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Africa Sector Database (ASD): Expansion and update
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Abstract

Since the construction of the Africa Sector Database (ASD) at the Groningen Growth and Development Centre, there has been a wave of statistical reforms in some of the countries in the ASD leading to significant revaluations of GDP. These reforms have provided a clearer picture of the size and structure of production of the countries involved (Sy, 2015). We update the ASD to reflect these statistical changes. Most importantly, following the methodology of ASD, we expand the ASD by constructing sectoral data for seven new African countries: Burkina Faso, Cameroon, Lesotho, Mozambique, Namibia, Rwanda and Uganda. This has resulted in an expanded database (from the 1960s to 2015) covering about 80% of GDP in sub-Saharan Africa.

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1 Introduction

There is a growing literature that portrays African National statistics as notoriously unreliable and potentially misleading. The negative characterisation of African data has been referred to in the literature as: The African Statistical Tragedy (Devarajan, 2013), the Jerven Debate and the Political Economy of Bad data (Sandefur and Glassman, 2015). One of the key concerns is that changes such as rebasing of time series or improvements in the estimates of the informal sector and subsistence and untaxed activities lead to substantial changes in GDP. Mentioning this in almost all of his papers, Jerven argues that the 60% overnight increase in Ghana's GDP as a result of rebasing is a potential source of worry (Jerven, n.d., 2009, 2010, 2011, 2013a, 2013b, 2014; Jerven & Duncan, 2012; Jerven & Johnston, 2015).

In response to these concerns, a UN high level conference on post-MDGs development goals has called for a data revolution in Africa and called for African national governments to disseminate information under an open data protocol (Sandefur and Glassman, 2015). This culminated in a resolution (L4) at the African Union known as the African Data Consensus (ADC). The ADC seeks to "create an inclusive data ecosystem involving government, private sector, academia, civil society, local communities and development partners that tackles the informational aspects of development decision-making in a coordinated way" (UNECA, 2015). This generates the needed information to drive social, economic and structural transformation, and to track progress on nationally, regionally and globally agreed goals such as the Ouagadougou Declaration on Employment Poverty Alleviation in Africa, the AU Agenda 2063 and the SDGs.

While the concerns raised in the literature may have motivated the ADC, which is very important for creating the data ecosystem that Africa needs, we argue that some academics have exaggerated the data problems and make wrong calls on some points. There are more data available for Africa than many observers realise, if one is willing to dig deep enough to unearth them. For instance Jerven (2013) argues that all discrepancies and problems in international income databases concerning Africa necessarily derive all their problems from the weaknesses of African national statistics (Jerven, 2013). We disagree with Jerven on this point. The differences between the Penn World Tables (PWT), the Maddison Database and the World Development Indicators (WDI) are primarily due to differences in statistical methods and not necessarily due to the underlying African statistics.

Unlike some of these overly pessimistic scholars, we think it is worthwhile to make a genuine effort to study, on a country by country basis, the different data sources and link them in a way that produces a reliable sectoral dataset for African economies. We argue that the meticulous study of the statistical sources, methods, statistical reforms, and macroeconomic reforms such as currency redenomination can result in a statistical database that can be used to analyse economic developments in sub-Saharan Africa.

Our starting point is the Africa Sector Database (ASD), developed by the Groningen Growth and Development Centre (GGDC), which provides long term-series on sectoral developments in Africa for 11 countries from 1960 to 2010. The ASD database is constructed on the basis of an in depth study of available statistical sources on a country by country basis (De Vries et al. 2013). It builds on earlier efforts by McMillan and Rodrik (2011).

In this project, we expand the ASD by adding sectoral data for seven additional countries from 1960 to 2015 (Burkina Faso, Cameroon, Lesotho, Mozambique, Namibia, Rwanda and Uganda). We also extend the data for the countries already in the ASD from 2010 to 2015, taking into account recent statistical and currency reforms in some of the countries.[3] We strictly follow the ASD methodology to ensure data continuity, consistency and comparability (see De Vries et al. 2013). As this paper is meant to be read as a stand-alone paper, some overlap and repetition of De Vries et al (2013) in the description of methods and procedures is inevitable. But we would like to fully and explicitly acknowledge our intellectual debt to the earlier paper by De Vries et al (2013).

The end result of this empirical exercise is an expanded Africa Sector Database with sectoral data on employment and value added for 18 important economies in Africa from the 1960s to 2015[4]. This covers about 80% of the GDP of sub-Saharan Africa.

Examination of trends in the data reveal that the service sector is increasingly becoming the most important sector in Africa both in terms of employment and value added. Agriculture is losing its position as the mainstay of economies in Africa. This is consistent with the literature on structural change, which argues that in the course of development, inputs shift from primary sectors to more dynamic sectors such as manufacturing and services and in response these sectors contribute more to GDP. What is very striking is that at low levels of GDP per capita, the industrial sectors and especially manufacturing sectors are rapidly losing steam as the engines of growth in most African countries. This immediately raises three important questions: Why has manufacturing remained constant or decreased in several countries in Africa (premature deindustrialisation)? Is the growth in services strong and dynamic enough to avoid becoming a potential structural change burden in Africa? Is the recent growth in Africa due to within sector growth, to structural change or to changes in labour participation? These are the kinds of questions that can be analysed with the extended ASD.

The rest of the paper is organised as follows: Section 2 reviews the literature on African data and prepares the ground for a meticulous study of the statistical sources, methods and reforms in the seven new countries: Burkina Faso, Cameroun, Lesotho, Mozambique, Namibia, Rwanda and Uganda. Section 3 describes the general content and layout of the database. It covers measures of output and labour input for the seven new African countries at the 10-sector level usually from the 1960s to 2015 and describes the data on output and labour input used to update the existing countries in the database from 2010 to 2015. The output measures include value added at current and constant prices. Labour inputs include total employment. Section 4 describes the sources and methodology used in constructing the value added variables. Consistent with the ASD methodology, the general approach is to use the most recent revisions of the national accounts as benchmarks and then apply historical growth rates calculated from older datasets to retropoloate the benchmark levels back to the 1960s. Section 5 describes the sources and methodology used in constructing the employment variables. We used sectoral employment data from population and housing censuses as our benchmark level estimates, sometimes complemented with data from labour force surveys. We then interpolate, extrapolate or retropolate employment using time series derived from establishment/household surveys or labour productivity information. In the case of agriculture we

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[3] Rebasing in Nigeria, Kenya, Tanzania and Zambia, and Currency Redenomination in Zambia.
[4] In the case of Uganda the data go back to the 1950s. In some other countries the data start from 1970.

use time series from FAO estimates of the active population in agriculture. Section 6 describes the process of updating the original ASD from 2010-2015 taking into account recent statistical and exchange rate reforms in some countries. Section 7 summarises and concludes.

2   The Data Debate

The study of structural transformation in Africa is limited by a lack of reliable long-run sectoral data. Data in general have been highlighted to be problematic in Africa (Devarajan, 2013: 9). Before Devarajan (2013) identified this problem, Young (2012) argued that measures of real consumption based on DHS data indicate that living standards in sub-Saharan Africa are growing at a rate 3.5 to 4 times greater than the rate indicated in national accounts datasets. Using the growth in household assets as a proxy for the growth in income and consumption he concludes that economic performance is better than suggested by national income data, putting the quality of national data in Africa into question. Harttgen et al (2013) challenged this claim by showing that the trend in assets is a biased proxy for the trend in income or consumption since there is a weak relationship between the growth of assets and the growth of income or consumption, with asset growth exhibiting drift behaviour.

Jerven, in various papers,[5] has further argued that African national statistics are highly unreliable and potentially misleading. Comparing the ranking of income per capita based on WDI, PWT and the Maddison historical database, he shows striking discrepancies. Countries are ranked into different income categories according to these databases. He concludes that there is a black box of uncertainty surrounding African data, resulting in knowledge and governance problems.

While this may have created the policy momentum for better measurement and the timely dissemination of data in Africa, we argue that some of Jerven's arguments and generalisations are hyperbolic. Jerven (2013) argues that all discrepancies and problems in international income databases concerning Africa necessarily derive all their problems from the weaknesses of African national statistics (Jerven, 2013). We argue that Jerven is wrong on this point. The differences between PWT, the Maddison Database and WDI are due to differences in statistical methods, not necessarily to the underlying African statistics. Garcia-verdu (2014) highlights fundamental problems of definition and many other inaccuracies in Jerven's book.

What this debate shows is that there are still serious problems of statistical measurement in Africa. Unfortunately, much of our current understanding of the nature of structural change and productivity growth in Africa is based on imperfect data. The informal sector, subsistence and untaxed activities are poorly measured (Young, 2012); measurement of manufacturing output is characterised by margins of errors (Ridell, 1990 cited in Jerven, 2009); and data quality in general is graded C or D in the PWT 6.2, reflecting an error margin of 30% or 40%. These problems of measurement produce a considerable amount of uncertainty in our continuous attempt to estimate the effect of structural change on productivity growth in Africa.

In many cases little can be done about these measurement problems by users of African statistics. But as a second best solution De Vries et al. (2013, 2015) developed a methodology to make the data "intertemporally, internationally and internally consistent". The ASD provides long-series on

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[5] See (Jerven, 2009, 2010, 2011, 2013a, 2013b, 2014; Jerven & Johnston, 2015)

sectoral development in Africa based on national and international sources. This method covers only 11 countries in Africa. However, the same sources used to construct the series are available for seven other African countries from 1960-2015, namely: Burkina Faso, Cameroon, Lesotho, Mozambique, Namibia, Rwanda, and Uganda.

3 Expanding the Africa Sector Database (ASD)

The original ASD covers 11 countries from 1960 till 2010 (De Vries et al. 2013). We have added 7 new countries and updated the original ASD that ended in 2010 to the year 2015.

The resulting expanded and updated ASD covers data for 18 Africa countries, with 4 variables reported across 10 sectors from 1960 to 2015. The industry classification is based upon the International Standard Industrial Classification of All Economic Activities (ISIC) Rev.3.1. To ensure that labour productivity of the sector Business Services (J+K) is not overestimated, value added for Dwellings is presented separately[6].

The update includes revisions of the data for Nigeria, Kenya, Tanzania and Zambia in recent periods (see details in the update section 4.3) because of the recent rebasing of GDP in the aforementioned countries and currency redenomination in Zambia.

The table below presents the countries in the original database and the new additions.

Table 1: List of Countries in the Africa Sector Database

ASD Database	Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa Tanzania, and Zambia
Expansion	Burkina Faso, Cameroon, Lesotho, Mozambique, Namibia, Rwanda, Uganda

Variables and the 10 Sectors

Table 2 lists the variables covered in the ASD. We cover the same variables in the update to ensure continuity and consistency.

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[6] There is no labour input for dwellings

Table 2: Variables used in both the ASD and EASD

Variable Code	Description
VA	Value added in current prices in local currency
VA_Q05	Value added in constant 2005 prices in local currency
VA_P	Value added price deflator (2005=100)
EMP	Persons engaged (usually ≥15 years)

For these four variables, data were usually available from the 1960s until 2015, in particular for value added at current prices. The length of the time series for value added at constant prices and employment differ for some countries depending on data availability. For Uganda employment data go back to 1952 and value added is available from 1955 onwards. Value added at current and constant prices is measured in millions of local currency while employment is measured in thousands of persons. Because of currency redenomination in some countries at different points in time, all value added data are converted to new national currencies.[7] Table 3 gives an overview of data availability in the EASD.

Table 3: Data Availability by Country

Code	Country	Currency	VA	VA_Q05	VA_P	EMP
BWA	Botswana	Pula (P)	1964-2015	1968-2015	1964-2015	1964-2015
BFA	Burkina Faso	Franc (CFA)	1965-2015	1966-2015	1966-2015	1970-2015
CMR	Cameroon	Franc (CFA)	1965-2015	1965-2015	1965-2015	1965-2015
ETH	Ethiopia	Birr (Br)	1961-2015	1961-2015	1961-2015	1961-2015
GHA	Ghana	Cedi (¢)	1960-2015	1960-2015	1960-2015	1960-2015
KEN	Kenya	Shilling (KSh)	1960-2015	1964-2015	1964-2015	1969-2015
LSO	Lesotho	Molati (LSL)	1964-2015	1965-2015	1965-2015	1970-2015

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[7] For example, one new Zambian Kwacha adopted in 2013 is equivalent to thousand old kwacha. We converted data estimated in old currency to the new currency by simply dividing it by a multiplicand of one thousand.

MWI	Malawi	Kwacha (MK)	1960-2015	1966-2015	1966-2015	1966-2015
MUS	Mauritius	Rupee (R)	1960-2015	1970-2015	1970-2015	1970-2015
MOZ	Mozambique	Metical (MT)	1966-2015	1966-2015	1966-2015	1970-2015
NAM	Namibia	Dollar (N$)	1965-2015	1965-2015	1965-2015	1960-2015
NGA	Nigeria	Naira (₦)	1960-2015	1960-2015	1960-2015	1960-2015
RWA	Rwanda	Franc (RWF)	1966-2015	1966-2015	1966-2015	1970-2015
SEN	Senegal	Franc (CFA)	1960-2015	1970-2015	1970-2015	1970-2015
ZAF	South Africa	Rand (R)	1960-2015	1960-2015	1960-2015	1960-2015
TZA	Tanzania	Shilling (SHS)	1960-2015	1960-2015	1960-2015	1960-2015
UGA	Uganda	Shilling (Ush)	1955-2015	1955-2015	1955-2015	1952-2015
ZMB	Zambia	Kwacha (ZK)	1960-2015	1965-2015	1965-2015	1965-2015

Sectoral Classification and Treatment of Dwellings

The ASD followed the International Standard Industrial Classification of All Economic Activities (ISIC) Rev.3.1 to define the 10 sectors. Table 4 reports the ISIC Rev 3.1 codes, the ASD sector name and the corresponding sub-sectors. Owner-Occupied Dwellings (70) are given special treatment in the ASD. Ownership of dwellings is the imputed rent which would normally be paid by the owner-occupier if s/he were renting the property rather than owning it. In other words, it is an estimate for the economy as a whole of what owner-occupiers would charge for the use of their own housing. The estimate is normally based on the number of dwellings given in the population and housing census and an imputed rent per month. In the ASD it is implicit in real estate activities which is part of Business Services (J+K). It has no employment equivalent therefore in productivity analysis, and as such tends to overestimate the productivity of the real estate sector if it is not deducted. As a result, it is treated separately in the ASD and EASD. This is particularly important for sub-Saharan Africa where many workers live in their own houses.

In the case of the seven additional countries, the National Statistical Institutes of Lesotho and Uganda construct a separate series for owner-occupied Dwellings. For Burkina Faso and Cameroon

we used the share of Dwellings in Business Services (J+K) of Senegal to construct a separate series for Dwellings (70). Since Burkina Faso, Cameroon and Senegal are AFRISTAT members, are in the same monetary zone, and have a similar economic structure we apply the share of Dwellings in Business Services (J+K) of Senegal to give a reasonable estimate of dwellings in the other two Francophone countries. As Namibia does not report separate series on dwellings we applied the share of dwellings in Business Services (J+K) of Lesotho to arrive at an estimate for Namibia. Namibia and Lesotho are in the Common Monetary Area (CMA) and have a similar real estate structure. Rwanda and Mozambique also do not report separate series on Dwellings. For these two countries we applied the share of Dwellings in Business Services (J+K) of Uganda and Tanzania respectively since the economic structure of these countries is similar to the two countries that do not report these data.

Table 4: The 10 Sectors

ISIC Rev3.1 code	ASD sector name	ISIC Rev3.1 description
AtB	Agriculture	Agriculture, Hunting, Forestry, and Fishing
C	Mining	Mining and Quarrying
D	Manufacturing	Manufacturing
E	Utilities	Electricity, Gas and Water Supply
F	Construction	Construction
G+H	Trade Services	Wholesale and Retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and Restaurants.
I	Transport	Transport, Storage and Communications.
J+K	Business Services	Financial Intermediation, Real Estate, Renting and Business Activities.
70	Dwellings	Owner occupied Dwellings (is part of Business services)
L,M,N	Government Services	Public Administration and Defence, Education, Health and Social work
O, P	Personal Services	Other Community, Social and Personal service activities, Activities of Private Households
TOT	Total Economy	Total Economy

4 Value Added

4.1 Sources for new countries

In expanding and updating the ASD, we followed carefully the approach used by (de Vries, de Vries, Gouma, & Timmer, 2013; G. De Vries et al., 2015) in constructing the value added series to ensure comparability, consistency and continuity. In the ASD, de Vries et al. (2013:12) apply the following rules and methods:

- They make a distinction between 'official' (NSI produced), and 'non-official' (estimates) sources.
- Official NSI data are used as the primary source.
- Non-official data are used to bridge gaps in official data using growth trends.
- When detailed sectoral data are missing, growth trends of aggregate sectors are applied.
- The most recent revision of the National Accounts data is used as the benchmark. Time series are constructed by extrapolating the benchmark value added levels forward and backward in time.
- Historical series are linked using growth rates, which ensure consistency over time.
- Current price series and price deflator series derive from the source data. Volume series (constant price series) are calculated implicitly by dividing current price series by a price deflator.

Official data are usually obtained from national statistical institutes. The main sources are yearly publications such as the Statistical Bulletins, Statistical Yearbooks and National Accounts reports. All countries in this study use the UN System of National Accounts in preparing value added data, ensuring that the data is highly comparable across countries. For some years official sources are not available from National Statistical Institutes. In those years, in our expansion and updating exercise, we complement the available official sources with value added data from the UN Yearbook of National Accounts and the online database of UN Official Country Data. These two UN sources are based on information elicited from the UN National Accounts questionnaire sent to the National Statistical Institutes. UN national accounts data are usually available since 1970, though for Mozambique and Namibia the UN source starts from 1991 and 1980 respectively, which is the same period for which we had national accounts data from the National Statistical Institutes. For Lesotho, the Bureau of Statistics started computing volume and price series from 1980 onwards.

If value added or price information is missing, we fill gaps in the data using information from the Africa Statistical Yearbook produced by UNECA (1970-1990)). Other (non-digital) official and Non-official sources were mostly obtained from the SAOS, University of London Library and the British Library. Table 5 summaries the sources used in ASD and EASD.

Table 5: Official and Non-official Data Sources

Official Sources	Non-official Sources
National Statistics Institute National Accounts publications (NSI)	UN Economic Commission for Africa, African Statistical Yearbook UNECA (ASYB)
UN Yearbook of National Accounts Statistics (UN YB)	Online database of UN Estimates of National Accounts (UN E)
Online database of UN Official Country Data UN OCD	

These sources are reported with different historical base years, methods, and different versions of the System of National Accounts. Also, some countries over the years changed or redenominated their currencies. For example, Lesotho changed its national accounts currency from the Rand to Maloti, while Uganda also changed its national accounts currency from pounds sterling to Ugandan Shillings and redenominated its old shillings to new shillings in 1989. As a result, we observed major breaks in the levels of series over time. To ensure a consistent series over time, the ASD back-casting technique is used to remove these breaks in series.

For the new countries added to the database, the National Statistical Institutes of Burkina Faso, Lesotho and Namibia extrapolated value added series backward in time to the 1980s. The other four countries have the latest revision of National Accounts starting in the 1990s. For the 1960s and 1970s we have value added series produced with different methods, standards, and SNA, resulting in breaks and inconsistent series.

We remove major breaks in series by using the first year of the most recent revisions of national accounts (value added) as our benchmark level data. We link the benchmark level series to historical series using growth rates. This repairs major breaks by adjusting the level of historical series to reflect current information and methodologies while maintaining historical growth rates. Table 6 indicates years for which recently revised national accounts are available for benchmark levels and years for which growth trends have been used.

For some years, Education; Health and Social Work; and Other Community, Social and Personal Services (M+N+O) are lumped together as a single sector in the UN database (UN OCD). We added Public Administration and Defence; Compulsory Social Security (L); and Activities of Private Households with employed persons (P) to get an aggregate sector (L+M+N+O+P).[8] We then applied the growth rate of this aggregate sector (L+M+N+O+P) to those years for which data were available for both Government Services (L+M+N) and Personal Services (O+P) as defined in the

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[8] Often sector P is not distinguished separately in the UN data. It is included in sector O.

ASD. Whenever detailed sector information is missing in the NSI sources and the Africa Statistical Yearbooks we followed a similar procedure.

Table 5: Availability of Sources for New Countries

VA current price	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015
Burkina												
Cameroun												
Lesotho												
Mozambique												
Namibia												
Rwanda												
Uganda												

VA Constant price	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015
Burkina												
Cameroun												
Lesotho												
Mozambique												
Namibia												
Rwanda												
Uganda												

Legend

Official Sources: Latest Revision of National Accounts data

Official Sources: Data used for trends   (Note: For Uganda this source goes back to 1955 but for convenience we shaded up to 1960)

Non-Official Sources: Data used for trends.

4.2 Value Added Methodology

Value added series in current prices for each of the ten sectors are constructed by linking historical data to the value added data from the latest revision of the national accounts. Using the same sources, we compute price deflator growth rates for each of the ten sectors – i.e. using the price deflators we deflate the value added data in current prices to obtain value added in constant prices using 2005 as the reference year. Total economy figures are obtained by the summation of the values of the ten sectors for each year (see De Vries et al, 2013).

The current value added series is computed by linking historical data to benchmark level estimates as:

$$VA_{t+1} = VA_t \times \left[\frac{VA_{t+1}^e}{VA_t^e}\right] \tag{1}$$

Where VA_t represents current value added in the benchmark year t and VA_t^e is the value added from the external non-official source. This preserves the historical growth rates by adjusting the levels in the maintained period to reflect the latest revision in the national accounts.

To obtain continuous data on current value added and price deflators, we calculate deflator growth rates using the current and constant valued added from the same source as:

$$\Delta VA\_P_{t+1} = \ln\left\{\left[\frac{VA_{t+1}^e}{VA\_Q_{t+1}^e}\right]/[\frac{VA_t^e}{VA\_Q_t^e}]\right\} \tag{2}$$

Where ΔVA_P_t is the logarithmic growth rate of the price deflator in year t; VA_t^e and $VA\_Q_t^e$ are the nominal and volume valued added data respectively for year t. Based on (1) and (2), we compute the sectoral volume data as:

$$VA\_Q_t = VA\_Q_{t+1}/EXP\left[\ln\left(\frac{VA_{t+1}}{VA_t}\right) - \Delta VA\_P_{t+1}\right] \tag{3}$$

Where VA_Q_t is the sectoral volume index for the year t. The advantage of this approach is that when detailed sector data are missing, we can use aggregate growth trends to represent the underlying detailed sectors. According to de Vries et al (2013) "it is more reasonable to make this assumption for price developments than for volume growth rates" (de Vries et al, 2013). When primary sources are not available, this method allows us to use price developments from external sources (de Vries et al, 2013).

4.3 Update of Value Added for existing ASD countries

The ASD has been used widely to analyse the long-run structural transformation of Africa. It contains data on 6 variables across ten sectors for 11 Africa countries. Since the construction of the ASD many Africa countries in the database have undergone statistical reforms or macroeconomic reforms. "For instance, in 2014 alone, Kenya, Nigeria, Tanzania, and Zambia all completed rebasing

exercises, which led to significant revaluations of their GDPs: Nigeria's latest (2013) GDP nearly doubled, Tanzania's grew by a third, and Kenya's and Zambia's increased by a quarter" (Sy, 2015). Nigeria revised its GDP estimates and recalculated historical data back to 1981 and Zambia, in addition, redenominated it currency.

GDDC acknowledged the large break in the sectoral series of Nigeria following the rebasing but they did not update the original data in the ASD because the Nigeria Bureau of Statistics (NBS) had not re-estimated the historical GDP.[9] NBS has now re-estimated the old series back to 1981 taking into account new sources and methods. The figure below compares the structure of production under the old national accounts and the new national accounts. The old estimates portray the Nigerian economy as industry-driven but the new estimates show that the Nigerian economy is actually service-driven. Therefore we updated the original ASD to reflect these recent reforms and statistical revisions in Nigeria as well as other African countries. For each country we take the first year of the revised estimates as benchmark. We then change the reference year to 2005. The notes below provide information about the update process that was adopted for each country in the ASD.
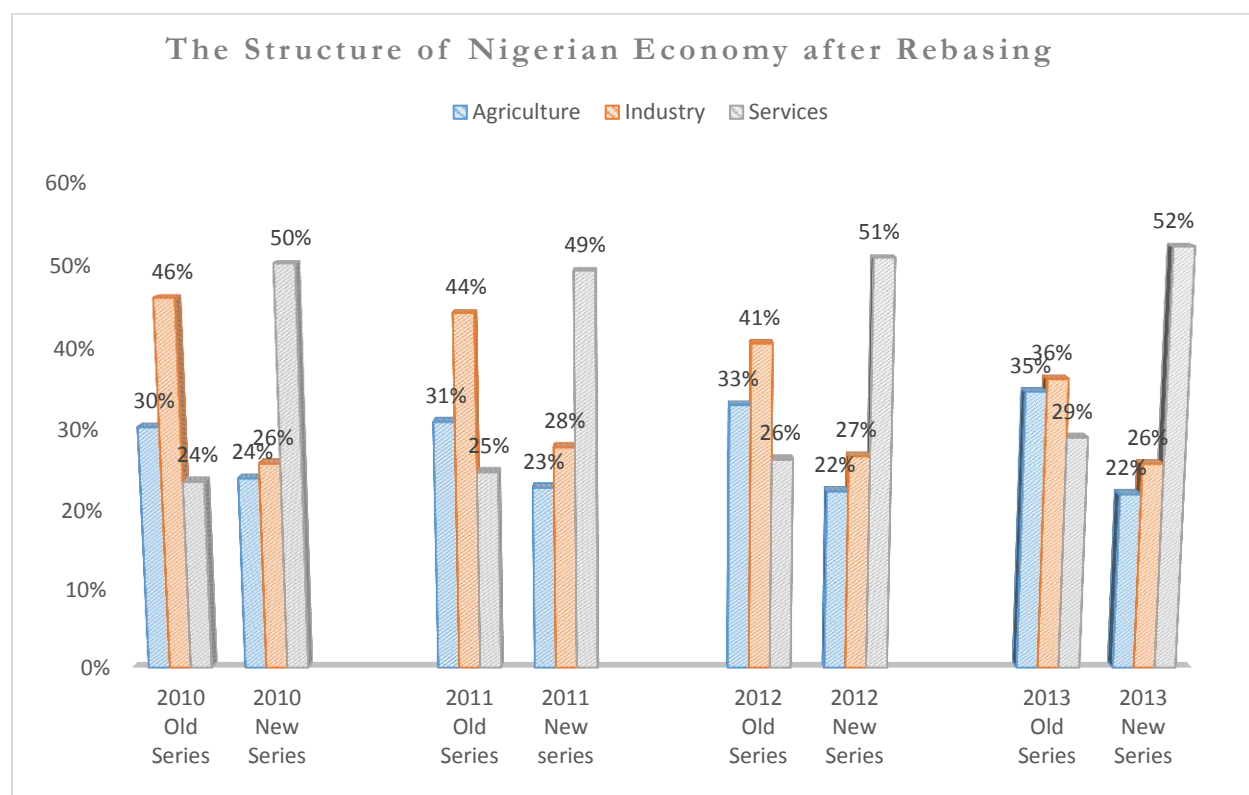
Source: NBS (2014). The figure shows the percentage share of GDP of Agriculture, Industry and Services. It compares each sector before and after rebasing. It shows significant re-evaluation of the structure of production after rebasing.

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[9] https://set.odi.org/comments-page-3/

4.3.1.1 Botswana

Value added by type of economic activity in both current and 2006 constant prices were obtained from Statistics Botswana.[10] The yearly data covers the period 2004-2015, thus containing seven years of overlapping data with the ASD. We compared the level data of the overlapping years (2004-2010) with the Botswana value added data in the ASD. For 2004-2005 data from both sources were the same since the ASD used the latest revision, at the time of construction, as the benchmark level data. However, from 2006-2010 the data obtained differ from the ASD benchmark level data following revisions undertaken by Statistics Botswana. Statistics Botswana usually revises the first estimate of yearly or quarterly data after receiving updated source data such as "finalized or audited data from companies in which differences and inconsistencies in the previously published data may be observed" (Statistics Botswana, 2016). As a result we update the ASD starting from 2006 to 2015 before joining this with the ASD data from 1960-2005. We chose 2005 as our reference year to recalculate the value added series in constant prices to obtain a volume series from 2006 to 2015 that is consistent with the ASD volume series from 1960 to 2005.

4.3.1.2 Ethiopia

For Ethiopia, current information on value added is not available on the website of the National Statistical Institute. We therefore used value added information from the 2016 Africa Statistical Yearbook (ASY).[11] We used the growth trend from the value added in current prices to update the Ethiopian value added data in the original ASD from 2010 to 2015. In the ASY, value added in constant prices is not reported, but the annual growth rate of GDP by kind of economic activity in constant prices is reported. We used the annual growth rate to update the value added series from 2010 to 2015.[12] For Dwellings in current prices we assume that the share of Dwellings (70) in Business Services (J+K) is constant since 2010. Using this constant ratio, we derive the Dwellings series in current prices from 2011 to 2015. For Dwellings in constant prices, we used the growth rate of Business Services from 2010 to 2015 to update. This smoothly updates the original ASD without any inconsistency or major breaks.

4.3.1.3 Ghana

The update period for Ghana is 2011-2015. GDP by type of economic activity in both current and 2006 constant prices was obtained from the Ghana Statistical Service (Revised Annual GDP 2015, Ghana Statistical Service(GSS)).[13] GSS reports the value added data in current and 2006 constant prices from 2006 to 2015. This overlaps with the Ghana data in the ASD. The data for overlapping years are the same as the data in the ASD since the recent revision was used as the benchmark level data in the ASD. As a result we used the level data for the period 2011-2015 to update the ASD

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[10]   data.http://www.statsbots.org.bw/sites/default/files/publications/GDP%20Q3%20December%202016.pdf.   The website in the footnote leads you to a PDF published by Statistics Botswana. On Page 13, you will find the yearly and quarterly data

[11]https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/African_Statistical_Yearbook_2016.pdf

[12] The update is done using the simple growth formula: $VA_{t+1} = VA_t(1 + g)$; where g is the annual growth rate reported in the ASY. VA is sectoral value added in constant prices.

[13] http://www.statsghana.gov.gh/gdp_revised.html The website in the footnote leads you to the Revised Annual 2015 GDP, September 2016 Edition in Excel format, which covers the period 2006-2015.

from 2010 to 2015. We then changed the reference year from 2006 to 2005 to obtain volume data consistent with the ASD.

4.3.1.4 Kenya

Kenya finished a rebasing exercise in September 2014 using some of the recommendations of the 2008 System of National Accounts. This increased GDP by about 15% with minor changes in the structure of production. The Kenya National Bureau of Statistics provides estimate of Gross Domestic Product by kind of economic activity from 2006 to 2015.[14] The last year of the rebased series was used as the benchmark year with the data then retropolated back to 1960 using the growth trend from the original ASD. We deflated the nominal series using the price index constructed from the rebased national accounts and the ASD. This updates the Kenya data to reflect the rebasing, the 2008 SNA and minors changes in the structure of production.

4.3.1.5 Malawi

The update period for Malawi is 2009-2015, and thus includes two overlapping years with the ASD. Gross Domestic Product by economic activity in both current and constant prices was obtained from National Statistical Office of Malawi.[15] The data for the overlapping years (2009-2010) differ from the data in the original ASD since the national accounts have been updated with recent information. As a result we used the level data for the period 2009-2015 to update the ASD. We then changed the reference year from 2010 to 2005 to obtain volume data consistent with the ASD.

4.3.1.6 Mauritius

Gross Domestic Product by kind of economic activity in both current and constant prices from 2006-2015 was obtained from Statistics Mauritius.[16] The Mauritius data is based on the 2013 CEA, the 2008 SNA and the NSIC Rev. 2. The update period for Mauritius is 2006-2015. We compare value added data for the overlapping years (2006-2010) with value added data from the original ASD. We found a slight difference for the overlapping years. Since the new official source embodies recent updates and revisions, we used it in place of the ASD data.

4.3.1.7 Nigeria

The GGDC constructed value added series for Nigeria in the ASD utilising information based on a severely outdated system of national accounts and base year. The entire data, including recent years, was based on the 1968 UN system of National Accounts and 1990 as a base year. In 2014, Nigeria rebased this outdated base year to 2010 following international standards and guidelines. The National Bureau of Statistics updated its survey frame, and "as a result, the size of the sample frame expanded from 83,733 to 851,628 establishments. In addition, the number of economic activities reported in the GDP computation framework increased to 46 compared to 33 in the previous series" (NBS, 2014). The new values for GDP were compiled following the 2008 UN System of National Accounts (SNA 2008 version), the International Standard Industrial Classification (ISIC Revision 4), the Central Product Classification (CPC version 2) and the ongoing development of an SUT for Nigeria (NBS, 2014). The rebasing also covered more economic activities including new sectors such as entertainment, research, and patents and copyrights, in addition to a broader

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[14] www.knbs.or.ke/gross-domestic-product-gdp/ https://www.knbs.or.ke/download/rebased-gdp-facts/
[15] http://www.nsomalawi.mw/images/stories/data_on_line/general/Quarterly%20Bulletins/Quarterly%20Statistical%20Bulletin,%20December%202016.pdf
[16] http://statsmauritius.govmu.org/English/StatsbySubj/Pages/National-Accounts.aspx

coverage of the services sector, particularly the informal sector. Following the update, nominal GDP in 2010 increased by 59.5 percent and the structure of the Nigerian economy changed significantly with the service sector being the fastest growing sector and contributing more to GDP than that previously estimated under the old base year. Historical data were recalculated backwards to 1981 using the new base year. This presents output information that is significantly different from the output used to construct the original ASD. As a result we reconstruct the entire value added data for Nigeria in ASD by:

- Using the newly revised estimate for the period 1981-2015 as level data.
- Using 1981 as a splicing point to backcast to 1960 using the growth trend from the ASD data.
- Recalculating the volume data using 2005 as a reference year, and then deriving the price index.

Value added series in current and constant prices (1981-2015) used as the level data were obtained from the Nigeria Bureau of Statistics.[17] For the period 1960-1981, we used the growth trend from the original ASD.

4.3.1.8   Senegal

GDP by kind of economic activity in both current and constant prices was obtained from UN Official Country Data. It covers the period 2009-2014, with two overlapping years. The data for the overlapping years are the same as the data in the original ASD, since the original ASD was constructed using the same source. As a result we used the level data for the period 2011-2014 to update the ASD from 2010 to 2014. We then changed the reference year to 2005 to obtain volume data consistent with the ASD. Since Government and Personal Services are put together in the UN OCD, we applied the growth trend of this aggregate sector to obtain separate series for both Government Services and Personal Services.

4.3.1.9   South Africa

Value added by kind of economic activity in both current and constant prices were obtained from Statistics South Africa.[18] We used yearly data from 2005 to 2015, thus giving six years of overlapping data with the ASD. We compared the level data of the overlapping years (2004-2010) with value added data in the ASD, and observe slight differences following revisions undertaken by Statistics South Africa. Statistics South Africa continuously updates and revises the first estimates of yearly or quarterly data after receiving finalised primary source data. Hence, we used level data from 2005 to 2015 in this revision and joined it with the ASD data from 1960-2004. We chose 2005 as our reference year to recalculate the value added series to obtain a volume series from 1960-2004 that is consistent with the new volume series from 2005 to 2015.

4.3.1.10   Tanzania

In 2014, Tanzania completed a rebasing exercise that changed its base year from 2001 to 2007. This rebasing takes into account the natural gas discovery and the mobile revolution in Tanzania. This increased Tanzanian GDP by about 33%. As a result of this rebasing exercise, we update the

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[17] http://nigerianstat.gov.ng/elibrary?queries[search]=GDP

[18] http://www.statssa.gov.za/?page_id=1854&PPN=P0441&SCH=6675

Tanzanian value added series in the ASD using this current data. Data on value added by kind of economic activity in both current and constant prices were obtained from the National Bureau of Statistics of Tanzania.[19] Thus giving six years of overlapping data. For the overlapping years, we used this revised source in place of the ASD.

4.3.1.11 Zambia

Another important update in this database is the value added series of Zambia. The primary source used to construct value added series for Zambia in the original ASD is based on the 1968 UN System of National Accounts. This version of the system of national accounts is quite outdated and hence a re-benchmarking of the national accounts of Zambia was long overdue. In 2014, Zambia completed a rebasing exercise that benchmarked the base year in 2010 using the 2008 UN System of National Accounts as a guideline. The input data used in the benchmarking exercise is based on the 2011/2012 Economic Census, the 2013 Non-agriculture Informal Sector Survey, the 2009/2010 Post Harvest Survey and the 2010 Living Conditions Monitoring Survey. "The main source of data for this benchmarking exercise was the Economic Census which was specifically undertaken to address the challenges of compiling economic statistics, such as the outdated benchmark year (1994), limited scope of coverage, and use of inappropriate price and volume indices. Overtime, the structure of the Zambian economy had significantly changed since 1994 largely on account of development of new industries and technological innovation" (CSO, 2014:1). In addition to this statistical revision, Zambia redenominated the Kwacha in January 2013.[20] The revised national accounts are reported in the new currency but value added data in the original ASD was reported in the old currency.

To account for these revisions, we update the original ASD by first converting the ASD data to the new Zambian Kwacha. We used the value added series from the revised national accounts (2010-2015) as our benchmark level data and then backcast to 1960 using the growth trend from the original ASD converted to the new currency. We used 2005 as our reference year, resulting in a consistent value added series in both current and constant prices from 1960 to 2015. The benchmark level data was obtained from the Central Statistical Office (CSO), Zambia.[21]

Update for Dwellings (70)

To obtain dwellings series from 2011-2015 for the updated database, we simply used the ASD dwellings estimate for 2010 as benchmark and then extrapolate using growth trends from Business Services (J+K) for all the countries. We deflated this series to obtain volume series by using the price index of Business Services (J+k).

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[19] http://www.nbs.go.tz/nbs/takwimu/na/HIGHLIGHTS_FOR_THE_THIRD_QUARTER_GDP_2016.pdf
[20] 1000 old Kwacha=1 new Kwacha.
[21] http://zambia.opendataforafrica.org/dwieeid/national-accounts-of-zambia?indicator=1004870

5 Employment

5.1 Sources of employment data for new countries

The main sources of employment used are: Population and Housing Censuses; Labour Force Surveys; (Other) Household Surveys; Establishment Surveys; and Economically Active Population in Agriculture. The UN system of national accounts and the Africa Charter on Statistics govern the production of national accounts statistics in Africa, meaning that value added data are consistent over time and space. The national accounts do not cover employment however. Historically, household surveys with a different focus, scope and definitions have been used to measure sectoral employment, meaning that country-by-country comparisons of sectoral employment estimates based solely on household surveys are in principle difficult. More recently, African countries have used labour force surveys based on an international harmonisation of concepts and definitions to measure sectoral employment, but sampling size and methods still vary across countries (McMillan et al., 2014; De Vries et al., 2013). For example, whereas Rwanda which has an estimated population of about 12 million uses "a rotation sample scheme with a sample size of 9,344 households per round, selected by means of a stratified two-stage probability design…" (Rwanda Labour Force Survey Report, 2016), Ghana with an estimated population of 29 million uses a sample size of 6,030 households constructed by means of two-stage random sampling (Ghana Labour Force Report, 2015). Though the methods in this case are similar, the sample size to population ratio varies significantly.

Establishment surveys are another source of sectoral employment. These surveys tend to focus on formal establishments above a certain size, and as a result sectoral employment is underestimated in agriculture and retail trade where self-employed, family workers and informal workers are more widespread. Moreover, this source does not cover establishments that employ workers below the threshold number of employees considered in the survey.

To overcome these shortcomings, De Vries et al (2013) and Timmer & De Vries (2009) defined employment as all persons employed (15 years and above). This definition allows them to use population and housing census (PHC) data as the main source of employment because PHC covers not only employees but also self-employed, family workers and all informal sector workers. To derive employment figures consistent with the coverage of the value added series in the seven countries, we followed the ASD approach strictly by using PHC data as benchmarks. When the PHC sectoral employment estimates are not reliable and/or not available we adjust them or replace them with data from labour force surveys. The key problem with this approach is that population censuses are typically conducted every ten years. We therefore interpolate between benchmark years using data from Household Surveys and Establishment Surveys (ES). De Vries et al (2013) distinguish between two interpolations based on data availability, in particular: "when ES data is available interpolation is based on annual growth trends. When this data is unavailable, interpolation is based on average trends in labour productivity between the benchmark years". We followed the same general approach. In the case of Agriculture, growth trends from the ILO economically active population in Agriculture are used to interpolate between benchmark years. The table below shows the primary sources of employment data.

Table 6: Sources of Employment

Population and Housing Census
Labour Force Surveys

Household Surveys
    • Living Standard Measurement Surveys
    • Household Income and Expenditure Surveys
    • Demographic Health Surveys
    • Population surveys
    • Priority Surveys
    • Welfare Monitoring Surveys

Informal Sector Surveys
Establishment Surveys
FAO data on the economically active in agriculture
ILO Estimates of employment-to-population ratios

5.2 Using Population and Housing Censuses as Benchmarks

The aim of a census is the complete counting of the population in a given country. This involves collating demographic and socioeconomic information on the population. For many African countries the PHC is a major source of employment data. Although questions about employment in the PHC are not as detailed as the Labour Force Survey (LFS), the PHC covers the entire working population including the self-employed, family workers and informal sector workers. In addition, PHC results are normally used to create the sampling frames for labour force surveys during the inter-censal period. This enables cross-referencing and adjustment of sectoral employment figures from both sources within a defined period. We used the PHC as benchmarks for the construction of the employment data. The table below shows the years for which data are used as benchmarks. If PHC data are not reliable, we adjust or replace using data from labour force surveys.

Table 7: Employment Benchmark Years

Country	1960s	1970s	1980s	1990s	2000s	2010s
Burkina Faso						
Census			1985*	1996	2006	
Survey		1970	1980	1994		2014
Cameroon						
Census		1976	1987		2005	
Survey	1965				2001	2010
Lesotho						
Census		1976	1986	1996	2006	
Survey						2011
Mozambique						
Census		1970	1980	1997	2007	
Survey				1990		2014/15
Namibia						
Census				1991[*]	2001	2011
Survey	1960	1970	1980		2000	2016
Rwanda						
Census		1978	1991	2002[##]	2012[##]	
Survey				2000	2010	2016
Uganda						
Census		1969[#]	1980	1991[#]	2002	2014[*]
Survey	1952-59[**]	1960-61[**]			2003, 2009	2013

*For these censuses the sectoral distribution is taken from the surveys of the nearest year. #. For these censuses employment by occupation is available, the surveys in the nearest year is used to map occupations to sectors. **Agriculture and Trade Services is adjusted using information from 1969 population census. ##. Figures are adjusted using surveys in the years below.

5.3   Publication Sources

The main publication sources of employment statistics are recent and historical publications from National Statistical Institutes. We obtained recent publications online and obtained historical publications from the reference sections of the SOAS University of London Library and the British Library. We also obtained data from international sources such as the ILO's Key Indicators of Labour Markets, Africa Integrated Census Micro Data and IPUMS International.

Sources	Acronym
National Statistical Institutes Publications	NSI
1. Census and Survey Reports	
2. Statistical Bulletins and Yearbooks	
3. Research Publications	
Online database: Africa Integrated Census Microdata	AICM
Online database: ILO Key Indicators of Labour Markets	KILM
Online database: IPUMS International, Minnesota Population Center	IPUMS
ILO Yearbooks of Labour Statistics	ILO YB
Online FAO Database on Economically Active population	FAO

5.4 Employment: Methodology[22]

Employment figures from population censuses are used as benchmarks. For the intervening years we interpolate using employment figures from establishment surveys or external sources (e.g. FAO data). Where establishment surveys are not available, we interpolate between years using average productivity growth rates. Interpolation based on survey or FAO data is given as:

$$E_t = E_{t-1} * EXP\left[\ln\left(\frac{E_t^e}{E_{t-1}^e}\right) - \frac{\ln\left(\frac{E_{b2}^e}{E_{b1}^e}\right)}{(b2-b1)} + \frac{\ln\left(\frac{E_{b2}}{E_{b1}}\right)}{(b2-b1)}\right] \tag{6}$$

Where $b2 > t > b1$, $b1$ and $b2$ are the first and second benchmarks. The e superscript represents data from external sources. Employment in each sector in year t is denoted by E_t. The interpolation based on average trends in labor productivity is computed as:

$$E_t = \frac{VA\_Q_t}{LP_{t-1}}/EXP\left[\frac{\ln\left(\frac{LP_{b2}}{LP_{b1}}\right)}{b2-b1}\right] \tag{7}$$

Where $b2 > t > b1$ and $LP_t = VA\_Q_t/E_t$ is labor productivity. The advantage of this method is that it harmonises movements in employment and value added since "linearly interpolated employment figure may be inconsistent with the growth trends of VA, resulting in irregular productivity patterns" (de Vries et al, 2013).

Extrapolation and Backcasting

Depending on data availability extrapolation and backcasting is necessary to complete the dataset. If data are available from external sources, we use sectoral trends to extrapolate and backcast from the nearest benchmark using (8) and (9):

Extrapolation: $E_t = E_{t-1} * \left(\frac{E_t^e}{E_{t-1}^e}\right)$ (8)

Back casting: $E_t = E_{t+1} * \left(\frac{E_{t+1}^e}{E_t^e}\right)$ (9)

Where E_t is sectoral employment in year t and superscript e indicates that data are from external sources. When establishment and external data are limited, we use average labour productivity to back cast and extrapolate between benchmark years using (10) and (11):

$$E_t^* = \frac{VA_{Q_t}}{LP_{t-1}}/EXP\left[\frac{\ln\left(\frac{LP_{b2}}{LP_{b1}}\right)}{b2-b1}\right] \tag{10}$$

Where $t > b2$; $LP_t = VA\_Q_t/E_t$

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[22] This paragraph closely follows the methodology outlined in De Vries et al. (2013), pp. 20-23.

$$E_t^* = \frac{VA_{Q_t}}{LP_{t+1}}/EXP\left[\frac{\ln\left(\frac{LP_{b2}}{LP_{b1}}\right)}{b2 - b1}\right] \qquad (11)$$

Where $t < b1$ and $b1$ and $b2$ are benchmark years. Using (10) and (11) it is assumed that the average labour productivity between $b1$ and $b2$ can sufficiently represent the productivity of the extrapolated or backcasted years due to sectoral employment statistics not being available. To overcome this constraint, de Vries et al (2013) use total economy employment estimates from the ILO-E database and normalise sectoral results from equation (10) using:

Total-Employment:

$$E_t^{TOT} = E_{t-1}^{TOT} * \left(\frac{E_t^{ILO}}{E_t^{ILO}}\right) \qquad (12)$$

Normalisation: $\qquad E_{i,t} = E_{i,t}^* \left[\frac{E_t^{TOT}}{\sum_{j=1}^{S} E_{j,t}^*}\right] \qquad (13)$

Where E_t^{TOT} is total employment in year t, E_t^{ILO} is the total employment level from the ILO-E database in year t, $E_{i,t}^*$ is estimated employment based on labour productivity levels between the closest benchmark years for sector i, and $E_{i,t}$ is the sectoral employment level normalised to the total employment level. This method aligns sectoral productivity with total economy productivity growth trends.

5.5   Sources for employment updates

ASD is arguably the only database that provides reliable long-run sectoral employment data for Africa. It has been used to analyse long-run productivity trends. However, since the construction of the ASD, most countries in the database have conducted comprehensive new labour force surveys and PHC. Therefore the ASD is updated from 2010 to 2015 using these recent surveys and censuses.

5.5.1.1   Botswana
Employment information from the 2011 Population and Housing Census published in the 2011 Labour Statistics Report was checked. The total employment figure for Agriculture in the original ASD estimate was 255,000 but in the 2011 Population Census Agricultural employment was reported as 98,000, a difference of 157,000. To ensure continuity and avoid a sudden break in the employment series, the ASD estimate is used as a benchmark in 2010 with data for later years constructed through extrapolation using the growth trend from the economically active population in Agriculture. For the other sectors, the 2010 ASD estimate is again used as a benchmark, with a linear trend in labour productivity then used to extrapolate to 2015. This gives a more consistent series than using the 2011 population and housing census as a benchmark.

5.5.1.2   Ethiopia
Employment information from the 2013 National Labour Force Survey and the 2011 ASD estimate are used as benchmarks. In the case of the agricultural sector, the growth trend from the

economically active population is used to interpolate for 2012 and extrapolate for 2014-2015. For other sectors, the employment series are estimated by using the 2011 ASD estimate as a benchmark and then extrapolating to 2015 using a linear labour productivity trend.

5.5.1.3 Ghana

The 2011 ASD estimate is used as the benchmark with the agricultural employment series then being extrapolated using the growth trend from the economically active population in agriculture. For other sectors a linear trend in labour productivity is used to extrapolate the employment series from 2012 to 2015.

5.5.1.4 Kenya

Employment data from the Kenya Economic Survey from 2011-2015 is used in the update. The 2011 employment estimate from the ASD is used as a benchmark, with the employment series for all sectors then being extrapolated using the employment growth trend from the Kenya Economic Survey.

5.5.1.5 Malawi

We used the 2013 Labour Force Survey and the ASD estimate for 2010 as benchmarks, linearly interpolating between these years and linearly extrapolating for the years 2014 and 2015 using the growth trend from the economically active population in agriculture for the agricultural employment series and a linear trend based upon labour productivity to extrapolate for the other sectors.

5.5.1.6 Mauritius

We used the employment data from the 2011 population census as a benchmark and then extrapolated to 2015 using total employment information by industry from the Mauritius Labour Series.

5.5.1.7 Nigeria

The 2011 ASD estimate is used as a benchmark in the case of Nigeria. We then extrapolated the agricultural employment series using the economically active population in agriculture, while for other sectors we used a linear trend in labour productivity to extrapolate data from 2012 to 2015.

5.5.1.8 Senegal

We used the 2010 ASD estimate as a benchmark and then extrapolated the agricultural employment series using the economically active population in agriculture, while for other sectors a linear trend in labour productivity is used to extrapolate the employment series from 2011 to 2014.

5.5.1.9 South Africa

We used data from the Quarterly Labour Force Survey (QLFS) for the years 2011-2016, except in the case of Agriculture, Government Services, and Personal Services, for which we used trends to extrapolate the 2010 ASD employment figures for 2011-2016. The agriculture figures reported in the QLFS are three times lower than the ASD estimate for 2010. Community and Other Social Services are lumped together in the QLFS. To get consistent figures for Agriculture, Government Services and Personal Services we used growth trends from the QLFS to extrapolate the 2010 data to 2015.

We used the 2011 ASD estimate as a benchmark and then extrapolated the employment series using the economically active population for the agricultural sector and a linear trend based upon labour productivity to extrapolate for the other sectors.

We used the 2010 ASD estimate as a benchmark and then extrapolated the agricultural employment series using the economically active population in agriculture. For other sectors, we used a linear trend in labour productivity to extrapolate the employment series from 2011 to 2015.

6   Concluding Remarks

The basis of this project is the Africa Sector database. The ASD provides long-run sectoral data for the analysis of the structure of 11 Africa economies. Since the construction of the ASD, there has been a wave of statistical reforms in some of the countries in the ASD leading to significant revaluation of GDP. These reforms have provided a clearer picture of the size and structure of production of the countries involved. We update the ASD to reflect these statistical changes. Most importantly, we expand the ASD by constructing sectoral data for 7 new African countries: Burkina Faso, Cameroon, Lesotho, Mozambique, Namibia, Rwanda and Namibia. This has resulted in an expanded database (from 1960s to 2015) covering about 80% of GDP in sub-Saharan Africa.

The paper strictly follows the ASD methodology to ensure data continuity, consistency and comparability. The ASD methodology ensures internal, international and intertemporal consistency of the data.

African National Statistics are evolving. The recent GDP rebasing across Africa have provided a more accurate data for the analysis of structural transformation on the continent. However, long-run sectoral data on the informal sector is still missing in international databases. More resources, international collaboration as well as collaboration with African National Statistical Institutes can produce this missing data.

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8   Appendix: Country Notes

8.1 *New Countries*
1. **Burkina Faso**

Background of National Accounts Statistics

In 2001, Burkina Faso adopted the 1993 UN System of National Accounts (SNA 1993) and changed the base year from 1985 to 1999. Prior to the adoption of the 1993 SNA, the Population Census of 1996, the Informal Sector Survey in 1997 and the Commercial and Industrial Census of 1998 revealed that the 1968 SNA underestimated output and productivity. Therefore the adoption of the 1993 SNA was long overdue. With technical support from the Observatoire economique et statistique d'afrique Subsaharienne (AFRISTAT), the Institut National de la Statistique et de la Demographie (INSD) upgraded to the 1993 SNA using the CRETES module. The CRETES software consolidates the use of SNA93 through the full integration of concepts, definitions and methods. AFRISTAT member states have common nomenclatures for activities (NAEMA) and for products (NOPEMA). This constitutes an important tool for harmonisation available to member states for their statistical work, in particular for the collection of statistical data and the preparation of national accounts. These nomenclatures are based on United Nations International Nomenclatures, including the International Standard Industrial Classification of All Economic Activities (ISC Rev 3) and the Central Product Classification (CPC). This ensures international comparison with non-French speaking African Countries.

The first publication that implemented the SNA93 is the National Economics Account, 2001 (Les comptes économiques de la nation 2001). The three years of accounts (1999, 2000 and 2001) were developed using the new system with 1999 as the base year. The old series of GDP (from 1985 to 1998) was also retroactively extrapolated to match the concepts and definitions of the SNA93 and the new base year. This publication links the old GDP backcast series (1985-1998) and three new accounts (1999-2001). More recent publications such as the National Economic Account 1999-2012, and the Burkina Faso Statistical Yearbook (Annuaire Statistique 2015) use the SNA93, though data for the period 1965-1984 uses the 1968 UN system of national accounts. To link this historical series with the new series we used data from recent series as the benchmark level data and backcast to 1965 using equation 1. See notes on data construction.

Period	Source	Notes
2013-2014	Annuaire Statistique 2015, pg 171-172, INSD[23]	Level used for nominal value added. SNA1993
1999-2012	Les Comptes Economiques de	Levels data used for nominal value added

[23]http://www.insd.bf/n/contenu/pub_periodiques/annuaires_stat/Annuaires_stat_nationaux_BF/Annuaire_stat_2015.pdf

	la Nation 1999 à 2012 : Comptes Définitifs[24], pg 27-32, INSD	SNA1993
1994-1998	Les Comptes Economiques de la Nation 1994-1999, pg 18-19 and 96-98, INSD[25]	Level used. Originally published in SNA1968 but retroactively extrapolated when SNA1993 was adopted by INSD.
1985-1993	Les Comptes Economiques de la Nation 2001, page 19-24 and 58-63, INSD[26]	Level used for sectors A-I. Services (J-P) do not follow ISIC 3 distinction. Growth rate of the aggregate sector was applied to each subsector.
1970-1984	UN National Accounts Official Country Data[27]	Trend used, difficult to disentangle personal and government services so aggregate growth rate was applied. Published in SNA1968
1965-1969	Africa Statistical Yearbook[28], Part 2 of 1972 and 1975	Trend used. Data on services (J-P) has not been defined separately so aggregate growth rate is applied to each subsector.

Construction Notes on Value Added Series

- The recent series is published in 1993 UN System of National Accounts. We used the first year of the recent series as the benchmark level data and link it to the historical data using equation 1. This repairs major breaks by adjusting levels of historical series to reflect current information, methodologies and system of national accounts while maintaining historical growth rates.
- For 1985-1998, the branches of economic activities are: Agriculture (AtB), Mining and Quarrying (C), Manufacturing (D), Utilities (E), Construction (F), Trade Services (G+H), Transport and Communication (I), Bank and Insurance, Other Services of Merchants, and Services of Non-Merchants (J-P).
- Sectors A-I match perfectly with the ASD sector classification but sectors J-P do not. The levels data were used for Sector A-I, while we matched Bank and Insurance, Other Services of Merchants, and Services of Non-Merchants to the ASD classification J-P by applying the growth rate of the sum of the aforementioned sectors to each detailed sector that corresponds to the ASD sectors.
- There is no information on Dwellings (70). The Share of Dwellings in Business Services (J+K) for Senegal was applied. Both Senegal and Burkina Faso are AFRISTAT members, are in the same monetary zone and have similar economic structure.
- For the period 1970-984, UN OCD was used. Sectors A-K correspond to the ASD classification, while sectors L-P slightly differ with Community and Government services being combined. We applied the aggregate growth rate of sectors L-P to both Government and Personal Services.

[24] http://www.insd.bf/n/contenu/pub_periodiques/comptes_eco/Comptes_eco_nat_99-2012.pdf
[25] http://www.insd.bf/n/contenu/pub_periodiques/comptes_eco/Comptes_eco_nat_94_99.pdf
[26] http://www.insd.bf/n/contenu/pub_periodiques/comptes_eco/Comptes_des_nations_2001.pdf
[27] http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201
[28] Obtained from the SOAS, University of London Library. https://library.soas.ac.uk/Record/386159

- For the period 1965-1969 data were obtained from the Africa Statistical Yearbook, 1972 and 1975. UNECA provides estimates of value added for Burkina Faso, then known as Upper Volta. Sectors J-P do not match the ASD classification. The aggregate growth rate of the main sectors of was applied to each sub-sector.
- Price information is not available for 1965.

Construction Notes on Employment

Year	Primary Sources	Source of Publication
1975	Total Employment from the General Population Census	INSD[29]
1980	Economically active population by Sector from AYB	UNECA
1985	Occupational employment levels from 1985 PHC	IPUMs International
1994	Sectoral ratios from HIEC[30]	ILO KILM
1996	Sectoral employment Levels from 1996 PHC	IPUMS International
2006	Sectoral employment levels from 2006 PHC	ILO KILM
2014	Sectoral employment levels from 2014 HIEC	ILO KILM
2003, 2005, 2007	Distribution of workers by Industry from Household Surveys	INSD[31]
1980-2015	Trend from the Economically Active Population in Agriculture	FAOSTAT

- We used level data from 1975, 1985, 1996, 2006 and 2014 as benchmarks.
- For the 1975 benchmark, total employment data was obtained from the report of the General Population Census. We applied the sectoral distributions of the economically active population from 1980, reported in the Africa Statistical Yearbook, to disaggregate the total employment figure into sectoral levels.
- In 1985, employment by occupation is available but employment by sector is not available. We map employment by occupation to sectors using the 1980 sectoral distributions of the economically active population.
- For Agriculture, we interpolate between benchmark years using growth trends from the economically active population in Agriculture from 1981 to 2015. From 1970 to 1980, retropolate and extrapolate using average trend from labour productivity (see equation 7, 10, 11). Average labour productivity trends are obtained by calculating labour productivity for benchmark years and linearly interpolating between these benchmark years.

2. **Cameroon**

Background of National Accounts Statistics

The first national account of Cameroon was prepared in 1964 and covers 1959, 1962/63 and 1963/64 for East Cameroon. These accounts were prepared to provide the empirical basis for the implementation of the Second Five-Year Economic Development Plan (1966-1971). After the

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[29] http://www.insd.bf/n/nada/index.php/catalog/21#page=accesspolicy&tab=study-desc
[30] Household Income and Expenditure Survey
[31] http://www.insd.bf/n/index.php/indicateurs?id=72

unification that led to the creation of the Federal Republic of Cameroon in October 1961, a virtual national account was prepared for the new federation that covers East Cameroon as well as other new regions with the help of French technical assistance. Oleg Arkhipoff was the French technical assistant who helped to build the first national account system that covers the entire federation. The Arkhipoff methodology was derived directly from the French Courcier System. Industrial censuses and administrative information from tax units were used as the primary source of information for the construction of national accounts. The methodology was used to prepare national accounts of Cameroun until the 1970/71 fiscal year when the National Statistic Institutes adopted the 1968 UN System of National Accounts (National Institute of Statistics, 2013).

The 1968 System of National Accounts was used to produce the 1971 national accounts and to convert previous accounts in the Cameroonian Courcier System to the SNA. The adoption of the 1968 SNA came with the introduction of the residence notion into the national accounting system. This emphasised the importance of national territory in the production of goods and services, unlike the Cameroonian Courcier System which included foreign administration and international organisations. National accounts were constructed by grouping institutional units according to functions: Non-Financial Companies and Quasi-Companies; Financial Institutions; Public administration; and Households and non-profit organisations at the service of households. The Courcier System operated under five accounts: production accounts; exploitation accounts; appropriation accounts; capital account; and external accounts. With the adoption of the 1968 SNA, the production and exploitation accounts were merged, and the appropriation accounts were divided into income, expenditure and final consumption accounts (National Institute of Statistics, 2013).

In 1993, the Institut National de la Statistique benefited from EU, French government and sub-Saharan Africa's Economic and Statistical Observatory (AFRISTAT) joint support to reshape and upgrade the national accounts to the 1993 UN SNA. This project was integrated into the ERETES package of AFRISTAT, with Cameroon being the pilot country. The Institut National de la Statistique adopted the 1993 SNA, ISIC Rev 3, the Central Product Classification (CPC) and the ERETES package, and changed the base year to 1989/90. This led to the production of a series of national accounts published in November 2004. The national account was published in both fiscal and calendar years. In the recent revision used as a benchmark, the base year was changed to 2000 and the national account was reconstructed backwards to 1993. The Institut National de la Statistique is planning to upgrade to the 2008 SNA using 2005 as the base year, further updating the data backwards to 1959 using 2005 as a reference year, as well as producing quarterly accounts with the assistance of AFRISTAT and Regional Accounts to help the decentralisation process (National Institute of Statistics, 2013).

Period	Source	Notes
2012-2015	Les Comptes Nationaux de 2015, pg 5-11, Institut National de la	Levels data used and the 1993 SNA

	Statistique[32]	
1993-2011	Les Comptex Nationaux, Optique production, Tables 6-22, Institut National de la Statistique[33]	Level data used for both value added in current and constant prices.
1965-1992	Comptex Nationaux du Cameroun, 1969/70-2008 publications, Institut National de la Statistique[34]	Trend used for value added in current prices for the whole period. It was also used to construct price series from 1971-1992. Price information is not available for the 1965-1970 period.
1965-1969	Africa Statistical Yearbook[35], Part 2 of 1970, 1972 and 1975	Trend used to construct price series from 1965-1970. Data on Services (J-P) has not been defined separately so the aggregate growth rate is applied to each subsector.

Data Construction Notes

- The recent Series is published in the 1993 UN System of National Accounts. We used the first year of the recent series as the benchmark level data and linked it to the historical data by using equation 1.
- The NSI started estimating volume data after the adoption of the 1963 SNA in 1971, therefore price information is not available from 1965-1970 from our primary source. We complement our primary source by using information from Africa statistical yearbook to construct price series from 1965 to1970. In the ASY, data on services (J-P) has not been defined separately so the aggregate growth is applied to each subsector.
- There is no information on Dwellings (70). The share of Dwellings in Business Services (J+K) for Senegal was applied. Both Senegal and Cameroon are AFRISTAT members, and have a similar economic structure. The price index of Business Services (J+K) was used to derive volume data on Dwellings (70).

Construction Notes on Employment

Year	Primary Source	Source of Publication
1965-1968	Number of Employees by Industry from 1975 ASY	UNECA
1972-1974	Number of Employees by Industry from 1980 ASY	UNECA
1973-1981	Number of Employees by Industry from 1985 ASY	UNECA
1976	Employment by Occupation from the 1976 PHC	IPUMS International
1976	Economically Active Population by Industry from the Yearbook of Labour Statistics, 1945-1989	ILO
1986	Sectoral Employment Levels from 1986 NSI Estimate	KILM

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[32] Available online at http://slmp-550-104.slc.westdc.net/~stat54/downloads/2016/Comptes_Nationaux_2015_final.pdf

[33] Available online at http://nso.cameroon.opendataforafrica.org/xkrcbs/national-summary-data-page

[34] Available at the SOAS, University of London Library https://library.soas.ac.uk/Record/383822

[35] Obtained from the SOAS, University of London Library. https://library.soas.ac.uk/Record/386159

2001	Sectoral Employment Levels from 2001 Household Survey	KILM
2005	Sectoral Employment levels from the 2005 PHC	IPUMS International
2005	Sectoral Employment Levels from the 2005 ESSI 1	NSI of Cameroon
2010	Sectoral Employment Levels from the 2010 ESSI 2	NSI of Cameroon
1980-2015	Economically Active Population in Agriculture	FAOSTAT

- We use level data from 1976, 1986, 2001, 2005, and 2010 as benchmarks. There was no available information for benchmark in the 1990s, making the interpolation period between 1986 and 2001 quite long .

- In 1976, employment by occupation is available but employment by sector is not available. We map employment by occupation to sectors using the 1976 sectoral distributions of the economically active population by industry reported by ILO. The figures reported in by ILO and the figures we obtained after mapping turns out to be very similar.

- Using the 1976 data from PHC as benchmark, we extrapolate to 1980 and retropolate to 1965 using growth trends from the annual number of employees by sector reported in the 1975, 1980 and 1985 Africa Statistical Yearbooks.

- From 1980 onwards, for the agricultural sector, we interpolate between benchmark years using growth trend from the economically active population in Agriculture.

- For the other sectors, we retropolate and extrapolate using average growth trend from labour productivity (see equation 7, 10, 11). Average labour productivity trends are obtained by calculating labour productivity for benchmark years and linearly interpolating between these benchmark years.

3. Lesotho

Background of National Accounts Statistics

The first National Accounts report was issued by the Bureau of Statistics in July 1967. This covers the 1964/65-1965/66 fiscal years. The National Accounts estimate was initiated by Mr. Michael Ward of the School of Applied Economics, Cambridge University. Interim work was circulated to governments' officials and agencies, and based on their inputs and the additional information provided many corrections and some changes in concepts and treatment were made. The concepts and definitions used in this report are generally in accordance with the principles laid down by the UN 1953 System of National Accounts although the presentation of tables follows more closely the practices of the Central Statistical office of the United Kingdom (Lesotho Bureau of Statistics (LBS henceforth), 1967).

The Bureau reports the potential margin of error associated with each statistical table, with 'A' representing errors in major aggregates probably less than 10%, 'B' representing errors in major aggregates probably between 10-25%, and Z representing errors not known, possibly in excess of 25%. Value added data by industry at current and factor costs were classified under B reflecting possible error between 10%-25%. One other important issue is that the 1964/65-1974/75 value added data is estimated in thousands of Rand. We converted it to Maloti. The Maloti was pegged at parity with the Rand. From 1964 to 1974, the data were estimated in the fiscal year, with the Bureau

of Statistics starting to estimate value added in in the calendar year in 1975. As a result the growth trend from the fiscal years 1964/65 to 1974/75 was used to estimate levels data for the calendar years 1964 to 1974 in this update.

Over the years as more information was gathered and the SNA was revised, the LBS also revised its series from 1975-1986 to reflect current information and methodologies. The period account was converted from the fiscal year to the calendar year in 1975 and value added in constant prices was computed beginning in 1980. Recently the 2008 UN SNA was adopted, with the base year changing to 2012 and the historical series recalculated back to 1982 to reflect the revision in method and system of National Accounts.

Period	Source	Notes
2007-2015	National Accounts 2015 Publication Tables, Lesotho Bureau of Statistics (LBS), 2015.[36]	Level used
1982-2006	National Accounts Revised estimates from 1982-2014, LBS.[37]	Level data used
1964-1981	- National Accounts 1964-5/1965-6, LBS, July 1967. - National Accounts 1973/74, LBS, Nov 1976. - National Accounts 1974/75, LBS, July 1977. - National Accounts 1976-1986, LBS, March 1988. - National Accounts 1980-1988 Analytical tables, LBS, Sept 1989. - National Accounts 1980-1988, LBS, Sept 1988. - Statistical Reports No 13: 1992 National Accounts 1980-1991, LBS. - Statistical Reports No 10: 1994 National Accounts 1980-1993, LBS. - Statistical Reports No11: 1997 National Accounts 1980-1996, LBS. - Statistical Report No 17: 2003 National Accounts 1982-2002, LBS. - Statistical Report No 6: 1999 National Accounts 1980-1998 - Statistical report No. 16 2002 - Statistical report No. 29 2008[38]	Trend used for nominal value added. We mostly used these reports to construct nominal value added and price series on dwellings.
1970-1979	UN National Accounts Official Country Data[39]	Trend used to construct price series.
1964-1969	Africa Statistical Yearbook, 1970, 1972 and 1974 Publications[40]	Trend used to construct price series.

Notes on Data Construction

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[36] Available online at **http://www.bos.gov.ls/**

[37] Available online at **http://www.bos.gov.ls/**

[38] These reports were obtained from SOAS, University of London Library. https://library.soas.ac.uk/Record/524079.

[39] Available online at http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201

[40] Available at SOAS, University of London Library. https://library.soas.ac.uk/Record/386089

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- The current revision used as the benchmark level data is constructed according to the 2008 UN System of National Accounts.
- The data from 1982-2015 were obtained from the website of the Lesotho Bureau of Statistics. We used the earliest year of this latest series as the benchmark for retropolation.
- The base year for the benchmark level information is 2012. Following the GGDC ASD methodology, we used 2005 as our reference year.
- The value added historical series in current prices from 1964-1981 was obtained from the National Accounts and Statistical reports of LBS. The estimation of the value added series was based on sectoral income so there is no information on prices from 1964-1979. The bureau started computing Value Added in constant prices in 1980. We filled this gap by constructing price series from 1964-1981 using information from the UN OCD and the ASY
- We linked the historical series (1964-1981) to the benchmark level data (1982-2015) using the growth trend.
- We then derived the volume data using the value added series in current prices and the price series.
- In 1972/73 only the wages and salaries of employees of the mining companies were taken into account when estimating the value added for Mining (C) sector. The Bureau did not include the operating surplus.
- In 1973/74, no company carried out mining activity in Lesotho, with the Bureau estimate for this fiscal year based on diggers only.
- In 1974/75, the estimate of the Mining sector (C) is based on the value of diamonds exported because diamonds were the only mineral extracted in Lesotho during this fiscal year.
- From the fiscal year 1964/65 to 1974/75 value added data is estimated in thousands of Rand. We converted it to Maloti and then used the growth trend. The Maloti is pegged at parity with the Rand.
- From 1964 to 1974, data were estimated according to the fiscal year. The Bureau of Statistics started estimating the value added in the calendar year in 1975. Therefore the growth trend from the fiscal years 1964/65 to 1974/75 was used to estimate the levels data for the calendar years 1964 to 1974 in this update.
- The recent revision of the national accounts which is online (1982-2015) does not report ownership of dwellings separately. However, the Statistical Reports published by the Bureau of Statistics of Lesotho contains figures on Ownership of dwellings.
- Data on dwellings are taken from various Statistical Reports published by the Bureau (see table above).

Construction Notes on Employment

Year	Primary Sources	Source of Publication
1976	Sectoral Employment Levels from the 1976 PHC	ILO
1986	Sectoral Employment Levels from the 1986 PHC	Lesotho Bureau of Statistics

1996	Sectoral Employment Levels from the 1996 PHC	KILM
2006	Sectoral Employment levels from the 2006 PHC	Lesotho Bureau of Statistics
2008	Sectoral Employment Levels from the 2008 LFS	Lesotho Bureau of Statistics
2011	Sectoral Employment levels from the 2011 Lesotho Demographic Survey	Lesotho Bureau of Statistics
1980-2015	Economically Active Population in Agriculture	FAOSTAT

- Lesotho Bureau of Statistics defines the minimum age of employment as 10 years. The data used covers persons engaged who are 10 years old and above.
- We used employment sectoral employment levels from PHC of 1976, 1986, 1996, 2006 and 2011 Lesotho Demographic survey as benchmarks.
- From 1980 to 2015, for the agricultural sector, we interpolate between benchmark years using growth trend from the economically active population in Agriculture. From 1970 to 1980, we retropolate and extrapolate using average trend from labour productivity.
- For the other sectors, we retropolate and extrapolate using average growth trend from labour productivity (see equation 7, 10, 11). Average labour productivity trends are obtained by calculating labour productivity for benchmark years and linearly interpolating between these benchmark years

4. Mozambique

Background to National Accounts Statistics

Period	Sources	Notes
1991-2015	National Accounts, Instituto Nacional De Estatistica[41]	Level data used for both value added in constant and current prices.
1966-1990	Africa Statistical Yearbooks, 1972-1995 yearbooks[42]	Trend used

Notes on Data Construction

- Revised value added series starting from 1991 was obtained online from the National Statistical institute.
- The revised series have been compiled in accordance with the 1993 UN System of National Accounts. We used the first year of this series as our benchmark data.
- We obtained non-official information from the Africa Statistical Yearbooks from 1966-1990. We linked this historical series to the benchmark level data using equation 1.

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[41] Available online at http://www.ine.gov.mz/estatisticas/estatisticas-economicas/contas-nacionais/anuais-1/pib_optica_producao.xlsx/view
[42] Available at SOAS, University of London Library. https://library.soas.ac.uk/Record/386089

- The National Statistical Institute does not publish a separate series for dwellings. However reports of a mission from Statistics Denmark to Maputo indicate that INE construct series for Owner-occupied dwellings. Because we are not privy to this information we applied the share of Dwellings in Business Services (J+K) of Tanzania to construct a separate series for Dwellings (70) because both countries have similar economic structure.

Construction Notes on Employment

Year	Primary Sources	Source of Publication
1970	Economically active population by industry from the 1970 Census	ILO
1980	Economically Active population by industry from the 1980 Census	ILO
1996/97-2008/09	Sectoral employment distributions from Jones and Tarp (2013)	UNU WIDER WP 45/2013
1997	Sectoral Employment levels from the 1997 PHC	IPUMS International
2003	Sectoral Employment levels from the 2003 HS	KILM
2005	Sectoral Employment distribution from the 2004/2005 Integrated Survey on Labour Force	INE
2005	Sectoral Employment distribution from the 2005 HBS	INE
2009	Sectoral Employment levels from the 2008/09 Employment Survey	INE
2010	Sectoral Employment distribution from the 2010 HBS	INE
2007	Sectoral Employment Levels from the 2007 PHC	IPUMS International
2015	Sectoral Employment levels from the 2014/2015 HS	INE
1970-2015	General Employment Information from the Anuario Estatistico	INE
1980-2015	Total Economically Active Population in Agriculture	FAOSTAT

- Data from 1970, 1980, 1997, 2007, and 2015 are used as benchmarks.
- We adjust the benchmark data for mining, manufacturing and utilities sectors for 1970 and 1980 using data from the Industrial Surveys.
- We generate series from the 1996-2015 using 1996, 2005, 2010 and 2015 data points from the Household Surveys as benchmarks, then linearly interpolating between these benchmark years. This results in a household Survey series that is used for interpolating between population census benchmarks.
- Labour productivity series is generated from 1970-1996. Average labour productivity trends are obtained by calculating labour productivity for benchmark years and linearly interpolating between these benchmark years
- For agriculture we interpolate between benchmark years using trends from the economically active population in Agriculture.
- For the other sectors, we interpolate between benchmark years for the periods 1970-1996 and 1997-2015 using labour productivity trends and trend from the generated Household survey series respectively.

5. Namibia

Period	Sources	Notes
1980-2015	National Account Time Series[43]	Level data used for value added in constant and current prices
1965-1979	Africa Statistical Yearbooks, 1972-1995 yearbooks[44]	Trend used

Notes on Data Construction

- The recent revision has been compiled in accordance with the 2008 UN System of National Accounts and retrospectively extrapolated to 1980 by the Namibia Statistical Agency. We used earliest year of this series as our benchmark level data.
- We obtained non-official information from the Africa Statistical Yearbooks from 1966-1979. We linked this historical series to the benchmark level data using the growth trend.
- Namibia does not report separate series on dwellings. As a result we applied the share of dwellings in Business Services (J+K) of Lesotho to arrive at an estimate for Namibia. Namibia and Lesotho are in the Common Monetary Area (CMA) and have a similar real estate structure.

Construction notes on Employment

Year	Primary Sources	Source of Publication
1960	Economically active population by Industry	UNECA
1970	Economically active population by Industry	UNECA
1980	Economically active population by Industry	UNECA
1987-1996	Economically active population by Sector	UNECA
1991	Sectoral employment levels from the 1991 PHC	NSA[45]
2000	Sectoral employment levels from the 2000 LFS	KILM
2001	Sectoral employment levels from the 2001 PHC	NSA
2004	Sectoral employment levels from the 2004 LFS	KILM
2011	Sectoral employment levels from the 2011 PHC	NSA
2012	Sectoral employment levels from the 2012 LFS	NSA
2013	Sectoral employment levels from the 2013 LFS	NSA
2014	Sectoral employment levels from the 2014 L FS	NSA
2016	Sectoral employment levels from the 2016 LFS	NSA
1980-2016	Total economically active population in Agriculture	FAOSTAT

- Data from 1960, 1970, 1980, 1991, 2001, 2011, 2016 as benchmarks.
- Note that the 1960, 1970, 1980 benchmarks were computed by applying the economy wide unemployment rate to each sector's economically active population reported by UNECA in the Africa Statistical yearbooks.

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[43] Available online at http://nsa.org.na/page/publications
[44] Available at SOAS, University of London Library. https://library.soas.ac.uk/Record/386089
[45] Namibia Statistical Agency

- The NSA report the 2001 employment by 4 aggregate sectors: Agriculture, Manufacturing and other Industries, Trade Services, and Private and Public Services. To obtain data points for the 10 sectors, we used the sectoral distribution from the 2000 labour force survey to disaggregate the 4 sectors reported in the census report into 10 sectors.
- Sectoral employment levels for the 2016 benchmark was obtained from the 2016 labour force survey.
- for the agricultural sector, we interpolate between benchmark years using growth trend from the economically active population in Agriculture. From 1960 to 1980, we interpolate between benchmark years using average trend from labour productivity.
- For the other sectors, we interpolate between benchmark years using average trend from labour productivity (see equation 7, 10, 11). Average labour productivity trends are obtained by calculating labour productivity for benchmark years and linearly interpolating between these benchmark years.

6. Rwanda

Period	Source	Notes
1999-2015	"GDP, National Accounts, 2015" National Institute of Statistics of Rwanda[46]	Level used for value added in current and constant prices.
1970-1998	UN National Accounts Official Country Data[47]	Trend Used. Continuous series for value added in current prices were available. For value added in constant prices, data for the periods 1970-1975 and 1980-1981 were missing. We fill in these gaps using information from the 1976 and 1985 Africa Statistical Yearbooks.
1966-1969	Africa Statistical Yearbooks	Trend used

Notes on Data Construction

- The earliest year of the recent value added series is used as the benchmark level data. The recent data were obtained online from the website of National Statistical Institute of Rwanda. The series was compiled using the 1993 UN System of National Accounts.
- From 1970 to 1998, the value added series from the UN Official Country Data was used. We linked this series to the benchmark level information using the growth trend. Continuous series for value added in current price was available. For value added in

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[46] Available online at http://www.statistics.gov.rw/publication/gdp-national-accounts-2015

[47] Available online at http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201

constant prices, data for the periods 1970-1975 and 1980-1981 were missing. We fill in these gaps using information from the Africa Statistical Yearbooks.

- Sectors A-K correspond to the ASD classification, while sectors L-P differ slightly as Community and Government services are combined. We applied the aggregate growth rate for sectors L-P to both Government and Personal Services.

- For 1987-1989, the value added series in constant prices of sector G+H[48] includes Transport, storage and communications and financial intermediation, real estate, renting and business activities. We applied the overall growth rate to all the sub-sectors defined in the ASD.

- The Rwanda National Statistical Institute does not report a separate series for Dwellings (70). As a result, we applied the share of Dwellings in Business Services (J+K) of Uganda to estimate a separate series on Dwellings (70) for Rwanda. Uganda and Rwanda are neighbours and have a similar economic structure.

Employment Construction Notes

Year	Primary Sources	Sources of Publication
1978	Sectoral employment levels from 1978 PHC	ILO
1989	Sectoral employment levels from 1991 PHC	NISR
2000	Sectoral employment levels from 2000 EICV 1	NISR[49]
2002	Sectoral employment levels from the 2002 PHC	KILM
2005	Sectoral employment levels from the 2005 EICV II	NISR
2010	Sectoral employment levels from the 2010 EICV III	NISR
2012	Sectoral employment levels from the 2012 PHC	NISR
2013	Sectoral employment levels from the EICV IV	NISR
2014	Sectoral employment levels from the 2014 ES	NISR
2016	Sectoral employment levels from the 2016 LFS	NISR
1980-2016	Economically active population in Agriculture	FAOSTAT

- Employment data from the PHC of 1978, 1989, 2002, 2012, and the 2016 LFS were used as benchmarks.

- In most sectors, the 2002 and 2012 PHC tends to underestimate employment. Therefore 2002 PHC benchmark is adjusted using the data from the 2000 Integrated Housed Living Condition Survey (EICV I).

- The 2012 PHC is also adjusted using information from the 2012 Integrated Living condition Survey (EICV III).

- We interpolate between benchmark years using trend in average labour productivity. Except the period 2000-2016 where trend from the EICV is used.

- For agriculture, we interpolate between benchmark years using trend from the economically active population in Agriculture.

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[48] Wholesale, retail trade, repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants
[49] National Institute of Statistics Rwanda

7. Uganda

Period	Sources	Notes
1997-2015	Statistical Abstracts, Uganda Bureau of Statistics[50]	Data used as benchmark level data for value added in constant and current prices
1955-1996	UN Yearbook of National Accounts Statistics, 1964-2000 Publications.[51]	Trend used. We checked for reliability, and when unusual growth rates are observed we replaced them with growth rates from UN OCD online or historical publication by the Uganda Bureau of Statistics (See rows below).
1970-1996	UN National Accounts Official Country Data[52]	Trend used. For some years, information on producers of government services is not reported in the UN Yearbook, however, information on narrowly defined government and other community services from UN OCD is used to fill the gap.
1955-1962	The Real growth of the economy of Uganda, 1954-1962, Uganda. Ministry of Economic Affairs, Statistics Branch. [Entebbe], 1964.[53]	Trend used to complement the growth trend from UN Yearbooks. It was the first National Accounts estimation that reports on prices. As a result several assumptions were made about some sectoral prices (See notes below).
1956-1961	Statistical Abstract, Ministry of Economic Affairs, Statistics Branch, [Entebbe], 1962.[54]	Trend used to complement the growth trend from UN Yearbooks. Some household production was excluded and some accounts were reconciled after marketing boards were taken over by private firms

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[50] Available online at http://www.ubos.org/publications/statistical-abstract

[51] Available at SOAS, University of London Library. https://library.soas.ac.uk/Record/299769 and https://library.soas.ac.uk/Record/299769.

[52] Available online at http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201

[53] Obtained from the British Library. http://explore.bl.uk/primo_library/libweb/action/display.do?tabs=moreTab&ct=display&fn=search&doc=BLL01003702038&indx=1&recIds=BLL01003702038&recIdxs=0&elementId=0&renderMode=poppedOut&displayMode=full&frbrVersion=&vid=BLVU1&mode=Basic&tab=local_tab&dscnt=0&vl(freeText0)=The%20real%20growth%20of%20the%20economy%20of%20uganda&dstmp=1502795627989

[54] Available at the British Library. http://explore.bl.uk/primo_library/libweb/action/display.do?tabs=moreTab&ct=display&fn=search&doc=BLL01003702039&indx=1&recIds=BLL01003702039&recIdxs=0&elementId=0&renderMode=poppedOut&displayMode=full&frbrVersion=&frbg=&&vl(488279563UI0)=any&dscnt=0&scp.scps=scope%3A%28BLCONTENT%29&tb=t&vid=BLVU1&mode=Basic&srt=rank&tab=local_tab&dum=true&vl(freeText0)=1962%20Statistical%20Abstract%2C%20Statistics%20Branch%20Uganda&dstmp=1502797195660

		(See notes below).

Notes on Data Construction

- Uganda revised its GDP in 2014, changing the base year from 2003 to 2009/2010. This revised GDP was compiled in the accordance with the 2008 UN System of National Accounts and the International Standard for Industrial Classification (ISIC Rev.4). We used the first year of this revised series as our benchmark level data.

- We linked the benchmark series to the historical series obtained from the UN Yearbook of National Accounts/UN OCD using equation 1. We complement this with information from historical publications by the statistics branch of the Ministry of Economic Affairs. The historical National Accounts is published in three different SNAs: the 1953, 1968 and 1993 Systems of Accounts.

- For 1955-1971, data were obtained from the 1964, 1970 &1975 UN Yearbooks of National Accounts. For the 1964 Yearbook, the industrial origin of production was published in current factor cost as well as 1960 factor cost. This was compiled according to the 1953 UN System of National Accounts but tailored to fit the "special character of the economy of Uganda" (UN Yearbook of National Accounts, 1964). The value added series was published in millions of pounds. Wholesale and retail trade; and Banking, insurance and real estate were aggregated into one sector. We applied the growth rate of this aggregate sector to both Trade Services (G+H) and Business Services (J+K). Government is narrowly defined as Public Administration and Defence, while the contribution of education and health to GDP is transferred to Other Services (item 11 on the UN table). This does not uniquely map into Government services (L, M, N) and Personal Services (O, P) defined in this database. We added Public administration and Defence to Services to obtain an aggregate sector, then applied the growth rate to both Government Services (L, M, N) and Personal Services (O, P). For the 1975 yearbook, the value added series was produced in accordance with the 1968 SNA. We used value added series from 1965-1971 from this yearbook. The figures were reported in Uganda Shillings. We map producers of Government Services to Government Services (L, M, N) defined in this database. The Sectoral data for 1964 was obtained from the 1970 Yearbook.

- For 1972-1978, data were obtained from the 1980 UN Yearbook of National Accounts Statistics, Volume 1 part 2. Value added in current and 1966 constant prices were published in accordance with the classifications and definitions recommended in the 1968 UN System of National Accounts. Value added in constant prices was available from 1972 to 1978 and value added in current prices was available from 1972 to 1976. There is no available data from 1976 to 1980 for value added in current prices and from 1978 to 1980 for value added in constant prices. In these cases, we linearly interpolate for missing years.

- For 1981-1988, data were obtained from the 1990 UN National Accounts Statistics: Main Aggregates and Detailed Tables, part II. Value added in current and 1987 constant prices were published in accordance with the classifications and definitions recommended in the 1968 UN System of National Accounts. Community, Social and Personal Services were put together and no value was reported for Producers of Government Service. We used information from the UN OCD on Public administration and Defence; Compulsory social security (L); and Education; health and social work; other community, social and personal

services (M+N+O). We map this to Government Services (L, M, N) and Personal Services (O, P) by using the aggregate growth trend.

- For 1989-1996, data were obtained from the 2000 UN National Accounts Statistics: Main Aggregates and Detailed Tables. Value added in current and 1991 constant prices were published in accordance with the classifications and definitions recommended in the 1968 UN System of National Accounts. In 1987, Uganda redenominated it currency, with 1 new shilling being equivalent to 100 old shillings. All data were converted to new shillings. Public administration and Defence; Compulsory Social Security; Education, Health and Social work; and Other community, Social and Personal Services were put together as one sector. We applied the aggregate growth rate to both Government Services (L, M, N) and Personal Services (O, P).

- We obtained information on Dwellings (70) mostly from the Statistical Abstracts published by the Uganda Bureau of Statistics or the Statistics Branch of Ministry of Economic Affairs, Entebbe. Owner occupied dwelling is reported under non-monetary GDP. From 2008 to 2015, it was reported under real estate of non-monetary GDP.

- We compared the growth rate from the UN historical data to the historical data published by the Government of Uganda. In cases where the UN estimate is not consistent we replaced it with the growth rate from the National Accounts published by the Statistics Branch of the Ministry of Economic Affairs, [Entebbe]. Particularly for 1955-1963, two such publications were used: "The Real growth of the economy of Uganda, 1954-1962, Uganda" and the "Statistical Abstract, Ministry of Economic Affairs, Statistics Branch, [Entebbe], 1962".

- Several assumptions were made about prices and values of some items in these publications. For instance, a sale of cotton during the ending of the season is used as an indicator of the fixed value added of cotton. This presumes that cotton harvested towards the end of the season is the same as the cotton harvested for the entire calendar year. For milk, a constant price is assumed in the current price calculation, meaning that the constant value equals the current value. For beer, the quantity per capita is assumed to be constant for the whole period but to differ among districts. The 1960 price is applied to calculate the total consumption of beer. For transportation, net output per vehicle is assumed to be constant from 1954 to 1962, which means as a result that the constant value is the same as current value. Gross output of the sector differed because of the rising input price. Household activities such as food preparation and beer brewing for home consumption as well as peasant house construction were excluded.[55]

Construction Notes on Employment Data

Year	Primary Sources	Source of Publication
1952-1961	Sectoral employment levels from the Annual Enumeration of Employees	Statistics Branch, Ministry of Economic Affairs, 1962
1969	Total Employment from the 1969 PHC.	UBOS

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[55] See paragraph 1 of "Statistical Abstract, Ministry of Economic Affairs, Statistics Branch, [Entebbe], 1962" and paragraph 67-128 of "The Real growth of the economy of Uganda, 1954-1962, Ministry of Economic Affairs, Statistics Branch, [Entebbe], 1964" for more details.

1965-1973	Number of employees by Industry from 1975 YBLS	ILO (1975) Yearbook of Labour Statistics
1970	Economically active population by Industry from 1975 ASY	UNECA
1980	Economically active population by Industry from the 1986 ASY	UNECA
1980	Employment by Occupation from the 1980 PHC	UBOS
1991	Employment by Occupation from the 1991 PHC	UBOS
2002	Sectoral employment levels from the 2002 PHC	UBOS
2003	Sectoral employment levels from the 2003 LFS	KILM
2005	Sectoral employment levels from the 2005 LFS	KILM
2005	Sectoral employment levels from the 2005 HIES	KILM
2009	Sectoral employment levels from the 2009 HIES	KILM
2012	Sectoral employment levels from the 2012 HIES	KILM, unreliable
2013	Sectoral employment levels from the 2013 HIES	KILM
2014	Sectoral employment levels from the 2014 PHC	UBOS
1980-2015	Economically active population in agriculture	FOASTAT

- We used data from the 1969, 1980, 1991, 2002 and 2014 Censuses as Benchmarks.
- For the 1969 Benchmark, total employment is taken from the population census and disaggregated into sectors using the 1970 sectoral distributions of the economically active population reported in the 1975 Africa Statistical Yearbook. We repeated the same procedure to derive the 1980 Benchmark. Total employment was taken from the 1980 census and sectoral distribution was taken from the economically active population by sector reported in the 1985 Africa Statistical Yearbook.
- From 1952-1961, employment by sector was reported in the 1962 Statistical Abstract. These figures are based on the annual enumeration of employment. Because this is an employee survey; the agricultural sector, trade services and personal services are underestimated. We adjust the figures for these sectors using information from the 1969 population census.
- In 1991 employment by occupation is available. We map occupation into sectors using information from household survey.
- From 1952 to 1973, we interpolate between benchmark years using trend from the number of employees by sector.
- From 2000 to 2015, we interpolate between benchmark years using trend from sectoral employment reported in household and Income surveys.
- For the remaining period, 1974 to 1999, we interpolate between benchmark years using trend from average labour productivity trend. In the case of agriculture, we used trend from the economically active population in Agriculture.

8.2   *Update of the ASD*

Country	Update	Source of Data	Notes

	Period		
Botswana	2006-2015	Gross Domestic Product, Third Quarter, Statistics Botswana[56]	Level data used
Ethiopia	2011-2015	Africa Statistical Yearbook, 2016, AfDB	Growth trend used
Ghana	2011-2015	Revised Annual GDP 2015, Ghana Statistical Service	Level data used.
Kenya	1960-2015	Quarterly GDP Reports, Kenya Bureau of Statistics, 2006-2015 ASD, 1960-2005	Level data used Trend used
Malawi	2009-2015	Quarterly Statistical Bulletin, National Statistical office of Malawi[57]	Level data used.
Mauritius	2006-2015	Digest, National Accounts of Mauritius[58]	Level data used
Nigeria	1960-2015	GDP 1981-2010 Revision Post Rebasing and the Quarterly Statistical Bulletin[59] ASD, 1960-1980	Level data Used Trend used
Senegal	2011-2015	UN OCD	Level data used
South Africa	2005-2015	GDP_Detailed Annual Tables, Statistics South Africa[60]	Level data used
Tanzania	2005-2015	Gross Domestic Product, 2016. Highlights for the Third Quarters[61]	Level data used
Zambia	1960-2015	GDP by type of economic activity, Central Statistical Office, 2010-2015[62] ASD, 1960-2010	Level data used for 2010-2015. Trend Used

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[57]http://www.nsomalawi.mw/images/stories/data_on_line/general/Quarterly%20Bulletins/Quarterly%20Statistical%20Bulletin,%20December%202016.pdf
[58] http://statsmauritius.govmu.org/English/StatsbySubj/Pages/National-Accounts.aspx
[59]   http://www.nigerianstat.gov.ng/report/371,   http://www.nigerianstat.gov.ng/report/220
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