How accurate are the prices in the British colonial Blue Books?[1]

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Relative prices have been memorably described as the 'DNA' of an economy (van Zanden, 2009): in that sense, economic historians of Africa have in the past decade begun a serious effort to map Africa's historical genome. Several have turned to the British colonial Blue Books (henceforth, *BB*) to assist in this task. These publications, annually compiled for the territories under British control by local administrators, usually contain a report on the retail prices of articles of common consumption, as well as—less regularly and less easy to interpret— the prices of local produce, often in difficult to interpret units like 'kettles', 'loads', or 'tins'. The availability and regularity of such reports has done much to facilitate the growth in long time series—in particular on real incomes—for British African colonies in the nineteenth and twentieth century. Indeed, the absence of similar documents for the French empire has probably played some role in the relative scarcity of new scholarship on the history of living standards in these colonies: the only published real wage study for a sub-Saharan African French colony is Thioub's (1994) short series for Dakar. That said, the existence of other regularly published documents, especially government budgets and trade statistics, has led to important work on inequality, fiscal history and labour history, among others (van Waijenburg 2018, Cogneau, Dupraz and Meslé-Somps 2018; Tadei, 2018; Huillery, 2014). Painstaking work to transcribe prices in the Blue Books themselves, meanwhile, has liberated much of the price data contained in the African *BB* from the often difficult-to-access physical volumes, and in the process has illuminated much that was once obscure about the economic development of British African colonies (Bolt and Hillbom, 2013; de Zwart, 2011; Frankema and van Waijenburg, 2012; Juif and Frankema, 2018).

In the ever-expanding literature on economic development in the British Empire, the numbers within the Blue Books have been taken as more or less reliable for the task at

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hand. Caruana Galizia (2015), writing on Malta, is the most explicit: "The Blue Books are reliable sources of information…colonial governors, who had no set revenue targets, had no incentive to misreport statistics." Perhaps, but before we get around to acquitting them on the charge of sending the wrong numbers to London, surely we must first ask: did they have any incentive to gather the right numbers in the first place?[3] Or are the prices reported in the *BB* simply hastily devised fictions—'Mickey Mouse' numbers, to take up the phrase of D. C. M. Platt (1989)?

This article uses independent weekly market reports from British African cities to investigate this question. These reports were printed in newspapers from the cities concerned, and the newspapers were not published by the colonial governments. A similar endeavour for London prices in the 19th century was undertaken by Solar and Klovland (2011), who showed that for some products newspaper reports diverged from the prices given in the official *London Gazette*, bringing new empirical light to bear on the vexed question of the accuracy of the Corn Returns (Adrian, 1977; Brunt and Cannon, 2013; Vamplew, 1980). Alongside the recent efflorescence in African economic history (Austin and Broadberry, 2014; Fourie and Obikili, 2019; Hopkins, 2009), there has been a considerable literature questioning the statistical basis upon which African economic history has been written (Jerven, 2013, 2011). While the harvest of new economic history has been most abundant for the colonial period, statistical criticism has mostly dwelled on the post-independence era, or at least the final years of colonial rule (Serra, 2014), when statistical practices were modernised—though there are exceptions (Duminy, 2017). Though some attention has been paid to the censuses, particularly of British colonies, the accuracy of statistics in the African Blue Books has to my knowledge not been critically evaluated.

The range of statistics presented in the *BB* is vast, covering many topics. Some of the sections are likely to be very reliable, since colonial rulers had every incentive to ensuring accuracy in statistics upon which the good administration of the colony depended. A considerable portion of the total page space is devoted to fiscal matters, and—absent fraud—the figures are likely to be very reliable. Another major section is devoted to documenting in minute detail the staffing of the administration, with information on salaries, benefits, leave of absence, and so on. These sections drew on information that would have been readily available to colonial officials, even if it had to be brought together in a standard format for metropolitan consumption. The weight of trade taxes in colonial revenues probably ensured that the Imports and Exports sections could be drawn up with relative ease and with considerable accuracy, though the figures usually only covered maritime trade. Other sections of the *BB* concerned education, the courts, prisons, railways, public works, regulations and legislation, population and vital statistics, currency and banking, religion, and agriculture. To varying degrees, these sections may have required some extra investigation on the part of the compilers.

[3] And governors were not the only ones who were responsible for collecting statistics: in addition to less important officials, who might have had professional incentives to misreport, statistics were sometimes gathered from the population itself, among whom the fear of increased taxation may have led to falsification of reports: this was most obvious in the case of censuses, but also affected, for example, livestock statistics in South Africa (Nell, 2017).

At first glance, the *BB* price reports seem to offer the ideal material for the construction of price indices. In addition to the wholesale produce price reports, which can admittedly pose some problems of interpretation, the *BB* give retail prices, eliminating the need for retail markup adjustments for most goods. The prices are given annually and cover a wide range of products—edible and otherwise. A standard list of goods appears to have been requested from colonial governors: wheat flour, wheat, bread, cattle, horses, sheep, goats, swine, milk, butter (salted and fresh), cheese, beef, mutton, pork, rice, coffee, tea, sugar, salt, wine, brandy, beer and tobacco. In some years, particularly in the mid twentieth century, some African *BB* gave prices for more locally relevant products as well. A section on 'produce prices' for agricultural goods was also included. And prices are almost always listed in standard British imperial units, allowing for easy comparison across time and space. But closer look at the prices available in the *BB* for various African colonies begins to make the historian uneasy, especially for earlier periods. In many cases, and for many commodities, prices are suspiciously constant from year to year. This might not be particularly worrisome for imported consumables like sugar or soap, since prices may have been set in thick world markets, where supply might adjust to any abnormal increase in prices above the cost of production, or they may retailed only by cartels or monopolists who impose a high and stable price. In any case, such goods composed only a small proportion of local consumption.

But this eerie apparent price stability is also found for staple starches, like millet, maize and cassava. We have no reason to suppose that the domestic African prices of these goods were largely determined by world markets. Nor, given the exogenous nature of the weather and the immense difficulty of increasing supply after the evidence of a poor harvest is known, is it likely that supply responses would keep prices stable from year to year. Poor harvests should have driven prices higher and abundant harvests should have pushed them lower. Official price statistics, however, would lead us to suppose that (for example) in Sierra Leone, the price of rice remained steady at 1.29 pence per pound between 1898 and 1912, a period of fourteen years! The price of mutton in the same city, to take another extreme example, is supposed to have remained at 6 pence per pound between 1880 and 1910, a period of thirty years. We have to conclude that supply and demand were both astonishingly constant, or that supply reacted extremely quickly to price shocks, or—and this is the hypothesis to be tested in this article—that the price statistics are sometimes imprecise.

The rest of this note is structured as follows: I first look at the history of the *Blue Books* and their production. I then turn to persistence of staple prices in a number of African colonies in the period 1880-1930 and their importance in workers' budgets. In the main part of the article I then compare the annual average prices given in the *BB* with annual averages calculated from weekly market reports from three British African cities: Freetown, in Sierra Leone; Lagos, in Nigeria; and Dar-es-Salaam, in what was then Tanganyika and is now Tanzania. These prices were gathered as part of a larger project on agricultural price behaviour and market integration in colonial Africa. Using the annual averages, I show that the *BB* often give a misleading picture of prices for staple goods in the years and colonies considered. I then consider the practical challenges for colonial officials of obtaining accurate averages, showing that the seasonal fluctuations of staple prices in Freetown were substantial, and were not necessarily the same from product to product. In order to estimate the number of price observations an official

would have to make throughout the year in order to obtain accurate annual averages, I conduct a simulation exercise using the Freetown weekly prices. Finally, I discuss the implications of this finding for future research.

The political economy of statistical output in the British Empire

The *BB*, which for regularity of publication, breadth of coverage and longevity had no equal in the other European imperial powers, began in 1822 when Lord Bathurst, the Secretary of State for War, had colonial administrations submit to London a series of returns on mostly financial and personnel matters. In 1823 a number of more general questions were added, including on colonial trade and currency. This new supply of colonial data was ordered to meet a new appetite in Britain for quantification (Rowse and Shellam, 2013). To judge by the Australian experience, colonial officials were somewhat perplexed by the need for metropolitan readers to obtain timely statistical information and found that producing an adequate response by the imposed deadlines was next to impossible. While the public accounts in Australia seem to have become reasonably accurate quite quickly, other kinds of data did not, and in 1859 the compiler of the colony's *Statistical Return*, a successor to the *BB* after New South Wales gained self-government, wrote of the agricultural statistics that "It is much to be regretted that information of so much importance . . . should be left to the casual and unchecked collection of the constabulary . . . It would be a mere waste of time to enter upon an analysis of figures in which no one believes" (Australian Bureau of Statistics, 1988). Colonial administrations, even in the settler colonies of Canada, Australia, New Zealand and South Africa, barely possessed the statistical expertise and administrative capacity to compile the kinds of information required of them: in 1846, the official charged with the Canadian *BB* complained that it 'required annually some months of my particular attention', on top of his other duties (Curtis, 1993).

However, if the conditions of work might lead us to wonder about the quality of the craftsmanship, the last serious lengthy discussion of the *BB*'s accuracy is, as far as I can tell, one published over a century and a half ago: an article by J. Casper in the *Calcutta Review* in June 1858. This is, of course, only about forty years into the run of the *BB*, which would last another eighty years afterwards. If Casper's account has the disadvantage of being extremely old, it has the merit of having been composed contemporaneously with the *BB* themselves. Casper had grave doubts about the accuracy of the annual returns, reserving particular scorn for those of Ceylon. He quoted the evidence of Sir James Tennant, then Colonial Secretary of Ceylon, to a parliamentary inquiry, in which Tennant said that when he prepared the 1847 Blue Book, he looked at previous years' vital statistics, and discovered that they had been exactly the same for several years on end. Tennant went on to say: "…on making further examination, I found that what they have been professing to send home as annual statistics, were in reality *transcripts from one year to another*." Casper attributed this careless attitude to the lack of interest of the metropolitan readers, who, if they turned their attention to colonial matters, read the annual reports of the governors which accompanied the *BB*, while the statistical compendia themselves were "quietly accumulating on the shelves of the Colonial Office", untouched by the bureaucrats. This lead to a neglect in the colonies, argued Casper: "the utter disregard for the documents

so long evinced in Downing Street, became at length reflected amongst the colonial local officials, who were not too mindful to bestow elaborate care on returns that, they felt, were destined to be red-taped, docketed and finally to be embalmed in the sarcophagus of the colonial office." Unnamed 'gentlemen' with whom Casper was apparently in contact told him that "no reliance whatever is to be placed on many of the West Indian and other Blue Book returns".

Though colonial administrations would become increasingly professionalised from the middle of the nineteenth century, the Second World War marked, in statistical matters as in others, a turning point in the colonial project in British Africa. The administrator-statistician was replaced by the university-educated statistician. This is not to suggest that there had been no improvement in statistical capacity in the years before 1939: indeed, the decennial imperial censuses had become much more rigorous between 1891 and 1931, and in some colonies, like the Gold Coast and Kenya (where the presence of white settlers encouraged the production of more detailed numbers), agricultural statistics had become steadily richer. Indeed, the turn towards professionalism can readily be detected in the pre-war African Survey project that sought (among other things) to take stock of colonial knowledge about Africa and devise priorities for further research. Nonetheless it was only in the 'developmental decade' after the War that most colonies obtained a dedicated statistical organisation. The Nigerian Department of Statistics, for example, was established in 1947, though there had been a Government Statistician between 1928 and 1934. By 1950 Nigeria had 105 staff in its Statistics Department; the Gold Coast 34, and the East Africa High Commission, covering Kenya, Uganda and Tanganyika, 162 (Searle et al., 1950). It seems a reasonable assumption that statistics that date from this time are likely to be of a reasonably high degree of accuracy. The period between Casper's account of statistical anarchy and the professionalised Statistical Departments of the post-war period has received comparatively little attention, and it is this period to which this article is devoted.

Staple food price fluctuations and real wages

Getting accurate price series for staples is important. For one thing, purchases of goods like maize, rice and cassava formed a large part of urban budgets in colonial African cities in the late nineteenth and early twentieth centuries. Table 1 calculates the cost shares of these staples in the constructed subsistence baskets in Frankema and van Waijenburg's real wage series between 1880 and the First World War. The authors collect consumer prices and nominal unskilled wages from the *Blue Books*, and combine them to form long real wage series. They show substantial changes in income over the colonial period in numerous urban centres in British Africa, suggesting that many colonies had witnessed considerable economic growth prior to independence. Weights for their price series are obtained by constructing city-specific 'subsistence baskets'. Following the methodology of Allen (2001), they devise a basket of goods that would meet the barebones subsistence needs of a family of two adults and two children. The 'maize' basket, therefore, is one in which almost all of a family's caloric needs—aside from a small amount of meat, sugar and oil—are met by consuming maize. In all three cities considered below, maize was the cheapest way of meeting caloric intake requirements (though it is worth pointing out that maize prices in this period were mostly not reported

in the retail price section of the *BB*, and Frankema and van Waijenburg instead imputed them with a regression that links maize with wheat and rice prices). In all three towns, families purchasing only the barebones subsistence maize basket would have spent between three-fifths and three-quarters of their budget of their income on maize. Purchasers of the rice budget would have been even more exposed to fluctuations in the price of their staple grain.

Table 1: Average weight of staple grain/tuber in total cost of barebones subsistence basket 1880-c.1914, selected cities.

City	Rice budget	Maize budget	Cassava budget
Lagos	76%	59% (*)	62%
Freetown	76%	72% (*)	n/a
Accra	79%	63% (*)	n/a

It is easy to show that staple price measurement error of the magnitude discussed below could have reasonably large impacts on the estimated standard of living in these colonies. If, for example, a labourer earned an income equivalent to one welfare ratio, and the staple grain constituted 60% of the family budget, then if grain was 40% more expensive than the estimated price, the welfare ratio would decline by about 20%. Budget studies from late-colonial urban Nigeria suggest that labourers spent roughly equal amounts on cassava flour, yams, rice and sorghum. Altogether, expenditure on starches accounted for half of the entire food budget, while expenditure on food accounted for 60% of all expenditures, meaning that starches accounted for about 30% of expenditures; considerably less than the in Frankema and van Waijenburg's barebones subsistence basket—as one would expect given their estimates of the welfare ratio of Nigerian labourers in this period—but still large enough that staple prices matter (Nigeria Federal Department of Statistics, 1957). In fact it is doubtful whether a single other price, save the nominal wage, could have been as important to the welfare of unskilled labourers in early colonial Africa.

If accurate staple prices matter for accurate real wages, then they must matter also for per capita GDP, for which these real wage series will serve as a crucial input in estimating agricultural output in African colonies. The 'Malanima shortcut' estimates agricultural GDP using a demand function that takes income (proxied by the urban wage), agricultural prices and non-agricultural prices as arguments. In some reconstructions, the real wage serves as the only proxy by which agricultural output is determined (Malanima, 2010). Rather like physicists who can only detect the existence of unobservable dark matter by studying its gravitational effect on the observable universe, historians of most preindustrial economies do not usually have access to quantitative information about harvests, but can study them indirectly via the ripples these fluctuations create in urban prices. But usefulness of price fluctuations in such work is conditional on those prices being more or less accurate.

Given this, perhaps the most obvious reason for scepticism of the *BB* as a source, though one largely limited to the nineteenth and early twentieth centuries, was alluded to above: the long periods during which important prices series stayed not just relatively constant,

but were literally unchanging. This is not impossible; indeed, the weekly rice price series for Freetown in 1894 is remarkably flat, and it is conceivable that for long period of time, or when harvests had been plentiful and storage could smooth consumption, prices remained steady. Elsewhere in the world, technological, contractual and marketing constraints have sometimes resulted in very sticky nominal prices, sometimes across decades: in the United States, famously, a can of Coke was priced at 5 cents from 1886 to 1959 (Levy and Young, 2004). It is not impossible to think of certain kinds of menu costs that could have created price stickiness in early twentieth-century West Africa. But these menu costs would have to bear considerable analytical weight: to believe the figures in the *BB*, staple prices were completely stable for a decade or more in several cases in early colonial Africa. In Table 2, I report the number of price changes for rice and cassava in a number of West African capital cities in the *BB* between 1880 and the First World War, taking the prices from the dataset digitised by Frankema and van Waijenburg (2012), as well as the average duration of a price 'spell', defined as:

$$D = \frac{-1}{\log\left(1 - \frac{1}{n}c\right)}$$

where D gives the duration, n is the number of years in the price series and c the number of changes. This formula is used rather than a simple ratio of price changes to observation due to the censored nature of the series at either end; a ratio would underestimate the duration of the initial and final price spells because the dates at which prices changed to their initial value or from their final one would not be observed.

Table 2: Price changes for staples in late 19th and early 20th century West Africa.

Product	City	Number of price changes	Average duration of price spell
Cassava (1881-1902)	Lagos	2 changes	11 years
Rice (1881-1904)	Banjul/Bathurst	1 change	24 years
Rice (1881-1911)	Accra	2 changes	15 years
Rice (1881-1912)	Lagos	12 changes	2 years
Rice (1881-1912)	Freetown	6 changes	5 years

The durations are extremely variable: the price of rice in Lagos, for example, changes every two years on average, while in Banjul it only changes once every quarter-century. We can compare this to our Freetown price series for various commodities: in our dataset, husk rice, maize and sorghum prices changed about once every four weeks, while clean rice prices changed about once every three weeks. Palm oil prices were particularly volatile, changing on average once every 1.71 weeks. This is not strictly inconsistent with the stability of annual average, since it is possible that prices were stationary: that is, that they fluctuated randomly around a central value that itself stayed constant for years or decades on end. However, it does eliminate the possibility that price stability was due to customary pricing, since we observe large-scale volatility even at the weekly level.

Comparing prices between sources: Blue Books and weekly market reports

The method of the following sections is extremely simple: I compare the annual average given in the *BB* with an annual average calculated from the weekly price reports. This comparison is interesting in its own right, without making any assumptions about which of the two series is more likely to be accurate. There are, though, several reasons to come down in favour of the market reports. The first relates to the conditions of statistical production: it is easier to imagine a harried or indifferent colonial official copying the previous year's price, or making some haphazard guess at the annual 'average', or recording a single observation of a market price and supposing it to be representative, than it is to imagine that newspapers, who were already publishing other kinds of weekly information, fabricated their prices from whole cloth. The often frequent and substantial changes in weekly price militate also in favour of the presumption that newspapers were publishing up-to-date price information. The second reason is one of audience: the *BB* were produced essentially for metropolitan consumption, while newspapers were read locally. Both material concerns (newspapers wanted domestic subscribers, who would have wanted accurate and timely market information) and the existence of local consumers with their own independent knowledge of market conditions suggest that the newspapers had a greater incentive to report accurately than did a clerk compiling the year's Blue Book to be sent to the Colonial Office, whose readers had little reason to care about retail prices and even less independent knowledge to contradict false reports. Some metropolitan consumers may have been interested in the cost of living in African cities, but probably they were especially interested in prices of foodstuffs of European consumption, like bread, as this would weigh on the real value of salaries offered to colonial officials or to employees of companies operating in urban Africa.

I have used market reports given in four African newspapers: for Freetown, the *Sierra Leone Times* and the *Colonial and Provincial Recorder*; for Lagos, the *Lagos Standard*, and for Dar-es-Salaam the *Dar-es-Salaam Times*. This yields multi-year rice, palm oil and maize series for Freetown and a maize series for Lagos. The Dar-es-Salaam series is extremely short—one year, in fact—and the only price that can be compared to the Blue Books retail price reports is for rice, though two other series are compared with the monthly wholesale price reports in the *BB*. The rice series for Freetown begins in 1893 and 1894, and then picks up after a hiatus in 1913 until 1918. The maize and palm oil series exist only for the latter period (the newspaper quotes palm oil prices in 1893 and 1894, but the *BB* for those years do not). Gaps of one or several weeks in the market reports were filled in with linear interpolations using the *imputeTS* package in R (Moritz and Gatscha, 2019), though spline interpolations yielded very similar results. Where a price range was given in the sources, an average price was computed using a geometric mean of the higher and lower price bounds, though in calculating the 'reporting error' I have compared the maximum and minimum prices in both sources rather than this geometric mean so as to avoid comparing apples to oranges.

Two limitations to this exercise ought to be pointed out. The first is that the sample of prices is drawn largely from Freetown, where market price reports are more plentiful, and many of the more serious discrepancies documented are from the Freetown examples. I cannot exclude the possibility of a more localised problem with Freetown *Blue Books* averages not present in other colonies. Similarly, much of the Freetown

sample is from a period of time probably not conducive to accurate statistical production: in five of the eight years the British Empire was fighting the First World War. This period also coincided with high inflation. The most serious discrepancies in the sample are for these years. Extrapolating from these unusual circumstances may be hazardous. Longer time series would help us determine whether data from other time periods is as unreliable as for the war years.

One objection to simply comparing average prices is that the method I have used to calculate *BB* averages (taking the geometric mean of the minimum and maximum prices listed) may not be the best way of assessing accuracy, since it requires an implicit assumption about the yearly distribution of prices around the mean. Therefore I compare reported minimum and maximum prices for the weekly data as well, and when I assess for accuracy in the Appendix, I report, for each commodity and each year, a variable called 'reporting accuracy', defined as the percentage difference between *BB* price and average weekly price for those goods with only an average reported in the *BB*, and as the mean of the same percentage difference for the minima and maxima for those commodities for which the Blue Books report a range rather than an average. This ensures that the discrepancies I document are not simply the result of a choice of averaging technique.

Freetown

For Freetown, prices were hand-collected from market reports in two Freetown newspapers: the *Sierra Leone Times* and the *Colonial and Provincial Reporter*. Three series in particular can be checked against the annual averages given in the Blue Books: those for domestically grown rice, for maize, and for palm oil. I examine each in turn.

Rice

For rice, one of the most important staples in Sierra Leonean budgets, two problems needed to be cleared up in order to make a comparison across sources, the first relating to the kind of rice to be compared, and the second to the unit in which it was measured. For most of the later years, there are in fact two weekly rice prices given: one for Mende and one for Temne rice, each referring to the ethnic group responsible for bringing them to market (Bangura, 2012). At the beginning of the period in which both rice prices are reported, the price of 'African clean rice' was identical to the following week's 'Temne rice', and so I have used Temne rice prices in the comparison with the *BB* 'Sierra Leone rice' series. This is a conservative step, because using Mende rices (either on their own or as part of a weighted bundle) would depress the estimated weekly prices, and make the difference with the *BB* averages even starker. Inconsistent metrology often poses problems when comparing price series with one another, particularly in African historical contexts where weights and measures were not always standard. Both rice series were originally expressed in bushels, and these are compared directly with the prices given in the *BB*, again recorded in bushels. It is possible, however, that the bushels used in one source are not the same bushels as in the other: a bushel of rice is usually 45 lbs, while in Sierra Leone clean rice was sold in bushels nearly twice as heavy—84 lbs, to be precise (Kaniki, 1973). The possibility that this is responsible for discrepancies in reported prices is considered further below.

The difference between the Blue Books annual prices and the average of the weekly prices from the *Sierra Leone Times* is not particularly remarkable for the first year; in the second year, the discrepancy is more important, although still not particularly alarming (see Table 3). It is worth noting that the sign of the error changes between years: the 1893 Blue Book overstates the average rice price, and the 1894 edition understates it. This could either be good or bad news. If errors are normally distributed but centred around zero, then they will, on average, cancel each other out, and averaging prices over multiple years would yield reasonably accurate series. Statistical noise will probably not swamp term trends, and regressions that rely on price data will understate causal relationships (Klepper and Leamer, 1984). On the other hand, year-to-year movements in *BB*-reported prices would not be readily interpretable, and there would be no easy method of correction without external sources to give some indication of the magnitude and direction of errors.

Table 3: Rice prices in Freetown, 1893 and 1894

Year	Product	Blue Books	Weekly	Difference
1893	Rice	7/6 a bushel	7/0 a bushel	– 7%
1894	Rice	7/6 a bushel	8/6 a bushel	+12%

The second run of rice prices begins in 1913.[4] These results, compared to the prices given in the relevant *BB*, present a greater challenge. Not only is the average rice price well below the average price given in the blue books, the difference between the two is far from constant, and year-to-year movements often go in opposite directions: in 1914 the *BB* records a substantial increase in prices, while my dataset shows a modest decline, a pattern that repeats in 1917. In 1915 the weekly price series suggests a rapid increase that the *BB* do not. Moreover, there is *no* overlap between the range suggested by the

[4] Actually, newspaper reports begin again in 1912, but do not exist for the entire year. These observations are hence excluded from the analysis.

BB and the annual averages calculated from the newspaper market reports. Taking all years together, the mean absolute reporting error is 48%.

Figure 1: Rice prices in Freetown, 1913-1918 from two sources, pence per bushel. Grey band represents maximum and minimum prices from the Blue Books.

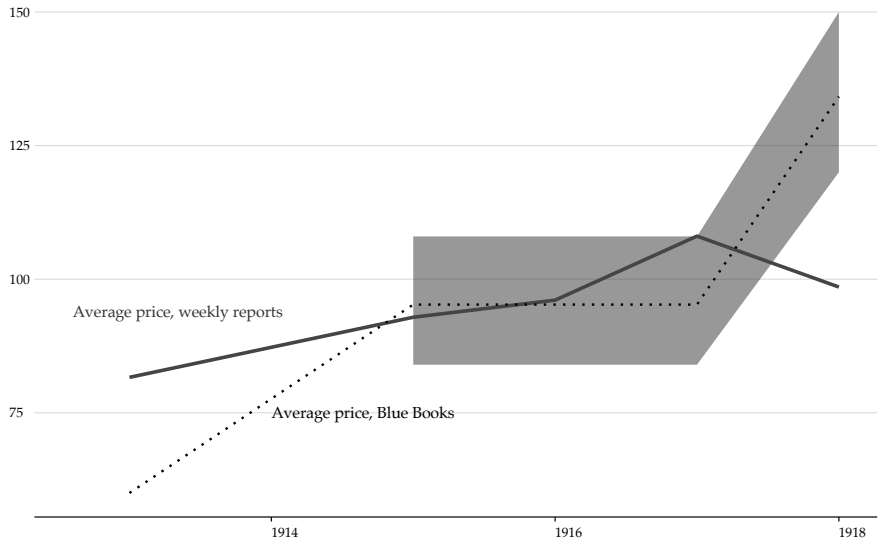
Is this simply a question of inaccurate metrology? The *Blue Books* supposedly measure prices paid for goods measured in imperial units, and, as we saw above, the imperial bushel contains much less rice than the commonly used bushel of rice in Freetown. If we assume that the *BB* report 45-lbs bushels, and the newspapers instead report 84-lbs bushels, then the magnitude of the errors is lower, though still substantial: the average yearly price given by the weekly series still lies outside the range given by the *BB*, except that for one year, 1915, the weekly price series average is now below the minimum price given in the *BB*.

Maize

The maize series for Freetown begins in 1913 and ends in 1918. However, the prices from 1914 were excluded due to an ambiguous change in the reporting of prices. While other years reported maize prices for both bushels and 'kettles', many observations in 1914 only report in bushels; but since the prices given for a bushel of maize are implausibly low, I suspect that on occasion what was quoted as the price for a bushel was in fact the price for a kettle. Since this occurred over a series of months that showed relative price instability, it is difficult to tell exactly when the recording error begins and ends. I have therefore excluded the entire year from analysis. The maize price series for Freetown is considerably more promising than the rice series. The weekly and *BB* series match well for 1915 and 1916, though errors are more substantial at either end of the series. Overall the absolute reporting error is 22%, which is not too grave. Even better, the errors in this subsample of years are reasonably equally distributed in either direction, so that taking an average across several years would tend to reduce the overall

error substantially: the mean error (that is, not taking the modulus before averaging) is only 11%. On the other hand, the more serious errors at the start and end of the series invite the question: is the comparatively good match between the *BB* and the market reports simply an artefact of the particular years for which we have data? Of course, the problem might go in the other direction—years with large errors may be atypical, and longer high-frequency price series are necessary to judge more conclusively.

Figure 2: Maize prices in Freetown, 1913-1918. Blue Books minimum and maximum prices drawn as grey band; geometric average as dotted line.



Palm oil

The palm oil price comparison is considerably less promising than for maize. The average absolute reporting error is 28%. Taking the average of errors rather than of the absolute value leads to an average annual reporting error of –21%; the *BB* averages are consistently below those of the newspaper reports. The shapes of the two time-series are completely different. While the *BB* report no price change between 1915 and 1918, the newspapers document a rising price trend. By 1918, the difference between the two series is stark: the actual price was nearly double the *BB* price. More broadly, the palm oil series confirms the intuition above, that the flatness of the price series in the *BB* reports is the result not of actual inertia in staple prices but rather of indifferent statistical reporting: not only did palm oil prices change rapidly from week to week, the annual averages also followed a broad upward trend when the *BB* report no change in prices for four years.

Figure 3: Palm oil prices in Freetown, 1913-1918. Blue books price drawn as dotted line.

Taking all the annual averages altogether, the product-year mean absolute reporting price error in Freetown was about 32%, though this masks some heterogeneity: the most accurate *BB* price was the maize price in 1916, which deviated from the newspaper reports by only 0.3%; the least accurate was the 1915 rice price, for which the error was a sobering 110%. Though it is reassuring that maize prices reported in the *BB* were on the whole reasonably accurate, it is not clear whether this helps the economic historian of Sierra Leone very much, since we cannot know if this finding holds outside the narrow period of time considered here, or whether the more substantial errors at the beginning and ending of the maize series are typical of the early *BB* period. The large errors in the palm oil and rice prices suggest that it would be unwise to rely on the accuracy of the prices of other goods that have not been tested here.

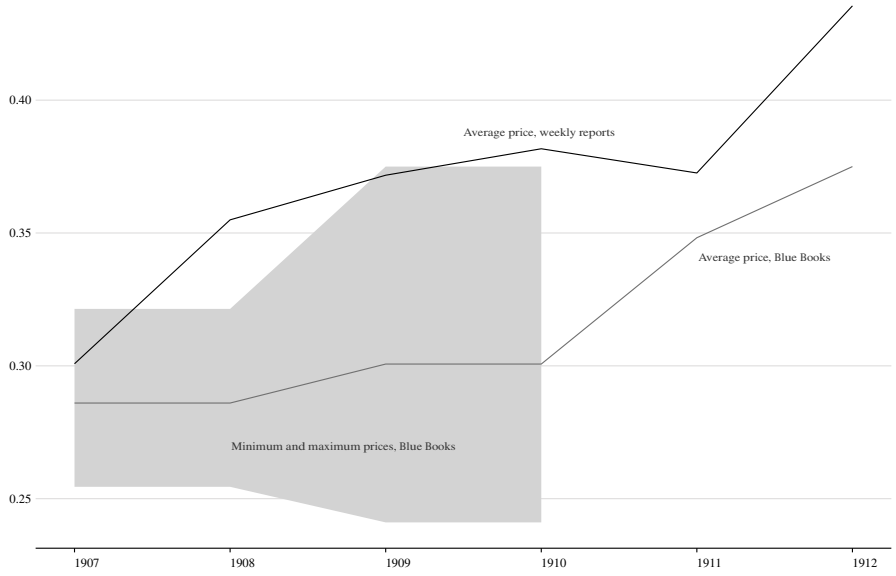
Lagos and Dar-es-Salaam

For Lagos we have a reasonably long series of maize prices. The catch is that they were reported in hundredweights or imperial tons, and are therefore likely wholesale prices in Lagos rather than retail prices. For this reason, I use the wholesale 'price of produce' series from the *BB* (though in any case there are no reported retail maize prices for this period anyway). The results of the comparison are mixed: the two series are certainly correlated, albeit imperfectly, though the levels are wrong: the *BB* prices are about 16% lower than the newspaper averages. Overall, the reporting error is only 13.4%, but unlike the Sierra Leone maize prices they are not evenly distributed either side of zero, and there is a small but persistent tendency for the *BB* to understate Lagos maize prices.

Perhaps more worrying are the inaccuracies in the ranges, represented as a grey band in Figure 4: the average price from the *Lagos Standard* price reports lies at or above the maximum price quoted by the *BB* for three of the four years for which maxima and minima were reported; consequently, the yearly maximum prices in the newspaper

series lay well above the *BB* maxima. This is a general though not invariable pattern with the price data reported in the newspapers: the range of prices quoted is usually substantially wider than the *BB* allow for, a phenomenon I return to in the discussion. This has implications not only for the estimation of annual 'average' prices, but also for our understanding of the magnitude of price volatility, and indeed price seasonality in colonial African economies.

Figure 4: Wholesale maize prices in Lagos, with Blue Books maximum and minimum prices as grey band. Pence per lb. (originals in cwt or long tons)



The Dar-es-Salaam series is the most fragmented and by far the shortest. We only have a single year (1923), though an extra layer of detail partially compensates: in addition to annual retail prices (albeit not for millet), the *BB* for Tanganyika give wholesale prices monthly for both maize and millet. The simple fact that recording was on a monthly basis is a favourable indicator for the accuracy of a yearly average. The price of the single commodity for which we can compare annual average retail prices across both sources, rice, appears not to have be well-measured in 1923: the *BB* give an annual price of 30 cents per pound, while the retail prices series suggest a price of 11 cents per pound. This may be due less to carelessness or fabrication and more due to a perennial problem with interpreting price reports: quality. Rice is not a homogenous good, and scattered price quotations in Dar-es-Salaam suggest that many types, imported and local, were available from sellers. In this case, it is likely that the Blue Books quoted high-quality rice, as might be bought by Europeans on high salaries, rather than the low-grade rice more likely to be consumed by African labourers. The rice price might therefore not be 'wrong' so much as it is vaguely described. It is worth pointing out that similar problems would no doubt arise with meat: the *BB* list prices for supposedly homogenous categories of meat ('beef', 'mutton' and 'pork', for example) without specifying to which cuts these prices refer.

If the retail rice price series is badly wrong, then the wholesale price series give reason for optimism: in fact, both the maize and millet prices from the newspapers track

reasonably closely with the wholesale prices in the *BB*: on average, the maize series deviates by only 14%, and the millet series a mere 10% in absolute terms. Moreover, if we calculate the average error (that is, the mean of the monthly error, rather than the mean of the modulus of the errors) the errors are 8% and 6% respectively, indicating that to some extent that discrepancies in the monthly price reports cancel one another out. Given that some of the weekly prices were interpolated, there seems little reason to doubt the accuracy of the monthly wholesale prices given in the *BB*. This lends some support to the idea that wherever prices are more frequently recorded in the *BB*, they are likely to be more accurate, or at any rate to accord with non-official price sources. The small errors are of small comfort to many of the users of the *BB* for whom wholesale prices of exported goods are not of great interest; while Tanganyika did export staples, not all British African colonies did, and no comparable series for maize or millet exists in this period for most other British African colonies. But it does suggest that where the colonial administration had some interest in prices (for example, for export or cash crops) then effort was generally taken to ensure accuracy.

Furthermore, it is worth noting the behaviour of the maize curves: the discrepancy between the newspaper series and the *BB* wholesale series only becomes appreciable when the *BB* series becomes a flat line. Though difficult to prove, the obvious hypothesis here is the Casperian one: that the official responsible for recording prices lacked them for several months and made the understandable decision to fill in the missing values with the last recorded price. If this was widespread among the time-pressed bureaucrats of colonial Africa, the long periods of stable staple prices should be viewed with deep suspicion.

Figure 5: Wholesale millet prices in Dar-es-Salaam, Blue Books and weekly market reports.

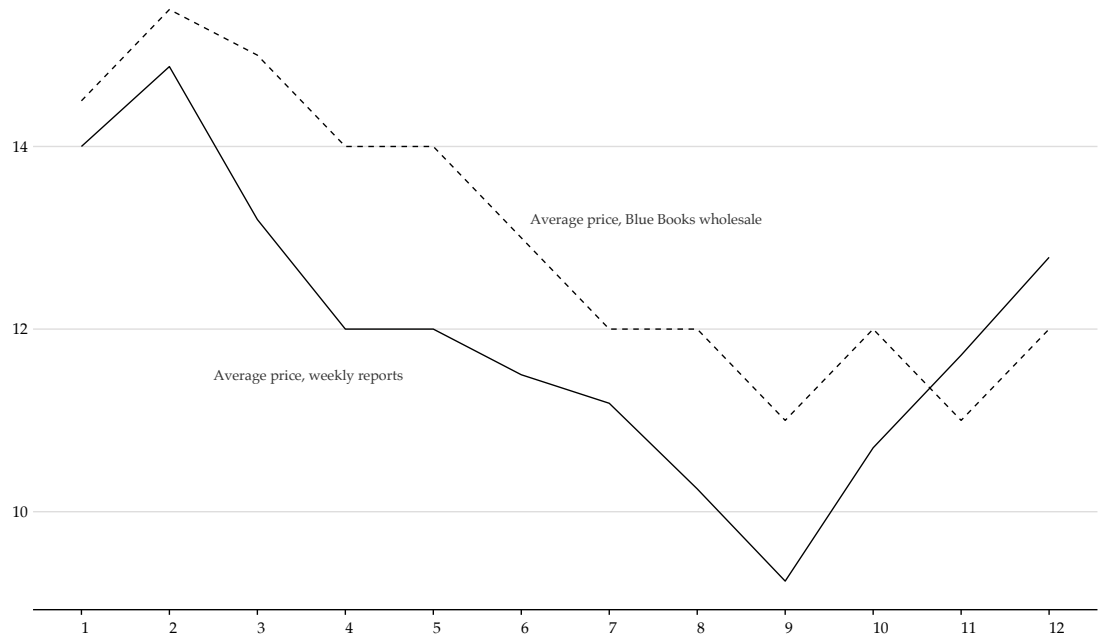
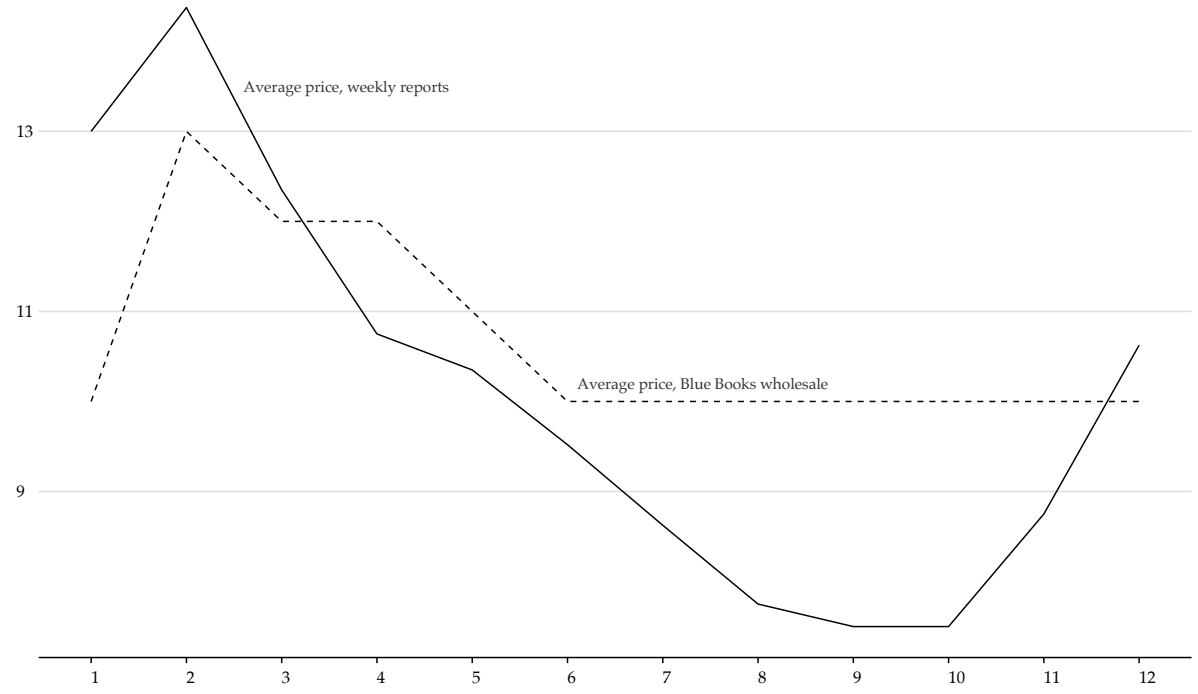


Figure 6: Wholesale maize prices in Dar-es-Salaam, Blue Books and weekly market reports.



Implications

Generally speaking, the results of all these comparisons are not especially encouraging. If we consider the 'reporting error'—that is, for results reported as averages in the *BB*, the percentage error between the newspaper and *BB* prices, and for minima and maxima, the mean percentage error for the minimum and maximum—then the average absolute error across all 26 comparisons (excluding the monthly wholesale prices for Dar-es-Salaam) is 37%. It is only 30% if we exclude the retail price of rice for Dar-es-Salaam, for which the reporting error may be a question of product heterogeneity. This is somewhat skewed by a few very inaccurate observations: the median absolute error is 23%, which is less alarming, though still appreciable. Perhaps more concerning than the average error is the variance: some prices are reasonably accurate, while others are wildly wrong. Nor are the signs of the errors necessarily predictable: of the 26 comparisons, in 12 the *BB* gave prices that were lower than the newspaper reports; in 9 comparisons the *BB* gave prices that were higher than the newspapers reports, and in 5 the comparisons were mixed: i.e., the *BB* maximum was higher and the minimum lower than in the newspapers, or vice versa. Nor can we trust the ranges given in the *BB*: and again, the errors are signed differently across products. For maize in Lagos, palm oil in Freetown, and rice in Dar-es-Salaam, the *BB* gives ranges that are much narrower than the market reports suggest; for rice in Freetown, however, the *BB* ranges are usually too wide, though the *BB* range for 1916 dramatically understates the variation in prices. Overall, how we might go about predicting *a priori* which series—or which years in which series—are likely to be inaccurate is not evident.

The practical significance of the difference between sources in terms of measuring living standards is sometimes considerable. Without a full range of prices for all goods in the consumption basket from the weekly reports, it is difficult to assess the overall reliability of real wage measures (though we can assume that import prices for other goods in the consumption basket, like sugar and cloth, were reasonably accurate). As an indication of possible magnitudes, however, I present in Table 4 the results of applying the newspaper-derived market prices instead of *Blue Books* retail prices to unskilled male labourer welfare ratios from 1915-1918. The 'Blue Books' welfare ratios are not identical to those in Frankema and van Waijenburg (2012); most notably, I have made some adjustments to their conversion from bushels to imperial pounds to reflect the fact that, contrary to official instructions to use imperial units, the compilers of the Sierra Leone Blue Books appear to have used local bushels (84 lbs) rather than imperial bushels (45 lbs) to measure African rice.

Table 4: Welfare ratios in Freetown with Blue Books and newspaper prices

Basket	Year	BB real wage	Newspaper real wage	Ratio newspaper/BB
Freetown, maize	1915	1.38	1.35	0.98
Freetown, maize	1916	1.35	1.35	1.00
Freetown, maize	1917	1.33	1.2	0.91
Freetown, maize	1918	1.12	1.46	1.3
Freetown, rice	1915	1.03	1.92	1.89
Freetown, rice	1916	1.00	1.28	1.27
Freetown, rice	1917	0.99	1.22	1.24
Freetown, rice	1918	0.91	1.46	1.63

In three of the eight comparisons, the newspaper welfare ratios are within a very tolerable 10% band of the *Blue Books* welfare ratios—in the case of the maize basket in 1916, there appears to be no discernible difference between the *Blue Books* and the market reports. For five comparisons, however, the changes are more substantial: in the case of the rice basket for 1915, the welfare ratio nearly doubles if we use the newspaper market reports. This suggests that for some individual years, and in some colonial cities, inaccuracies in the annual averages in the *Blue Books* grain prices could result in substantial changes to our estimates of living standards in Africa, though in other times and places the *Blue Books* are a reasonably reliable source of retail prices.

We can, of course, make some guesses as to the kinds of conditions which would have resulted in inaccurate prices. One is simply the density of administrators in urban centres: if there were fewer hands to do the work, the less the likelihood that the task of recording accurate staple price records was allocated the resources required. Another likely factor affecting accuracy would have been the instability of prices themselves. The intuition here is simple: acquiring information about prices is costly, and therefore the number of observations from which an average (or a range) is to be calculated will be less than the ideal number of observations, which is equal to the number of transactions over a given time period (say, a year). How costly observation is depends on the method of obtaining prices. I have been unable to find any evidence of instructions to colonial

officials about the best method of obtaining average retail prices. One possibility is that they relied on reports from other organisations, like Chambers of Commerce. This was certainly the method employed by the French administration in Dakar, which asked the Chambre de commerce de Dakar to provide it with prevailing retail prices for its monthly *Bulletin de renseignements économiques*. Though this certainly lowered the cost of acquiring price data (or rather, shifted it to the private sector), it was not without difficulties. The administrator of Dakar wrote to the Governor General of the Federation in 1929 complaining that: "the current price tables and indices...could only be drawn up with great difficulty: most of the trading firms were hostile to any idea of them giving up the necessary data, even to their own organisation, the Chamber of Commerce." (Letter from Administrator of Dakar to Governor General of Afrique occidentale française, 23 October 1929, Dakar, Archives nationales du Sénégal, 6Q39 (19), translation mine.)

Another option would have been to send someone to produce markets to obtain quotations, but this again would have been costly from the point of view of administrative time, and it is difficult to believe that it could have happened very often during the year. The tendency for any one observation to coincide with the 'true' annual average depends on the distribution of prices. In the extreme case in which prices are exactly stable over the entire year, say six pence per pound, then officials only need to observe market prices once to gain an accurate estimate of annual prices; if, to take another extreme, prices began at six pence per pound on January 1 and increased by 1% each day thereafter, a single price taken in either January or December would be extremely inaccurate if made to represent the entire year, while a price in June might suffice. These cases do not, however, resemble the actual movement of African prices in our dataset, which seem strongly marked by seasonality, as agricultural prices usually are when storage is imperfect.

In Figure 7, I show seasonal factors from a time-series decomposition for the three products in Freetown for which our dataset contains prices. The lines depict the average deviation in each month from the annual average price (where 1 is the annual average). All three series show reasonably strong seasonal patterns, though these are not identical: the price peak for rice is in October, for maize in February, and for palm oil in February. If we imagine that a colonial officer went to the market and observed prices at only one point during the year, what time would be best? Probably the best month would have been May: both maize and palm oil prices were close to their thirteen-month moving average; rice prices in May were about 5% below. If the officer went in March, however, rice prices would be 14% below their annual average, maize prices 9% higher, and palm oil prices 13% higher. We can also try to find months that fit the pattern observed in the errors above: that is, that rice prices were higher in the *BB* than in the market reports, maize prices about the same, and palm oil prices lower. If this was the result of a single observation, then the likely candidate would have been October, where the seasonal factors fit this pattern.

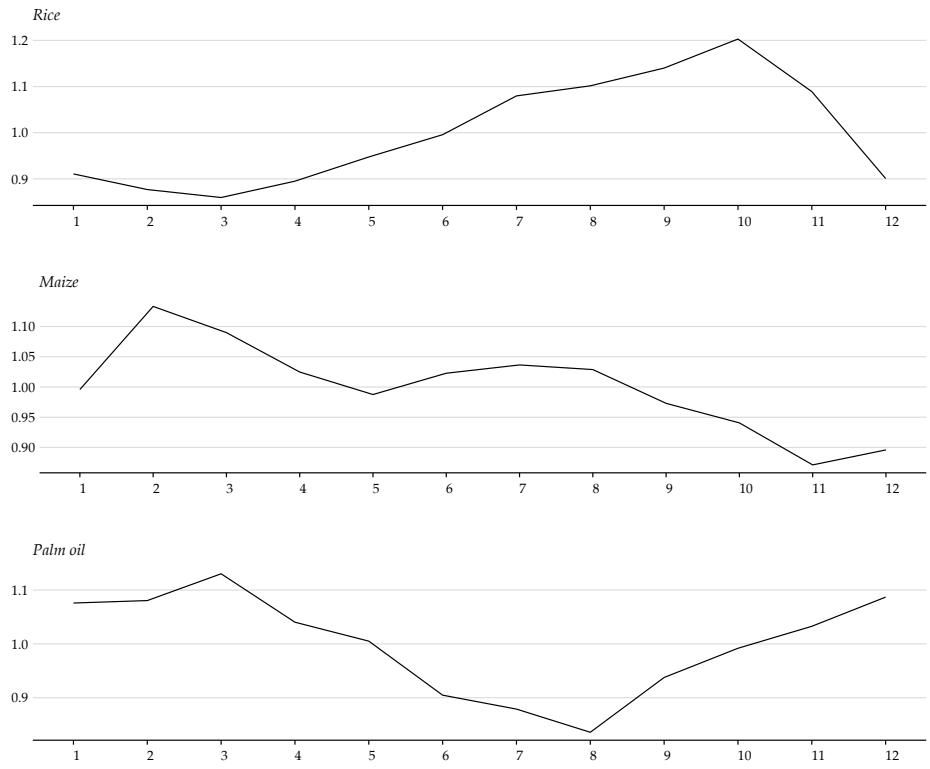


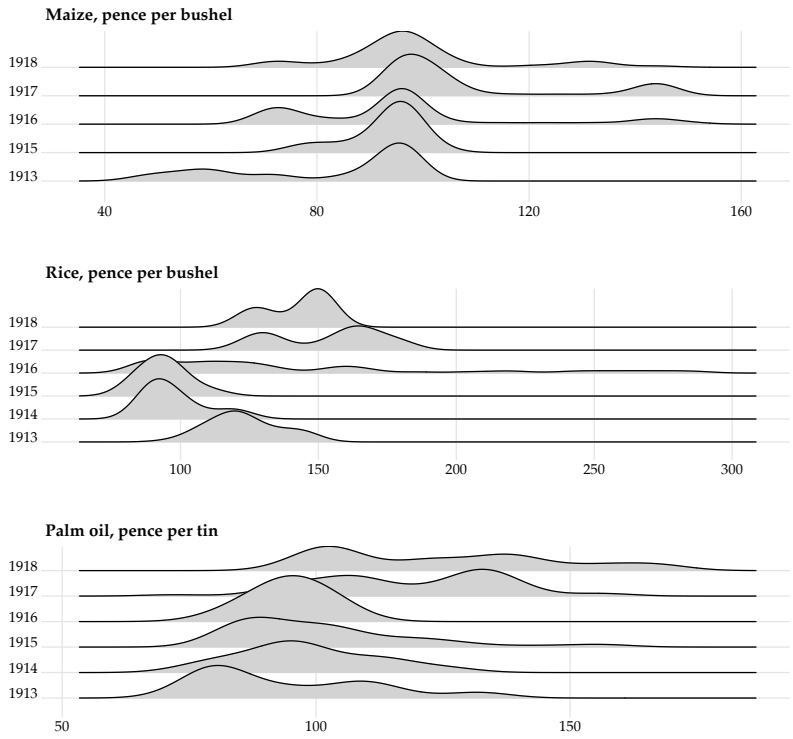
Figure 7: Seasonal factors in Freetown by product, 1913–1918.

This exercise, however, ignores the fact that there was substantial variation in prices beyond the merely seasonal. In Figure 8, I give kernel density plots of weekly prices for Freetown prices by year. They show substantial differences in distributions, even for the same product in different years: rice prices are reasonably 'well-behaved' in 1913, for example, showing a bell-like shape; in 1919, however, there are several distinct 'humps'. It is noticeable that the series with the most agreement between *BB* and market reports, maize, has the most bell-like distributions for most years, while the other two series have much more spread-out price distributions, indicating greater volatility during the year. This would have made the collection of prices more difficult, and may explain why some series are more accurate than others. Unfortunately, without the market reports it would not be possible to identify volatility series from the *BB* alone, though qualitative reports on market dynamics may be available where hard data is not.

In order to understand the challenge facing a colonial official in getting the average price by making only a few observations, I conduct a simulation exercise. For each product and each year of the Freetown price series I draw at random first one price, then two, then five, then ten, then twenty. This simulates a colonial officer going to the Freetown produce market and obtaining price quotations once a year, twice a year, and so on. I then construct an annual average based on these price draws and compare it to the actual average from the entire year's market reports and record the simulated average as 'accurate' if it is no more than 10% higher or lower than the average from the whole year. I then repeat this 10,000 times for each year and record the proportion of simulated averages that are accurate. The resulting Table 5 can be interpreted as estimating the

probability of calculating an accurate annual average given the number of observations made per year.

Figure 8: Distribution of weekly prices in Freetown by year and product



If a colonial official could record market prices 20 times a year, then prices would be extremely likely to be accurate. If the official goes only once, then probable accuracy depends a lot on the distribution of prices: if the official goes to the market once at random and records the price of rice in 1914, then this single observation has a four-in-five chance of coming within 10% of the true annual average; if the official did the same in 1916, he would have only a one in ten chance of coming within 10% of the true annual average. By the time we get to something approaching quarterly or, even better, monthly observations, the likelihood of obtaining an accurate average is very high. If we relax the accuracy requirements so that the *BB* average must be within 30% (higher or lower) of the 'actual' (i.e., newspaper) averages, then things become much simpler. Only in the high-inflation year of 1916 would it have been necessary to go obtain more than one price observation during the year in order to arrive at an accurate annual average for rice. In all years, two observations would almost certainly have been sufficient for a maize average within 30% of the true value, and the same was true of palm oil. This underlines a broader point: the 'accuracy' of a set of data can only really be defined in relation to the question for which it is being used.

Unfortunately for researchers today, for most historical African contexts we know neither the annual distribution of prices for staples nor the number of times that colonial

officials observed prices (if this is how they arrived at annual averages for the *BB*). All we know is that the *BB* are a potentially unreliable map of the staple price history of early twentieth century Africa: probably reasonable accurate when the inflationary terrain is flat, but liable to deceive in hilly areas. Researchers who use the *BB* prices in their work might therefore use the comparisons presented in this article to construct rough confidence intervals or margins of error around estimates, particularly if their analysis focuses on short-term fluctuations rather than long-term trends.

Table 5: Accuracy of simulated price averages, Freetown 1913-1918.

Product	Year	Number of observations per year				
		1	2	5	10	20
Rice	1913	62%	86%	98%	100%	100%
Rice	1914	82%	88%	97%	100%	100%
Rice	1915	66%	91%	100%	100%	100%
Rice	1916	11%	21%	41%	59%	82.8%
Rice	1917	49%	74%	94%	100%	100%
Rice	1918	75%	94%	100%	100%	100%
Maize	1913	4%	38%	70%	90%	99.3%
Maize	1915	90%	97%	100%	100%	100%
Maize	1916	54%	46%	74%	90%	99.3%
Maize	1917	34%	48%	86%	97%	100%
Maize	1918	73%	64%	88%	97%	100%
Palm oil	1913	17%	49%	80%	94%	100%
Palm oil	1914	61%	74%	93%	99%	100%
Palm oil	1915	35%	61%	80%	95%	100%
Palm oil	1916	80%	96%	100%	100%	100%
Palm oil	1917	35%	58%	78%	91%	100%
Palm oil	1918	22%	56%	80%	95%	100%

Conclusions

This article should not, however, be read as a counsel of despair. For one thing, the discrepancies between market reports and the Blue Books, though substantial in some years and for some products, may prove not to be as important for later periods as they are for earlier ones, particularly if increasing colonial state capacity led to increased statistical capacity. While none of the 'peasant export' colonies of British Africa ever reached the administrative density of Western European countries, bureaucratic capacity did increase over the course of colonial rule, and statistical capacity was professionalised, particularly after the Second World War. If the 'thin white line', to use Kirk-Green's (1980) evocative phrase, grew thicker over time, then the price statistics of later years would probably have grown more reliable too. For another thing, retail prices form only a small part of the data in the *Blue Books*. The trade and public finance statistics are likely to be very accurate, given their usefulness to colonial administrators.

Nor does it necessarily follow that since the early *BB* prices are frequently wrong, they should never be used. The discrepancies observed above can be large in some cases, but their relevance depends on the question being asked. The most important data quality

question for most economic historians is not so much "are these numbers accurate?" but more "are these numbers good enough for this particular purpose?" Long-run trends in welfare may not be greatly changed by more accurate price series if errors are not too large, especially if multi-year averages are used. In this respect, it is notable that the average absolute error (is considerably larger than the simple average error (around 5%). In other words, errors in one direction are to some extent cancelled out by errors in the other direction. Thus, the results in this article should not be interpreted as an attack on the valuable existing work on African real wages based on the *BB*; rather, they give an indication of their likely margins of error from year to year. Furthermore, the other major input into real wages—nominal wage rates—may be much more accurate, given the weight of colonial administrations on the demand side of the wage labour market in most African colonies. But work based on the changes rather than the levels of staple prices would be affected by inaccurate prices, especially if based on locally produced foodstuffs like rice, maize or millet. This would, for example, be the case if real wages were turned into GDP series and annual growth rates studied (for example, in studying year-to-year income volatility). Researchers of market integration would equally be advised to avoid the early *BB* prices if their econometric method relied heavily on the spatial correlation of changes in annual prices (though one might still measure the convergence of price levels using multi-year averages). But we should be careful not to throw a very healthy baby out with the bathwater: the quantitative study of African living standards has and will continue to make vital contributions to our understanding not only of Africa's economic past, but also its future. Returning to van Zanden's DNA metaphor, the better the map we have of the price genome of Africa, the better we will understand the distinctive paths of development of Africa's economies. In drawing attention to some of the possible pitfalls in using the *BB*, I am affirming the importance of this project, not questioning its worth.

A more long-term ambition ought to be the collection of new price series, at the finest possible levels of spatial and temporal disaggregation, across Africa. Economic historians of Africa, familiar with the formidable challenge of finding appropriate archival material out of which to fashion such series, may very well object that this task seems doomed from the beginning. Indeed, another article to use the *BB* price reports to construct a real wage series, this time for Singapore, argues that the *BB* are 'all there is' (Choy and Sugimoto, 2018). But this assessment seems overly pessimistic, at least for British Africa. Non-official price sources have yet to be systematically exploited, though Rönnback's (2014) use of company account books is an exception; Frankema and Juif's (2018) use of reports from a mining company is another. In general, the archives of other European firms that employed local labour may contain information about the prices of rations. The price reports of newspapers are extremely valuable where they exist and should be exploited. The writing of a more elaborate price history of Africa would be labour-intensive but would amply repay the effort.

APPENDIX: RAW PRICES AND REPORTING ERRORS

Notes: The absolute 'reporting error' is the modulus of either the percentage difference between the reported BB average and the average of weekly prices, or the mean percentage difference of reported BB maximum and minimum prices compared to the maximum and minimum prices in the weekly reports, respectively. In slightly more formal notation, denoting p_B^{AVG} as the average price recorded in the Blue Books, p_B^{MAX} as the maximum price recorded in the *BB*, and p_B^{MIN} as the minimum price recorded in the Blue Books, with the subscript N denoting the newspaper weekly market reports:

$$\text{RE}=\begin{cases}\left|\dfrac{p_B^{AVG}-p_N^{AVG}}{p_N^{AVG}}\right|, \text{ if } BB \text{ report average}\\ \dfrac{\left|\dfrac{p_B^{MAX}-p_N^{MAX}}{p_N^{MAX}}\right|+\left|\dfrac{p_B^{MIN}-p_N^{MIN}}{p_N^{MIN}}\right|}{2}, \text{ if } BB \text{ report a range}\end{cases}$$

The signs in parentheses (+, –) indicate the direction of the error: a (+) indicates that the *BB* overestimate the 'real' price (given by the market reports), a (–) indicates that the *BB* underestimate the real price, while a parenthesis containing both indicates that one of the minimum/maximum prices was an underestimate and the other was an overestimate.

Reporting error for annual price averages and ranges in the BB

Product	Year	Town	BB	Newspapers	Reporting error
Annual average retail prices					
Maize, pence per bushel	1913	Freetown	60	82	26% (–)
	1915	Freetown	84-108	78-102	7% (+)
	1916	Freetown	84-108	78-150	22% (+)
	1917	Freetown	84-108	96-144	19% (+, –)
	1918	Freetown	120-150	72-144	35% (+)
Palm oil, pence per 4-gallon tin	1913	Freetown	72	94	24% (–)
	1914	Freetown	120	98	22% (+)
	1915	Freetown	75	101	26% (–)
	1916	Freetown	75	95	21% (–_
	1917	Freetown	75	116	37% (–)
	1918	Freetown	75	125	40% (–)
Rice, pence per bushel	1893	Freetown	90	84	7% (–)
	1894	Freetown	90	102	12% (+)
	1913	Freetown	126-180	96-144	28% (+)
	1914	Freetown	126-180	90-120	45% (+)
	1915	Freetown	180-216	84-114	102% (+)
	1916	Freetown	180-216	84-288	70% (+,–)
	1917	Freetown	180-216	120-180	35% (+,–)
	1918	Freetown	240-270	126-150	85% (+)

Maize, pence per lb	1907	Lagos	0.25-0.32	0.22-0.375	14% (+,–)
	1908	Lagos	0.25-0.32	0.32-0.41	22% (–)
	1909	Lagos	0.24-0.38	0.29-0.44	16% (–)
	1910	Lagos	0.24-0.38	0.23-0.46	11% (+,–)
	1911	Lagos	0.36	0.37	4% (–)
	1912	Lagos	0.38	0.44	14% (–)
Rice, cents per lb	1923	Dar-es-Salaam	30-35	8-20	226% (–)

Reporting error for BB monthly wholesale prices in Dar-es-Salaam, 1923.

Product	Month	BB	Newspapers	Reporting error
Maize, shillings per 100 kilos	January	10	13	23% (–)
	February	13	14.4	10% (–)
	March	12	12.4	3% (–)
	April	12	10.8	12% (+)
	May	11	10.4	6% (+)
	June	10	9.52	5% (+)
	July	10	8.62	16% (+)
	August	10	7.75	29% (+)
	September	10	7.5	33% (+)
	October	10	7.5	33% (+)
	November	10	8.75	14.3% (+)
	December	10	10.6	6% (–)
Millet, shillings per 100 kilos	January	14.5	14	3%
	February	15.5	14.9	4%
	March	15	13.2	14%
	April	14	12	17%
	May	14	12	17%
	June	13	11.5	13%
	July	12	11.2	7%
	August	12	10.2	17%
	September	11	9.24	19%
	October	12	10.7	12%
	November	11	11.7	6%
	December	12	12.8	6%

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