values of these classes were transcribed and deflated by the agricultural price index. The new series of agricultural output are shown in figure 4.

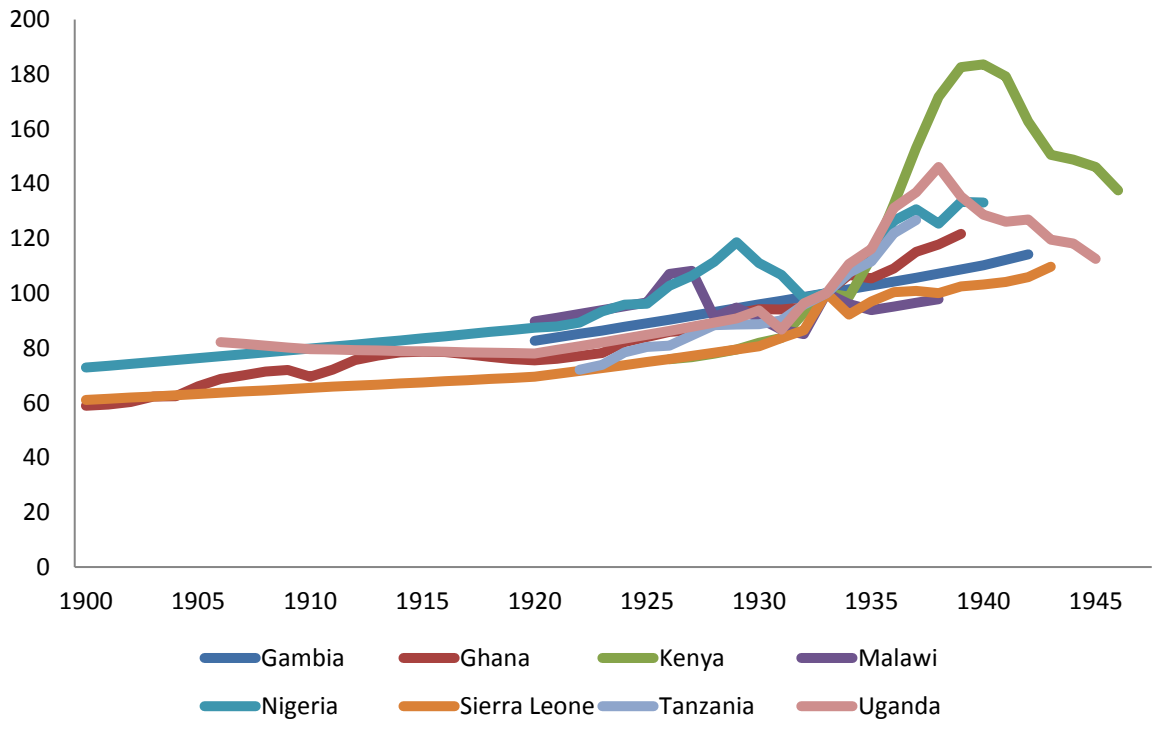
FIGURE 3 AFRICAN AGRICULTURAL OUTPUT, 1900-46 (1933 = 100)



Industry

Industry was the least important sector in terms of its share of output, comprising of three main branches: building, mining and manufacturing. Building is assumed to grow in line with population, as in Broadberry et al. (forthcoming; 2015), Fourier and van Zanden (2013) and Schön and Krantz (2012). Mining, both the value and volume, was recorded in the Blue Books. Manufacturing output was not recorded in the Blue Books, which note that "no important manufactories exist and no information is available regarding native industries". Following Broadberry et al. (forthcoming), manufacturing is proxied by population. The new indices of industrial output are shown in figure 5.

FIGURE 4 AFRICAN INDUSTRIAL OUTPUT, 1900-46 (1933 = 100)

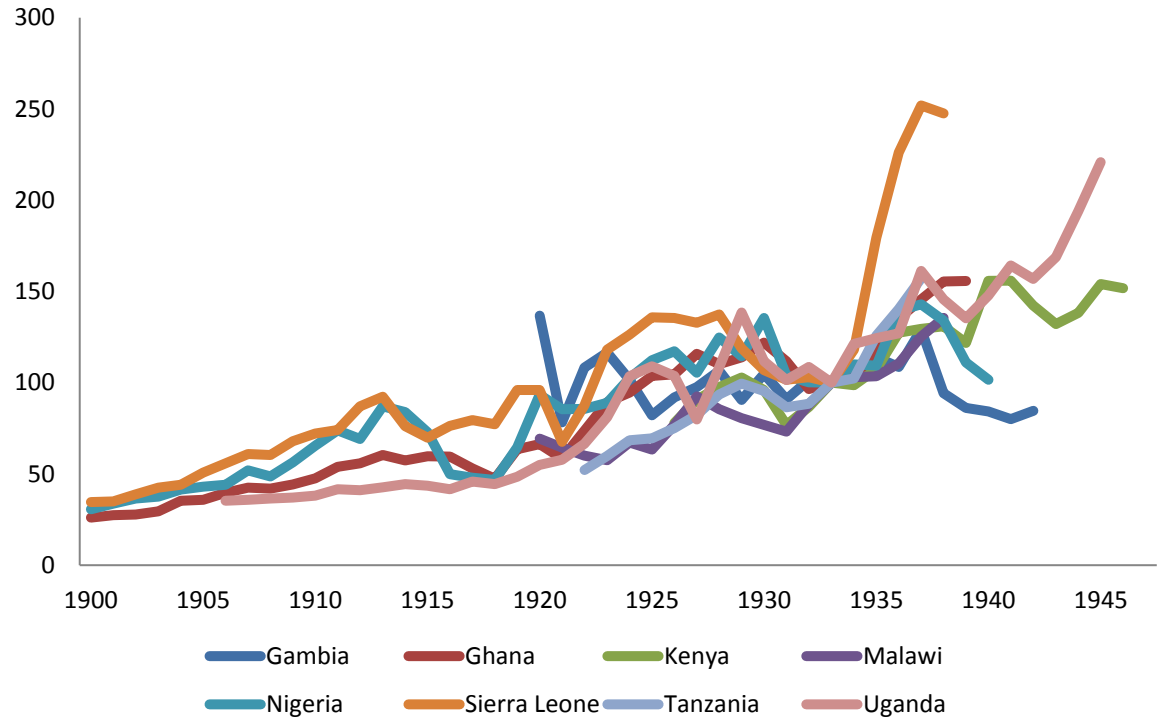


Services

Services were a relatively important sector of the African economy, involving the following branches: communications, distribution, domestic services, finance, government, housing, transport

and other services. Communications is the revenue of the "posts and telegraphs", which included revenue from telegraph and telephone receipts, postage of letters and parcels, wireless licenses etc., deflated by the services deflator. Distribution is a weighted average of exports (60 percent) and industrial output (40 percent), as in Broadberry et al. (2015). Exports were deflated using a weighted average of the agricultural and industrial price indices, where the weights were derived from table 1. Domestic services and housing are proxied by population, following Broadberry et al. (2015). Finance is based on the number of banks in operation (Broadberry et al. 2015). Government is measured as total government revenue (Broadberry et al. 2015), deflated by the services deflator. Transport is the revenue of railways and tramways, deflated by the services deflator. Other services are assumed to grow in line with the weighted average of the services described above. The new series of services output are shown in figure 6.

FIGURE 5 Service Output



Gross Domestic Product

In order to aggregate the branch indices into sectoral indices, a benchmark is needed that relates each branch to a sector. In this paper, we allocate Okigbo's (1962) estimate of nominal GDP for Nigeria in 1950 to the branches and sectors reported in table 1.

TABLE 1

SECTORAL SHARE OF NOMINAL GDP, 1933 (PERCENT)

Sector	Share
Agriculture	65.9
Industry	6.4
Building	1.6
Mining	1.1
Manufacturing	3.7
Services	27.7
Communications	0.4
Distribution	10.6
Domestic services	0.5
Finance	0.1
Government	2.1
Housing	1.2
Transport	4.5
Other services	8.4
Total	100.0

Source: Derived from Okigbo (1962).

The indices of the volume of agricultural, industrial and services production can be converted into nominal indices by multiplying the respective volume index by a respective price index. For agriculture, the deflator is the agricultural price index described above. For industry, the deflator is a weighted average of the price indices for building, mining and manufacturing. Building prices are proxied by the index of nominal industrial wages described above, as in Broadberry et al. (2015). Mining prices are calculated using the aforementioned values and volumes of mining output. Manufacturing prices are proxied by the non-agricultural price index discussed above. The weights are based on the industrial output shares in table 1. For services, the deflator is a weighted average of distribution prices and other services prices. Distribution prices are again a weighted average of agricultural and industrial prices, as in Broadberry et al. (2015). Other services prices are the index of nominal services wages described above, as in Álvarez-Nogal and Prados de la Escosura (2013) and Broadberry et al. (2015), where the weights are calculated from table 1.

The indices for real GDP are a weighted average of the sectoral indices. The GDP deflators are a weighted average of the sectoral deflators. The weights are listed in table 1. The indices of nominal GDP are calculated by multiplying real GDP and the GDP deflator.

An important consideration is whether the shares, which were derived from Nigerian national accounts, are appropriate for the other economies that we study. Evidence from the censuses indicates that the occupational structure was similar across all of the economies. Thus, the assumption is that labor productivity in each sector was equivalent across economies.

To convert the indices into the level of GDP, we use the benchmarks reported in table 2 from Prados de la Escosura (2012) multiplied by population from Frankema and Jerven (2014), where 1933 = 100. For the first half of the twentieth century, Prados de la Escosura (2012) reported benchmarks for 1900, 1913, 1925, 1929, 1933, 1938 and 1950. The only benchmarks for which we have GDP estimates for all countries are 1929 and 1933. As the value added shares in table 1 are based on Nigeria in 1950, we chose 1933 on the basis that it is closer in time.

TABLE 2

AFRICAN GDP PER CAPITA IN 1933

(1990 INTERNATIONAL DOLLARS)

Country	
Gambia	486
Ghana	740
Kenya	503
Malawi	300
Nigeria	595
Sierra Leone	482
Tanzania	334
Uganda	569

Source: Prados de la Escosura (2012).

In order to calculate agricultural output, we estimated an agricultural demand function. While we use parameters that have been used widely in the literature, it could be that our results are sensitive to the calibration. We therefore re-estimate real GDP per capita for each country using two alternative sets of parameters. The first column of table 3 reports the baseline results, where the own-price, income and cross-price elasticities are set to $e = -0.6$, $g = 0.5$ and $b = 0.1$, respectively. The second column shows the results for $e = -0.5$, $g = 0.4$ and $b = 0.1$, as in Malanima (2011). The third column reports those for $e = -0.5$, $g = 0.4$ and $b = 0.1$, as in Prados de la Escosura (2013). As can be seen, the average (μ) and standard deviation (σ) of real GDP per capita growth are not materially affected by the choice of parameters.

TABLE 3

ROBUSTNESS TO ALTERNATIVE CALIBRATION

(PERCENT)

Country	Sample	$e = -0.6$, $g = 0.5$, $b = 0.1$		$e = -0.5$, $g = 0.4$, $b = 0.1$		$e = -0.4$, $g = 0.3$, $b = 0.1$	
		μ	σ	μ	σ	μ	σ
Gambia	1920-42	-0.9	16.7	-1.2	17.4	-1.5	18.5
Ghana	1900-39	3.6	8.3	3.8	8.4	3.9	8.7
Kenya	1926-46	3.8	9.3	3.7	9.0	3.7	8.9
Malawi	1920-38	2.5	7.5	2.5	6.9	2.5	6.3
Nigeria	1900-40	1.9	10.5	1.9	9.5	1.9	8.6
Sierra Leone	1900-38	4.9	11.2	4.9	11.3	5.0	11.8
Tanzania	1922-37	5.8	7.6	5.6	6.8	5.4	6.1
Uganda	1906-45	2.0	8.2	2.0	7.2	2.0	6.2

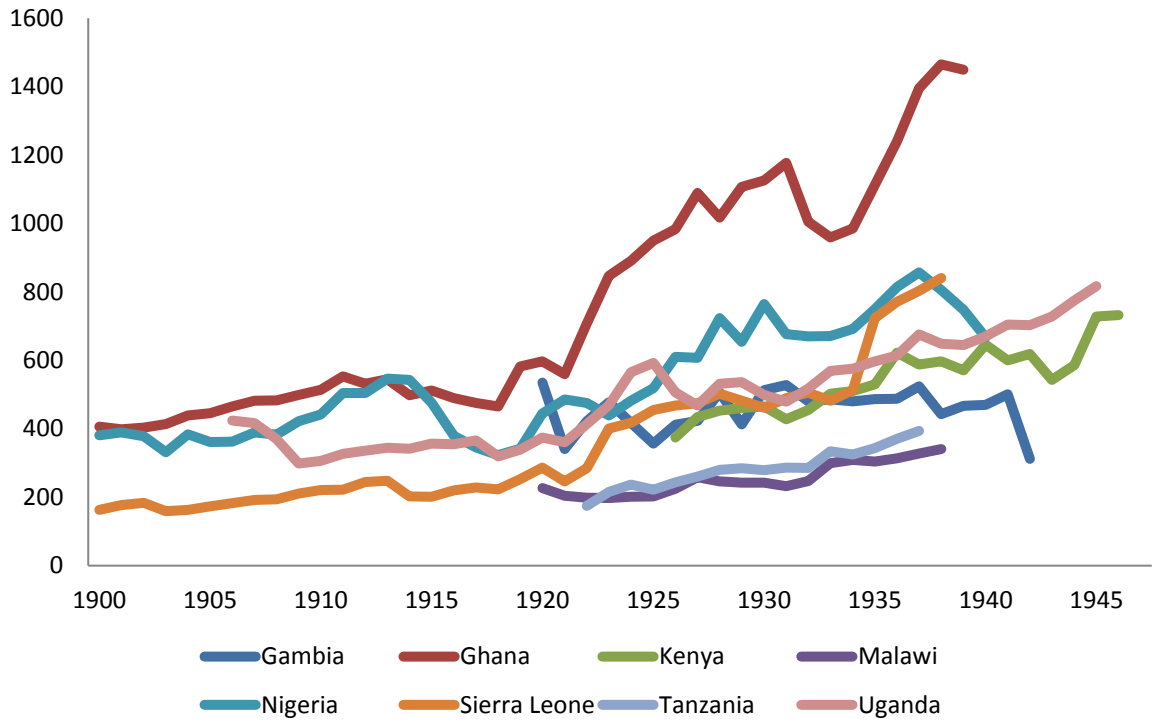
Source: See text.

RESULTS

The GDP growth series is displayed in Figure 6. The pronounced growth in the interwar years as estimated for the Gold Coast by Jerven (2014) using just sectoral weights and quantities is confirmed by this alternative method. Growth is faster in the Gold Coast (Ghana) than in other British Colonies, yet, all the countries are on a path of growth.

FIGURE 6

AFRICAN GDP PER CAPITA, 1900-46 (1990 INTERNATIONAL DOLLARS)



Source: See text.

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APPENDIX

While the paper sets out the blueprint for constructing the historical national accounts, this appendix outlines the departures from that blueprint that were needed to deal with differences in data availability from country to country, as well as other country-specific information.

Gambia (1920-42)

Three adjustments were necessary in the case of Gambia. First, wages in industry were not reported from 1928. Therefore, wages in this sector are assumed to grow in line with a weighted average of wage growth in agriculture and services. Second, the Blue Books note that there were "no mines." As a result, industrial output comprised solely of building and manufacturing. Third, no information was recorded on transport output. Therefore, it is assumed to grow in line with the output of services that were recorded.

To weight our index of wages, we calculated shares of total employment for agricultural, industry and services, which were based on the 1931 *Report and Summary of the Census of the Gambia* (1932).

Ghana (1900-39)

There were two caveats to the estimates for Ghana. First, agricultural wages were not reported before 1925. Therefore, the aggregate wage index is spliced back from 1925 using a weighted average of wages in industry and services. Second, the Blue Books did not record the exports of class I and II goods separately from 1933. As a result, we extrapolate using total exports.

To weight our index of wages, we calculated shares of total employment for agricultural, industry and services, which were based on Aboagye and Bolt (2018).

Kenya (1926-46)

No departures from the blueprint were necessary for Kenya other than for the calculation of employment shares. The 1931 *Report on the Census Enumeration of the Non-Native Population made in the Colony and Protectorate of Kenya* (1932) only recorded the non-native population, as the title suggests. As the non-native population was a tiny fraction of the total population, we use an average of the Gambian, Ghanian and Nigerian occupational shares to weight the wage index.

Malawi (1920-38)

The Blue Books for Malawi are missing mining output between 1920-4 and 1936-8. Mining is unlikely to have been significant in these years, as just £70 was produced on average in the years for which data exist. Therefore, the industrial production index is spliced backwards to 1920 and forwards to 1938 using the growth of building and manufacturing output.

The 1931 *Report on the Census* (1932) for the Nyasaland Protectorate recorded the "Asiatic", and "European" population. As the native population was not recorded, which accounted for virtually the entire population, we use an average of the Gambian, Ghanian and Nigerian occupational shares to weight our index of wages.

Nigeria (1900-40)

In order to move from agricultural consumption to production, data is needed on the net exports of agricultural (class 1 and 2) goods. Before 1914, the Blue Books did not break down imports and exports by class. Therefore, based on the level of imports and exports of these goods in 1914, we splice back using the growth rate in total imports and exports. In 1914, class 1 and 2 goods made up 92 percent of total exports, which suggests that this assumption is reasonable.

Mining output was not consistently recorded in the Blue Books prior to 1920. Therefore, two industrial production indices are constructed, one for 1920-1940 based on the output of all three branches and one for 1900-1920 based on building and manufacturing. Using the index based on all three branches, we splice backwards from 1920 using the growth rate of the index based on building and manufacturing.

Prior to 1914, the number of banks listed in the Blue Books is for Southern Nigeria only. However, there is no jump in 1913, which suggests that all of the Nigerian banks were based in the South.

The deflator for industry is a weighted average of the price indices for building, mining and manufacturing. As mining output is not available before 1920, it follows that a deflator cannot be constructed. Therefore, the industrial deflator is projected backwards from 1920 using the growth rate of the building and manufacturing price index.

To weight our index of wages, we calculated shares of total employment for agricultural, industry and services, which were based on the 1931 *Census of Nigeria* (1933).

Sierra Leone (1900-38)

No adjustments were necessary for Sierra Leone other than for the calculation of employment shares. The 1931 *Report of Census* (1931) only recorded the colony, the area surrounding Freetown,

but not the protectorate. Given that the colony constituted a small fraction of the total population, and that there may have been important differences in the occupational structure between the colony and the protectorate, we use an average of the Gambian, Ghanian and Nigerian occupational shares to weight the wage index.

Tanzania (1922-37)

No deviations from the blueprint were necessary for Tanzania other than for the calculation of employment shares. The 1931 *Report on the Non-Native Census* (1932) only recorded the non-native population, as the title implies. As the non-native population was a minor fraction of the total population, we use an average of the Gambian, Ghanian and Nigerian occupational shares to weight the wage index.

Uganda (1906-45)

Due to a number of deficiencies in the Blue Books for Uganda, a few departures from the baseline were necessary. First, due to inconsistent trade statistics, it is assumed that net exports of agricultural goods were zero, which implies that agricultural consumption equaled production, as in Álvarez-Nogal and Prados de la Escosura (2013), Broadberry et al. (2015) and Malanima (2011). Second, mining output was not recorded consistently before 1929. As a result, the all branch index of industrial production was spliced backwards from this point using a weighted average of the building and manufacturing indices. Third, transport output was not sufficiently recorded before 1924. Therefore, the all branch index of services output is spliced back from 1924 using a more narrow index that excludes transport.

The 1931 *Census Returns* (1933) for Uganda only covered the "European", "Indian", "Goan", "Arab" and "other non-native population". As the native population was not recorded, which was roughly 90 percent of the total population and presumably had a different occupational structure to the non-native population, we use an average of the Gambian, Ghanian and Nigerian occupational shares to weight our index of wages.

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CLASSIFICATION OF PRICES

Good	Agricultural/Industrial
Beans	Agricultural
Beef	Agricultural
Butter	Industrial
Candles	Industrial
Cassava	Agricultural
Coal	Industrial
Cotton	Industrial
Ghee	Industrial
Groundnuts	Agricultural
Kerosene	Industrial
Maize	Agricultural
Matama	Agricultural
Millet	Agricultural
Mutton	Agricultural
Palm oil	Industrial
Potatoes	Agricultural
Rice	Agricultural
Salt	Industrial
Sim sim	Agricultural
Soap	Industrial
Sugar	Industrial
Sweet potatoes	Agricultural
Wheat	Agricultural
Yams	Agricultural

[i] See also Jerven 2018 for a study on Nigeria.