ETD - Economic Transformation Database

The Economic Transformation Database (ETD): content, sources, and methods

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Abstract: This note introduces the GGDC/UNU-WIDER Economic Transformation Database (ETD), which provides time series of employment and real and nominal value added by 12 sectors in 51 countries for the period 1990–2018. The ETD includes 20 Asian, 9 Latin American, 4 Middle-East and North African, and 18 sub-Saharan African countries at varying levels of economic development. The ETD is constructed on the basis of an in-depth investigation of the availability and usability of statistical sources on a country-by-country basis. The ETD provides researchers with data to analyse the variety and determinants of structural transformation and supports policies aimed at sustained growth and poverty reduction.

Key words: database, employment, value added, sectors, Asia, Latin America, sub-Saharan Africa **JEL classification:** C80, N10, O10

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1 Introduction

This technical note describes the construction of the Groningen Growth and Development Center (GGDC) and UNU-WIDER Economic Transformation Database (ETD). The ETD provides a comprehensive, harmonized, longitudinal dataset covering sectoral employment and value added (VA). The ETD aims to be an important new data resource for researchers exploring macroeconomic development. It is specifically designed to facilitate the analysis of structural transformation and productivity growth in developing countries. It supports the conduct of policies aimed at facilitating structural change for sustained growth and poverty reduction in low-income countries.

The ETD includes measures of economic growth and labour input for 51 countries, distinguishing 12 sectors of the total economy, annually from 1990 to 2018. The variables included are real and nominal VA and persons employed. The ETD includes 20 Asian, 9 Latin American, 4 Middle-East and North African (MENA), and 18 sub-Saharan African countries at varying levels of economic development.

The ETD is the successor to the GGDC 10-sector database (Timmer et al. 2015). In comparison with the GGDC 10-sector database, the ETD has better coverage of low-income developing countries, distinguishes 12 sectors in the International Standard Industrial Classification, Revision 4 (ISIC rev. 4) classification, and has time series that run until 2018. This will stimulate new analysis. For example, the ETD distinguishes between financial services and business services. The ability to examine trends in business services activities is relevant to several lines of research, including the broad perspective on industrialization that covers production-related business services activities (Newfarmer et al. 2018).

In constructing the database, we collate relevant information from libraries, archives, and the internet. We make systematic use of the collected data to construct a harmonized, longitudinal database. That is, the guiding construction philosophy is to produce a dataset that for each country satisfies several consistency requirements. The series have been constructed by application of consistent linking procedures, which repair major breaks and thus improve intertemporal consistency. Our general approach to constructing sectoral VA series is to use level data from the latest revisions of national accounts and back-cast these data using sectoral growth rates from historical statistics or earlier releases. Real VA is then calculated from the estimated nominal data and price deflators and rebased to express values in 2015 prices.

International consistency is assured through the application of the United Nations System of National Accounts (UN SNA) framework for the measurement of Gross Domestic Product (GDP) in the sources. By using a consistent employment concept of persons engaged across countries and employing a harmonized sector classification (ISIC Rev. 4), we aim at international consistency of the variables.

To derive meaningful productivity estimates, the labour input and output measures have to cover the same activities. That is, they must be internally consistent. Therefore, we use persons engaged as our employment concept rather than employees. Data on employment are typically not available from national accounts. The measurement of persons engaged allows us to use population census

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¹ See Kruse et al. (2020) for a comparison of the ETD with other sectoral datasets, and an analysis of industrialization patterns.

data, which are by far the broadest and most reliable of the primary data source types in many developing countries. We pay particular attention to deriving employment series that are consistent in terms of coverage with VA in the national accounts and rely heavily on population censuses for benchmark years. Establishment and labour force surveys are typically used to interpolate series in between census benchmark years. These sources are always carefully checked in terms of methodology and categorization before use.

The remainder of this note is structured as follows. Section 2 presents the content of the database. Section 3 presents the general approach to constructing the dataset. Section 4 discusses potential concerns about the measurement of VA and employment.² Section 5 provides concluding remarks.

2 Content of the GGDC/UNU-WIDER Economic Transformation Database

This section describes the content and basic set-up of the ETD, including country coverage variables and sector classification. The key points regarding its content are given below.

The ETD includes data for:

- 51 developing economies: 21 in Africa, 9 in Latin America, and 21 in Asia;
- 12 sectors of the total economy following the ISIC rev. 4 industry classification;
- nominal value added in local currency;
- real value added in local currency (2015 prices);
- persons engaged;
- time series with annual data from 1990 to 2018.

Table 1 provides a list of the economies covered in the ETD. Levels of economic development vary considerably across the economies covered and range from low-income countries such as Burkina Faso to high-income countries such as Japan (using the IMF 2020 classification). The countries are spread across Asia, Africa, and Latin America. Moreover, they cover different geographical areas within each of these continents, such as Ethiopia in East Africa and Namibia in South Africa. The countries also vary considerably in the size of their domestic market and population, and in terms of factor and resource endowments.

Table 2 gives an overview of the sector classification used in the ETD. The database covers the 12 main sectors of the economy classified according to ISIC rev. 4. In the remainder of this note, we refer to sectors using their ISIC rev. 4 code or ETD sector name, given in the first and second columns of Table 2. The official ISIC descriptions are given in the final column.

In contrast to the GGDC 10-sector database, the ETD distinguishes between financial services and business services. This is possible due to the availability of more detailed sectoral data. The ability to examine trends in business services activities is relevant for several lines of research, including the broad perspective on industrialization that accounts for production-related business services activities (Newfarmer et al. 2018), analysis that measures activities involved in global value chains (Timmer et al. 2019), and analysis that examines the role of services in development (Liu et al. 2020).

2013; de Vries et al. 2015; Timmer et al. 2007).

² Parts of Sections 3 and 4 have appeared in previous work on the construction of sectoral data (see de Vries et al.

Table 1: Economies covered in the ETD

	Africa	Asia	Latin America
1	Botswana	Bangladesh	Argentina
2	Burkina Faso	Cambodia	Bolivia
3	Cameroon	China	Brazil
4	Egypt	Hong Kong, China	Chile
5	Ethiopia	India	Colombia
6	Ghana	Indonesia	Costa Rica
7	Kenya	Israel	Ecuador
8	Lesotho	Japan	Mexico
9	Malawi	Korea (Rep. of)	Peru
10	Mauritius	Lao (P.D.R.)	
11	Morocco	Malaysia	
12	Mozambique	Myanmar	
13	Namibia	Nepal	
14	Nigeria	Pakistan	
15	Rwanda	Philippines	
16	Senegal	Singapore	
17	South Africa	Sri Lanka	
18	Tanzania	Chinese Taipei	
19	Tunisia	Thailand	
20	Uganda	Turkey	
21	Zambia	Viet Nam	

Source: authors' construction.

Table 2: ETD sector list

	ISIC rev. 4	ETD	ISIC rev. 4 description
1	Α	Agriculture	Agriculture, forestry, and fishing
2	В	Mining	Mining and quarrying
3	С	Manufacturing	Manufacturing
4	D+E	Utilities	Electricity, gas, steam, and air-conditioning supply; Water supply; sewerage, Waste management and remediation activities
5	F	Construction	Construction
6	G+I	Trade services	Wholesale and retail trade; Repair of motor vehicles and motorcycles; Accommodation and food service activities
7	Н	Transport services	Transportation and storage
8	J+M+N	Business services	Information and communication; Professional, scientific, and technical activities; Administrative and support service activities
9	K	Financial services	Financial and insurance activities
10	L	Real estate	Real estate activities
11	O+P+Q	Government services	Public administration and defence; Compulsory social security; Education; Human health and social work activities
12	R+S+T+U	Other services	Arts, entertainment, and recreation; Activities of households as employers; Undifferentiated goods- and services-producing activities of households for own use; Activities of extraterritorial organizations and bodies; Other service activities

Source: authors' construction.

The VA from real estate activities (ISIC rev. 4 industry L) consists of VA from rental activities and imputations of owner-occupied housing. The latter imputation is based on an equivalent rent approach and is added to GDP. It does not have an employment equivalent; therefore, it should be excluded from productivity analyses. This can easily be accomplished, as VA from real estate activities is distinguished separately in the ETD (see Table 2).

3 Construction of variables: general approach

3.1 Gross value added by sector

Key points:

- Official National Statistical Institutes (NSIs) VA data are used as the primary source.
- Non-official data are used to bridge gaps in official data using growth trends.
- When disaggregated sector data are missing, we use growth trends of broadly aggregated sectors.
- The most recent revision of national accounts (NA) data is used as the benchmark level data.
- Historical series are linked using growth rates, which ensures consistency over time and removes unrealistic breaks.
- We estimate nominal and price deflator series from the source data and derive volume data implicitly.

Gross VA in current and constant prices is from national accounts published by the national statistical institutes (NSIs). VA by sector is compiled according to the UN System of National Accounts (UN 2008). Therefore, international comparability is high, in principle. However, NSIs frequently change their methodologies. Within national accounts, GDP series are periodically revised, which includes changes in the coverage of activities (e.g. after a full economic census has been carried out and 'new' activities have been discovered), changes in the methods of calculation (e.g. the use of double deflation), and changes in the base year of the prices used for calculating volume growth rates. Most developing countries use a fixed-base Laspeyres volume index and update this periodically, typically every 5 or 10 years.

Country-specific sources, including statistical bulletins and research publications published by NSIs, are our most important source of official data. NSIs are typically the producers of official NA data. Collection and dissemination is conducted by these offices, often in collaboration with the Central Bank and/or the Ministry of Finance. Where possible, the data are collected directly from NSI websites, libraries, and archives. Generally, only the most recent updates of the national accounts are available directly from NSI websites, and continuous series typically cover less than 20 years. The level of sectoral detail in which VA data are reported varies across countries and periods but they are typically sufficiently detailed to distinguish the sectors in the ETD, sometimes with the aid of supplementary sources.

The UN is an important outlet for official NA provided by NSIs—both for the latest updates and for historical series. Furthermore, parallel series of different revisions of NA are provided. The UN publishes NA statistics through its UN Yearbook (YB) and UN Official Country Data (OCD). The UN YB has been published since 1958 and has since used various sectoral classifications. NSI

official data are also published online via the UN data portal,³ and the most recent data use the ISIC rev. 4 classification.

Our general approach is to start with the most recent available GDP data from the NA provided by the NSI or Central Bank. These data will typically be compiled according to UN (2008), but the compilation may vary by country as some countries still follow the approaches outlined in the SNA 1993 (UN 1993) (and even sometimes the SNA 1968, see UN 1968). Historical NA series are subsequently linked to this benchmark year. This linking procedure ensures that growth rates of individual series are retained, although absolute levels are adjusted according to the most recent information and methods.

We use official statistics whenever these are available. However, for years for which no official data are produced by the NSI we use the estimates provided by the UN. We check whether the UN figures are consistent with the NSI figures for those years when data from both sources are available. Whenever the aforementioned sources do not provide sufficient data to produce continuous series, we add information from additional non-official sources.

We estimate volume data from separately constructed series of nominal VA and price deflators. This has several advantages. In cases where statistics at the detailed sector level are missing, we assume that growth trends of the aggregate sector are representative of the detailed underlying sectors. It is more reasonable to make this assumption for price developments than for volume growth rates. Especially for smaller sectors, it is not uncommon for price deflators to follow similar trends across similar sectors. This method also allows us to add information on price developments from external sources, such as the consumer price index, when this is not available from primary sources.

3.2 Employment by sector

Key points:

• Employment is defined as all persons engaged, aged 15 years and older.

- We use census data as the primary source for our benchmark level estimates.
- Census data are checked for reliability and, if necessary, replaced or supplemented by labour force survey (LFS) data.
- Survey data are used to interpolate employment levels between benchmark years.
- Data on the economically active in agriculture are used for trends in agricultural employment between benchmark years.
- Back-casts/extrapolations from the first/last benchmark are based on survey data.
- Where no survey data are available, interpolation or back-casts/extrapolations are based on average labour productivity growth or ILO model-based sectoral employment estimates between benchmark years.

Employment in our data set is defined as 'all persons engaged', including all paid employees, the self-employed, and family workers. The preferred age boundary is 15 years, since, typically, the contribution of children to production is small. Ideally, labour input should be measured in hours worked. However, insofar as they are available, the data are irregular and information on hours worked typically covers only the formal sector.

³ https://unstats.un.org/unsd/snaama/downloads

Employment information is typically not available from a country's NA, as it is not part of the SNA. Table 3 provides an overview of potential sources of sectoral employment. Two primary sources of employment data exist, namely LFS data, which are collected at household level, and establishment surveys based on firm-level questionnaires. Both have their advantages and disadvantages for establishing annual sectoral employment trends.

Table 3: Employment data sources

Primary source	Acronym
Labour force survey	LFS
Establishment survey	ES
Population and housing census	PC
Household survey	HS
Priority survey	
Living standards measurement survey	
Welfare monitoring survey	
Demographic health survey	
Population survey	
Data on the economically active in agriculture	EAA
ILO model-based sectoral estimates	ILO-M

Source: authors' construction.

The LFS is a comprehensive and well-established source with substantive international harmonization of concepts because it uses definitions set out by the International Labor Organization (ILO), although sampling size and techniques differ between countries. The LFS aims to cover employees as well as the self-employed and family labour, although our investigation of sources suggests that in some surveys the self-employed and family labour are underreported in sectors that rely on this kind of worker. The main problem with LFS data is its limited consistency with output data from the NA, especially at the sectoral level, due the relatively small sample size. In addition, the sample is sometimes restricted to particular regions, such as urban areas, or is not properly stratified across regions or population subgroups.

Information from establishment surveys (ES) is often more consistent with VA measures in the NA, because the output series for the NA are also based on this source. However, while the coverage by ES is reasonably accurate for goods-producing industries, this is not always the case for services. Moreover, ES typically cover only firms that surpass a certain threshold (for example, >20 employees or above a certain turnover level). This excludes smaller firms, which are especially abundant in developing countries. Another limitation is that data on self-employed and unpaid family members are usually not collected. This is problematic for sectors like agriculture and informal parts of the economy, where these categories make up a significant share of total employment. ES are therefore not well suited to the compilation of employment statistics by sector that cover the entire economy.

Therefore, we normally use an alternative source based on household questionnaires but with a much more extensive coverage than the samples of the LFS: the population census (PC). This ensures full coverage of the working population and a reliable sectoral breakdown. However, PCs are typically quinquennial or decennial and cannot be used to derive annual trends. Whenever possible, therefore, we use the PC to indicate absolute levels of employment, and the LFS and ES to indicate trends in between.

Census data are not always reliable and are sometimes disputed; even census data that are reasonably accurate in terms of broader aggregates can be less reliable at the sectoral level. To check the reliability of the data we perform a number of checks. First, total employment to total population ratios are calculated for the entire period using population data from the Maddison historical statistics (Bolt and van Zanden 2014). We consider ratios of between 30 and 40 per cent as credible. These boundaries are based on average ratios derived from the PC and LFS figures in previous work for the GGDC 10-sector database. Second, the sectoral trend from consecutive censuses is checked for correlation with VA data. Third, we check the original source documents of the NSI census questionnaires and reports to ensure that the phrasing of the questions and the employment definitions are consistent with our persons engaged classification. We also check the period of the year during which the census was carried out, to alert us to potential undercounting of, for example, seasonal agricultural employment, and we look for other anomalies such as unusually large residuals or groups of 'Employment Not Stated'. Finally, we check the PC coverage of female employment using survey data. Women constitute an important part of the labour force—usually around or above half of total employment in the agricultural sector in developing countries. Sometimes we prefer LFS to PC as sources of benchmark-level data. Whenever we find patterns not in line with the established criteria, we supplement or replace the PC as a source of benchmark level estimates with LFS or HS data, except in such cases where it is possible to correct the census data in a reliable and transparent manner.

The EAA and ILO-M databases provide a continuous time series of non-official data. These numbers are usually estimated by applying econometric models and are used to provide trends.⁴ Time series on the economically active population in agriculture are used for trends in agricultural employment, with some exceptions such as Botswana and Burkina Faso (as described in the detailed country-by-country sources and methods in the appendix). Always and everywhere we pay particularly close attention to the accuracy of agricultural employment data, as agriculture is (a) among the sectors most often inaccurately reported due to informality and seasonal aspects, and (b) one of the most important sectors for empirical researchers and policy-makers. For Latin American countries we use the harmonized HS data for Latin American countries provided in the Socio-Economic Database for Latin America.⁵

We distinguish between two methods of interpolation, depending on data availability. When ES data are available, interpolation is based on annual growth trends. When these data are unavailable, interpolation is based on average trends in labour productivity or ILO-M between the benchmark years. Agricultural employment figures are interpolated using growth rates from the series on the economically active population in agriculture. This is discussed further below.

3.3 Interpolation methods

Interpolation based on ES/LFS, ILO-M, and EAA data

The level estimates for all sectors are interpolated between benchmark years using annual growth rates from the ES/LFS, ILO-M, or EAA (external) data. To accommodate annual fluctuations between the benchmark years, we employ a procedure that uses the average annual growth trend

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⁴ EAA = employment in agriculture (% of total employment) (modelled ILO estimate) * (employment to population ratio, 15+, total (%) (modelled ILO estimate) * population ages 15–64 (total)). See https://databank.worldbank.org/source/world-development-indicators.

⁵ https://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/

between the benchmark years, supplemented by information on the annual deviations from this trend, taken from external data.

For each sector, the interpolation method can be expressed mathematically as follows:

$$EMP^{t} = EMP^{t-1} * EXP \left[LN \left(\frac{EMP_{e}^{t}}{EMP_{e}^{t-1}} \right) - LN \left(\frac{EMP_{e}^{b2}}{EMP_{e}^{b1}} \right) / (b2 - b1) + LN \left(\frac{EMP_{e}^{b2}}{EMP_{e}^{b1}} \right) / (b2 - b1) \right]$$
 (1)

Where b1 < t < b2. b1 and b2 denote the first and second benchmark, respectively, and (b1 - b2) the number of years in between. Sectoral employment is denoted by *EMP*, in year t. The e subscript indicates external employment data.

Interpolation based on average trends in labour productivity

For years in which no ES/LFS data are available, we interpolate between benchmark years using the ILO-M or average sectoral productivity growth rates. We calculate real sectoral productivity levels by taking the output to employment ratio. These productivity levels are then linearly interpolated. In turn, we divide the sectoral volume data by the sectoral productivity level to arrive at the employment estimate for a particular year.

For each sector, the interpolation method can be expressed mathematically as follows:

$$EMP^{t} = \frac{VA_{Q}^{t}}{LP^{t-1}} / EXP \left[LN \left(\frac{LP^{b2}}{LP^{b1}} \right) / (b2 - b1) \right]$$

$$\tag{2}$$

Where b1 < t < b2; $LP^t = \frac{VA_-Q^t}{EMP^t}$. b1 and b2 denote the first and second benchmark year, and (b2 - b1) the number of years in between. Sectoral employment is denoted by EMP, in year t. Sectoral VA in constant prices is denoted by VA_-Q^t and labour productivity by LP. This method is used because it allows us to harmonize movements in VA and employment. In contrast, linearly interpolated employment figures would be be inconsistent with the growth trends of VA, resulting in irregular productivity patterns. A downside of this approach is that some series are artificially smoothed between benchmark years.

Extrapolation and back-casting methods

Analogously to the interpolation methods we calculate back-casts and extrapolations using two methods. When external data are available, we use these sectoral trends to back-cast or extrapolate from the nearest benchmark estimate.

For each sector, the extrapolation and back-casting method using external data can be expressed mathematically, respectively, as:

Extrapolation:
$$EMP^t = EMP^{t-1} * \left(\frac{EMP_e^t}{EMP_e^{t-1}}\right)$$
 (3)

Back-casting:
$$EMP^t = EMP^{t+1} / \left(\frac{EMP_e^{t+1}}{EMP_e^t}\right)$$
 (4)

Where sectoral employment is denoted by EMP^t in year t. The e subscript indicates external employment data.

Whenever no ES statistics are available, we back-cast or extrapolate using the ILO-M or average annual labour productivity trends between the last two benchmark years. For each sector, the

extrapolation and back-casting method using average annual labour productivity between the two closest benchmark years can be expressed mathematically, respectively, as:

Extrapolation:
$$EMP_E^t = \frac{VA_{\cdot}Q^t}{LP^{t-1}} / EXP \left[LN \left(\frac{LP^{b2}}{LP^{b1}} \right) / (b2 - b1) \right]$$
 (5)

Where:
$$t > b2$$
; $LP^t = \frac{VA_Q}{EMP^t}$

Back-casting:
$$EMP_E^t = \frac{VA_-Q^t}{LP^{t+1}} / EXP \left[LN \left(\frac{LP^{b2}}{LP^{b1}} \right) / (b2 - b1) \right]$$
 (6)

Where:
$$t < b1$$
; $LP^t = \frac{VA_{-}Q^t}{EMP^t}$

b1 and b2 denote the first and second closest benchmark years, and (b2 - b1) the number of years in between. Estimated employment is denoted by EMP_E^t , in year t, VA in constant prices by VA_Q^t ; labour productivity by LP.

3.4 Consistency

We aim at consistent time series of gross VA and employment. By linking the series, major breaks (e.g. due to changes in methodology) are repaired. International consistency of the cross-country sectoral data is ensured through the system of NA for VA, the use of a consistent base year for real VA, the employment concept of persons engaged, and the use of a harmonized sectoral classification. We classify activities into sectors, using ISIC rev. 4. The industrial classification used in the national primary data sources is based on this classification or is directly related to it.

For the derivation of meaningful productivity measures, the labour input and output measures should cover the same activities (internally consistent). As we use persons employed as our employment concept rather than employees, and base our employment numbers on large-scale surveys, overlap in coverage of employment and VA from the NA is maximized. A notable exception is the own-account production of housing services by owner-occupiers. For this, an imputation of rent is made. This is calculated as the number of owner-occupied units times the average rent of equivalent tenant-occupied units. It is added to GDP in many countries. This imputed production does not have an employment equivalent and should not be included in output in labour productivity comparisons. Typically, imputed rents are included in real estate activities (ISIC rev. 4, sector L) and increase output in this sector by 50 per cent or more without any labour input equivalent. This percentage varies over time and across countries, affecting the analysis of growth and development. Real estate activities are shown separately to enable simple exclusion from the analysis.

For most countries, sectoral time series in ISIC rev. 4 are used and extrapolated with growth rates in sectoral VA in ISIC rev. 3 to create longer time series. Several countries publish only sectoral VA data in the ISIC rev. 3 classification.

For linking purposes, sectors in ISIC rev. 3 are mapped to sectors in ISIC rev. 4. This mapping is provided in Table 4. The level at which we do the mapping is guided by the level of sectoral detail that is available in the NA. For example, part of the economic activities in ISIC rev. 3 sectors 21–22 are included in ISIC rev. 4 sector J (information and communication services). If more detailed sectoral data are available for a country, these will be used to ensure more accurate mapping. Secondary data sources are often used to supplement the primary data sources so as to ensure more accurate ISIC rev. 3 to 4 mapping; for example, some secondary regional or international databases provide data at a more disaggregated level, which are used for splitting smaller sectors in specific years.

Table 4: Mapping ISIC rev. 3 to ISIC rev. 4.

	ISIC rev. 3	ISIC rev. 4	Description						
1	A+B	Α	Agriculture						
2	С	В	Mining						
3	D	С	Manufacturing						
4	Е	D+E	Utilities						
5	F	F	Construction						
6	G+H	G+I	Trade services						
7	60–63	Н	Transport services						
8	64+71–74	J+M+N	Business services						
9	J	K	Financial services						
10	70	L	Real estate						
11	L+M+N	O+P+Q	Government services						
12	O+P+Q	R+S+T+U	Other services						

Note: real estate activities are presented separately.

Source: authors' construction.

The mapping in Table 4 also provides the basis for extrapolating data in the ETD backwards using the GGDC 10-sector database (sectoral data are presented in the ISIC rev. 3 classification in the GGDC 10-sector database). Note that financial services and business services are not separately distinguished in the GGDC 10-sector database, so trends in the finance and business services sector of the GGDC 10-sector database are used to extrapolate backwards series for business as well as financial services in the ETD.

4 Data issues

A note of caution on the data is warranted. Scholars have recently reiterated that the statistical foundations underlying GDP and employment estimates in many developing countries are subject to measurement error (Devarajan 2013; Jerven 2013). The quality of statistics is related to, among other things, the capacity to collect, manage, and disseminate data; the funding of statistical offices; and the allocation of responsibilities for its collection (which can cause fragmentation in surveys and gathering exercises).

The first five columns of Table 5 present Statistical Capacity Indicators that are published by the World Bank and refer to the year 2015. Values are shown for countries that are covered in the ETD. The first column assigns a score of 1 if annual chain linking has been adopted or the base year for the NA data is within the last 10 years. For most Latin American countries the score is 1, but the score is 0 in several countries in Africa and Asia, because they have an outdated base year or did not chain link the data. The next column presents the periodicity and timeliness assessment of statistical capacity. Values range from 0 to 100. Several countries score low on this measure, such as Myanmar. On average, Latin American countries score higher, with an unweighted average of 90.7 compared with 85.1 for Asian countries and 84.9 for African countries. The third column assigns a score of 1 if the country had a census at least once in the 10 years preceding 2015. This is the case for all countries covered in the ETD except Pakistan (though Pakistan conducted a census in 2017).

Table 5: Indicators of statistical capacity, 2015, and categorization

Country	National accounts base year	Periodicity and timeliness assessment of statistical capacity	Population census	Source data assessment of statistical capacity	Statistical capacity score (overall average)	Categorization (A/B)
Argentina	1	86.7	1	100	95.6	Α
Bangladesh	1	90.0	1	80	76.7	Α
Bolivia	0	96.7	1	80	78.9	Α
Botswana	1	66.7	1	40	45.6	В
Brazil	1	66.7	1	60	72.2	Α
Burkina Faso	0	93.3	1	70	67.8	Α
Cambodia	0	90.0	1	80	76.7	В
Cameroon	0	86.7	1	40	55.6	В
Chile	1	96.7	1	100	95.6	Α
China	0	80.0	1	60	70.0	Α
Chinese Taipei						Α
Colombia	1	83.3	1	80	84.4	Α
Costa Rica	0	93.3	1	80	84.4	Α
Ecuador	1	86.7	1	50	72.2	Α
Egypt, Arab Rep.	0	93.3	1	100	91.1	Α
Ethiopia	1	76.7	1	80	68.9	В
Ghana	1	86.7	1	50	65.6	Α
Hong Kong, China						Α
India	1	73.3	1	80	77.8	В
Indonesia	1	93.3	1	80	84.4	Α
Israel						Α
Japan						Α
Kenya	1	73.3	1	50	54.4	Α
Korea (Rep. of)						Α
Lao PDR	0	93.3	1	70	71.1	Α
Lesotho	1	86.7	1	60	65.6	Α
Malawi	1	96.7	1	80	75.6	Α
Malaysia	1	73.3	1	80	74.4	Α
Mauritius	1	80.0	1	100	93.3	Α
Mexico	1	96.7	1	80	92.2	Α
Morocco	0	83.3	1	80	81.1	Α
Mozambique	1	96.7	1	50	72.2	Α
Myanmar	1	66.7	1	50	55.6	В
Namibia	1	73.3	1	40	47.8	В
Nepal	0	86.7	1	80	72.2	Α
Nigeria	1	83.3	1	80	71.1	В
Peru	1	100.0	1	80	93.3	Α
Pakistan	1	96.7	0*	60	75.6	В
Philippines	0	86.7	1	100	82.2	Α
Rwanda	1	90.0	1	70	73.3	Α
Senegal	0	86.7	1	80	75.6	Α
Singapore						Α
South Africa	1	83.3	1	80	81.1	Α
Sri Lanka	0	90.0	1	80	73.3	Α
Tanzania	1	86.7	1	80	75.6	В
Thailand	0	86.7	1	80	85.6	Α
Tunisia	1	80.0	1	70	76.7	В

Country	National accounts base year	Periodicity and timeliness assessment of statistical capacity	Population census	Source data assessment of statistical capacity	Statistical capacity score (overall average)	Categorization (A/B)
Turkey	0	86.7	1	70	82.2	Α
Uganda	1	86.7	1	80	72.2	В
Viet Nam	1	86.7	1	100	82.2	Α
Zambia	1	80.0	1	60	60.0	В

Note: National accounts base year: the year used as the base period for constant price calculations in the country's national accounts; the score is 1 if annual chain linking has been adopted or the base year is within the last 10 years. Periodicity and timeliness assessment of statistical capacity: values range from 0 to 100. Population census: Score is 1 if the country had a census at least once in the last 10 years. Source data assessment of statistical capacity: values range from 0 to 100. Statistical capacity score (overall average): provides an overview of the capacity of a country's national statistical system based on a diagnostic framework assessing three dimensions: methodology, source data, and periodicity and timeliness. Observations in columns (1)–(5) are for the year 2015. The final column provides an assessment of the country's sectoral data in the ETD based on the statistical indicators in columns (1)–(5) and whether a reliable source of sectoral employment data covered a recent year, namely 2015–2018. * Pakistan conducted a population census in 2017.

Source: authors' compilation based on Statistical Capacity Indicators (https://databank.worldbank.org/source/statistical-capacity-indicators, accessed October 2019).

The fourth column assesses the statistical capacity with respect to source data. Values range from 0 to 100. On average, Latin American countries also score higher on this indicator (82.2 on average), and it is notable that African countries again score lower (69.5 on average) than Asian countries (76.9 on average). The penultimate column provides an overview of the capacity of a country's national statistical system based on a diagnostic framework assessing three dimensions: methodology, source data, and periodicity and timeliness. Values range from 0 to 100. Low values are observed for Botswana (45.6), Kenya (54.4), Cameroon (55.6), and Myanmar (55.6). High values are observed for Argentina (95.6), Chile (95.6), Peru (93.3), and Mauritius (93.3). The final column provides a categorization of countries as A or B. Measurement uncertainty and future data revisions are likely larger for countries classified as 'B' than for those classified as 'A'. The categorization is based on the indicators of statistical capacity presented in Table 5, and whether a reliable source of sectoral employment data for a recent year has been used, namely for one of the years 2015, 2016, 2017, or 2018. For several countries, including Cambodia, Cameroon, Ethiopia, and Myanmar, it was difficult to obtain recent sectoral employment data. The availability of recent employment data weighs heavily in the decision to classify a country as 'A' or 'B'. For example, Ghana and Kenya score low on overall statistical capacity but have reliable recent employment data; therefore, they are categorized as A.

4.1 Measurement of sectoral value added: issues

In agriculture, food crops are sometimes based on eye estimates, traditional fishing catches might not be reported, and changes in livestock for many species may not be tracked. In manufacturing, the growing output of small-scale industries and handicrafts might be underreported. Some countries try to estimate these activities using area sample surveys, which are often biased towards urban areas. For many construction activities, particularly those relating to own-account construction and farm buildings in rural areas, information is not available. This also applies to data on ownership of dwellings and their imputed rents. Some countries roughly estimate imputed rents in urban areas, while others do not include separate estimates of these series. Some countries do not impute rental value for owner-occupied dwellings in rural areas. Data on distributive trade and transport services are limited. Sometimes countries use a 'mark-up' method, applying estimated trade margins to the value of (only partly known) locally produced and imported goods.

Data for transport services, such as tonne-kilometres and passenger-kilometres, might not be available or might be based on rare, small-scale sample surveys or inquiries.

In a nutshell, weaknesses relate to tracing agricultural output over time, measuring services sectors' GDP, and accounting for unorganized activities in manufacturing and elsewhere. In addition, limited information on intermediate consumption often implies the use of rough input—output coefficients to measure GDP.

We link the most recent revision of VA levels to past series using annual growth rates. Therefore, errors in estimates of growth rates are most relevant. Typically, it is assumed that the same error in VA levels applies to annual changes (Morgenstern 1965). However, the absolute error margin in the change from year to year is likely to be lower than the absolute values if the NSI only considers the possible change from the previous year. This implies that in this case annual changes have different and lower error margins.

Outdated base years signal lower reliability of the statistics, as they may not include the expansion of new or informal activities. In line with recent improvements in statistical analysis, many countries included in the ETD have a recent base year and have conducted new surveys that aimed at getting a better estimate of economic activity within the territory.

Table 6 provides an overview of NA statistics on real VA by economic activity in the ISIC rev. 3 and rev. 4 industry classifications.

Table 6: Real value added by economic activity in ISIC rev. 3 and ISIC rev. 4

	1990					1995					2000					2005					2010					2015			2018
Africa																													
Botswana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burkina Faso ¹	0	0 (0	0	0	О	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Cameroon	0	0 (0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Egypt	0	0 (0	0	0	О	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Ethiopia	0	0 (0	0	0	О	0	0	0	О	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Kenya	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Lesotho	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Malawi	0	0 (0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Mauritius	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Morocco	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Mozambique	0	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Namibia	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nigeria	Χ	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Rwanda	0	0 (0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Senegal	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ
South Africa	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanzania	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Tunisia	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ
Uganda	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Zambia	0	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ

	1990				995					2000					2005					2010					2015			2018
Asia	7				÷					7					7					7					7			7
Asia Pangladaah	0 0		~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Bangladesh Cambodia	0 0																											
China	X >																											
Hong Kong,																												
China	0 (
India	0 (0																										
Indonesia	0 (0		0																								
Israel	0 (0	0	0	0	0	0	0	0	X	X	X	X	X	X	X	X	X	X	X	X	X	Χ	Χ	X	X	X	Χ
Japan	0 (0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X	X	X	Χ	Χ	Χ	X
Korea (Rep. of)	X >	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	X	X	Χ	X	X	X	Χ	X	X	X	Χ	Χ	Χ	Χ	Χ	X	Χ	X	Χ
Lao (P.D.R.)	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Malaysia	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Myanmar	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nepal	0 (0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Pakistan	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Philippines	0 (0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Singapore	X >	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Sri Lanka	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Chinese Taipei	X >	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Thailand	X >	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Turkey	X >	X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Viet Nam	0 (0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Latin America																												
Argentina	0 (0	0	0	0	0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Bolivia	X >	(X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Brazil	0 0	0	0	0	0	0	0	0	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Χ
Chile	0 (0	0	0	0	Χ	Χ	Χ	Χ	Х	Χ	Χ	Χ	Х	Х	Χ	Χ	Х	Х	Χ	Χ	Χ	Χ	Χ	Х	Χ	Х	Χ
Colombia	0 (0	0	0	Χ	Χ	Χ	Χ	Χ	Х	Х	Χ	Х	Х	Х	Χ	Х	Х	Х	Χ	Χ	Х	Х	Х	Х	Х	Х	Х
Costa Rica	0 >	(X	Χ	Χ	Χ	Χ	Χ	Χ	Χ	Х	Х	Х	Х	Х	Х	Χ	Х	Х	Х	Χ	Χ	Х	Х	Х	Х	Х	Х	Х
Ecuador	X >	(X	Χ	Χ	Х	Χ	Χ	Х	Х	Х	Χ	Χ	Х	Х	Х	Х	Х	Х	Х	Х	Χ	Х	Х	Х	Х	Х	Х	Х
Mexico	0 0	0	Χ	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Peru	0 (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Χ	Х	Х	Х	Χ	Х	Х	Х	Х	Х	Х	Х

Note: X refers to NA sector value added at constant prices available in ISIC rev. 4 classification, except for ¹ Burkina Faso, where sector value added is in current prices in ISIC rev. 4 classification. O refers to data in ISIC rev. 3 classification.

Source: authors' construction.

In Table 6, X refers to NA sectoral VA at constant prices available in the ISIC rev. 4 classification; O refers to data in the ISIC rev. 3 classification. Data in the ISIC rev. 4 classification suggest that NA procedures follow the latest international practice. The majority of countries report sectoral VA in the new ISIC rev. 4 classification. Most countries have also produced a time series in the

new sector classification that starts in the mid-2000s or sometimes in the 1990s.⁶ We emphasize that our approach of using only NSI data from the most recent SNA revision as benchmark levels, and then back-casting using trends from older data, ensures that all ETD VA series are consistently in the most recent SNA revision even when such data are not available directly from the NSI for earlier years.

4.2 Measurement of sectoral employment: issues

One issue concerns the measurement of underemployment. Many workers in developing countries are neither fully employed nor wholly unemployed, especially in agriculture, where all family members help with farm work. As a result, there will be substantial differences in underemployment rates between rural and urban areas. Employment in the ETD is defined as all persons engaged, and thus aims to include paid employees as well as self-employed and family workers even if they are underemployed.

Historically, there have been inconsistencies in the way developing countries have treated those engaged in small-scale farming. There has been a tendency to classify small-scale farmers as inactive rather than employed, particularly in the case of women, whose farming activities were often seen as an extension of their household work (Posel and Casale 2001). This practice differs across countries and is partially related to religion and culture. We adjust employment numbers to include female workers in the labour force when there is a clear bias in reporting females as household workers only. Women constitute an important part of the agricultural labour force, usually around or above half of total employment in that sector. Whenever we find patterns that are not in line with the established criteria, we supplement or replace the PC as a source of benchmark-level estimates with LFS or HS data. Sometimes this involves the use of additional labour force surveys.

The preferred census question asks for the sector of employment during the last 12 months, since such a question will also include seasonal workers in agriculture. Differences in age limits and reference periods in labour force enumerations may impair cross-country and intertemporal consistency. In the source data, typically no upper age limit is imposed, but there is usually a lower age limit, which varies from 6 to 15 years. Typically, the contribution of children to production is small. To facilitate comparability of the employment data, we include only persons aged 15 years and older in the labour force. In general, we exercise a preference for more reliable data over more precise employment age classifications. For example, a high-quality population census with a 12+ employment age classification would be preferred as a benchmark to a questionable, small-sample survey with a 15+ classification. In some cases, it is possible to adjust the census data to more accurately reflect the 15+ age classification. The appendix provides country-specific information regarding such decisions and adjustments.

5 Concluding remarks

Comparative studies of sectoral growth are hampered by the lack of a large-scale international database on output and productivity trends by sector in developing countries. This note presents the construction of the GGDC/UNU-WIDER Economic Transformation Database (GGDC/UNU-WIDER ETD) developed by the Groningen Growth and Development Centre

⁶ Since the switch to ISIC rev. 4 is recent, we express real sectoral VA in a recent base year, namely in 2015 prices. This makes it less likely that base year prices will be set for a year in which sectoral VA is reported in ISIC rev 3.

(GGDC) with funding and cooperation from the United Nations University World Institute for Development Economics Research (UNU-WIDER).

The database is constructed on the basis of an in-depth study of available statistical sources on a country-by-country basis. It is the successor to the widely used GGDC 10-sector database. This note discusses the contents of the ETD, the selection procedure of the sources, and the methods used to ensure intertemporal, international, and internal consistency. Compliance with consistency requirements is important to ensure the usefulness of the database in long-term analyses of growth and productivity.

One of the key strengths of the ETD is the individual and personal attention given to the data sources for each country. The team of researchers carefully examined primary data sources and associated reports as well as supplementary material in order to identify anomalies, issues, and inconsistencies, and ensured that data selection decisions were based on consistent and homogeneous guiding principles. Further checks were carried out at the aggregate level, and surprising or unexpected results were individually investigated.

Population censuses provide important benchmarks of sectoral employment. Typically, censuses are conducted only every decade due to the time and effort required in undertaking a population count. Several countries, such as Ethiopia and Thailand, had a census scheduled for 2020, but these have been postponed due to the Covid-19 pandemic. This is a mixed blessing for the ETD and for analysis of structural transformation in general. On the one hand, we would have liked to incorporate the censuses in the ETD. On the other hand, the release of census results in 2021 or 2022 will provide an interesting opportunity to examine how the pandemic has affected patterns of work in developing countries.

References

- Bolt, J., and J.L. van Zanden (2014). 'The Maddison Project: Collaborative Research on Historical National Accounts'. *The Economic History Review*, 67(3): 627–51. https://doi.org/10.1111/1468-0289.12032
- de Vries, K., G.J. de Vries, R. Gouma, and M.P. Timmer (2013). 'Africa Sector Database: Content, Sources, and Methods'. Available at: https://https://www.rug.nl/ggdc/productivity/10-sector/other-releases/africa-sector-database?lang=en (accessed January 2021).
- de Vries, G.J., K. de Vries, R. Gouma, S. Pahl, and M.P. Timmer (2015). 'GGDC 10-Sector Database: Content, Sources, and Methods'. Available at https://www.rug.nl/ggdc/productivity/10-sector/(accessed January 2021).
- Devarajan, S. (2013). 'Africa's Statistical Tragedy'. Review of Income and Wealth, 59(2), S9–S15. https://doi.org/10.1111/roiw.12013
- Diao, X., M. Ellis, M. McMillan, and D. Rodrik (2020). 'Africa's Manufacturing Puzzle: Evidence from Tanzanian and Ethiopian Firms'. Mimeo. Cambridge, MA: Harvard University.
- Hamilton, J.D. (2013). 'Oil Prices, Exhaustible Resources and Economic Growth'. In: R. Fouquet (ed.), *Handbook on Energy and Climate Change*, Chapter 1, pp. 29–63. Cheltenham: Edward Elgar Publishing. https://doi.org/10.4337/9780857933690.00007
- IMF (2020). World Economic Outlook: The Great Lockdown'. Washington, DC: International Monetary Fund.
- Jerven, M. (2013). Poor Numbers: How We Are Misled by African Development Statistics and What To Do about It. Ithaca, NY: Cornell University Press.

- Kruse, H., E. Mensah, K. Sen, and G.J. de Vries (2021). 'A Manufacturing Renaissance? Industrialization trends in the developing world'. WIDER Working Paper 2021/28. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2021/966-2
- Liu, X., A. Mattoo, Z. Wang, and S.-J. Wei (2020). 'Services Development and Comparative Advantage in Manufacturing'. *Journal of Development Economics*, 144: 102438. https://doi.org/10.1016/j.jdeveco. 2019.102438
- McCaig, B., M. McMillan, I. Verduzco-Gallo, and K. Jefferis (2015). 'Stuck in the Middle? Structural Change and Productivity Growth in Botswana'. NBER Working Paper w21029. Cambridge, MA: National Bureau of Economic Research.
- Minnesota Population Center (2019). 'Integrated Public Use Microdata Series, International: Version 7.2'. Minnesota Population Center.
- Morgenstern, O. (1965). On the Accuracy of Economic Observations. Second Edition. Princeton, NJ: Princeton University Press.
- Newfarmer, R., J. Page, and F. Tarp (eds) (2018). *Industries without Smokestacks: Industrialization in Africa Reconsidered.* Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198821885.001.0001
- Posel, D., and D. Casale (2001). 'Gender Aggregates: Women Subsistence Farmers Affect The Unemployment Count'. *Agenda*, 16(49): 82–88.
- Resnick, D., and J. Thurlow (2017). 'The Political Economy of Zambia's Recovery: Structural Change without Transformation?' In M.S. McMillan, D. Rodrik, and C. Sepúlveda (eds), *Structural Change, Fundamentals, and Growth: A Framework and Case Studies*, Chapter 6, pp. 235–66. Washington, DC: International Food Policy Research Institute (IFPRI). http://dx.doi.org/10.2499/9780896292147_ch6.
- Sit, V. (1998). 'Hong Kong's "Transferred" Industrialization and Industrial Geography'. *Asian Survey*, 38(9): 880–904. https://doi.org/10.1525/as.1998.38.9.01p0387e
- Timmer, M.P., E. Monnikhof, and G.J. de Vries (2007). 'GGDC Sectoral Database for Asia: Sources and Methods'. Available at: https://www.rug.nl/ggdc/productivity/10-sector/ (accessed January 2021).
- Timmer, M.P., G.J. de Vries, and K. de Vries (2015). 'Patterns of Structural Change in Developing Countries'. In J. Weiss and M. Tribe (eds), Routledge Handbook of Industry and Development, pp. 65–83. Abingdon: Routledge.
- Timmer, M.P., S. Miroudot, and G.J. de Vries (2019). 'Functional Specialisation in Trade'. *Journal of Economic Geography*, 19(1): 1–30. https://doi.org/10.1093/jeg/lby056
- United Nations (1968). System of National Accounts 1968. https://unstats.un.org/unsd/nationalaccount/docs/1968SNA.pdf
- United Nations (1993). System of National Accounts 1993. https://unstats.un.org/unsd/nationalaccount/sna1993.asp
- United Nations (2008). System of National Accounts 2008. https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf

Appendix: Sources and methods by country

Argentina

Employment

Period	Sectoral data sources
2010	Population census (in ISIC rev. 4 classification)
2011–18	Trend using Encuesta Permanente de Hogares (EPH Continua)
1990–2009	Trend using the GGDC 10SD

^{*} The sectoral data in the Encuesta Permanente de Hogares is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Value added

Period	Sectoral data sources
2004–19	Value added in current prices (in ISIC rev. 4)
2004–19	Value added in constant prices (in ISIC rev. 4)
1990–2003	Trend from GGDC 10SD

^{*} Value added series from 2004 to 2019 obtained from the Statistical Office (INDEC, accessed June 2020)

Bangladesh

Employment

Period	Sectoral data sources
1990–2018	Trends from ILO Modelled Estimates
1990–2018	Trend in EAP in Agriculture
2016, 2013, 2010, 2006, 2003, 2000, 1996, 1991, and 1989	NSI Labour Force Surveys

- Benchmark Levels in 2016, 2013, 2010, 2006, 2003, 2000, 1996, 1991, and 1989 (out of sample) from NSI Labour Force Surveys (LFS).
- From 1990–2018, all interpolations and forwards extrapolations between benchmark years use trends from ILO Modelled Estimates.
- Pre-2006, the ISIC 3 to ISIC 4 split assumed constant sub-sector shares of ISIC 3 parent sectors.

Bangladesh has performed population censuses (PC) in 1991, 2001, and 2011. Additionally, the NSI has released regular Labour Force Surveys with a relatively high frequency across the entire period 1990-2018. As the PCs do not go into great detail with regards to employment statistics, whereas the LFSs are specifically about this topic, the LFSs are the preferred source of benchmark sectoral employment levels and provide benchmarks years in 2016, 2013, 2010, 2006, 2003, 2000, 1996, and 1991, in addition to an 'out-of-sample' benchmark in 1989 which is used to anchor the interpolations. One exception is that the employment in 'Mining' is unrealistic in the 2000 LFS, and employment in 'Mining and Manufacturing' is unrealistic in the 2013 LFS, therefore the 2000 and 2013 level data for these sectors only are dropped and instead interpolated over as described below. In between benchmark years, and going forwards from 2016, all sectoral employment interpolations and forwards extrapolations are performed using trends from the ILO Modelled Estimates. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. Prior to 2006, all primary and secondary source data is in either ISIC 3 or ISIC 2 classification, therefore the split to ISIC 4 is performed assuming that the ISIC 4 sub-sector shares of ISIC 3 or 2 parent sectors remained constant at their 2006 ratios.

Value added

Period	Sectoral data sources
2010–18	Sectoral Current and Constant Price VA Data from 2019 Statistical Yearbook
2002–10	Trends from Sectoral Current and Constant Price VA Data from 2011 Statistical Yearbook
1990–2002	Sectoral Current and Constant Price VA Data from UN OCD

- From 2010–18, current and constant price sectoral VA levels data taken directly from NSI National Accounts as reported in the 2019 release Statistical Yearbook.
- From 2002–10, current and constant price sectoral VA levels data backwards extrapolated using trends from NSI National Accounts as reported in the 2011 release Statistical Yearbook.
- From 1990–2002, current and constant price sectoral VA levels data backwards extrapolated using trends from the UN Official Country Data (UN OCD).
- As 'Real Estate' and 'Business Services' are never separated, post-2006 the ratio of the two sectors in Pakistan is applied, and pre-2006 this ratio is held constant.
- Pre-1992, the UN data is less disaggregated, so missing sub-sectors share the common trend of their parent sector.
- Bangladesh Fiscal Year runs July 1 19XX to June 30 19XX+1. UN Convention is to attribute all to year 19XX+1, this is followed here.

The Bangladesh NSI releases sectoral VA data in current and constant prices in Statistical Yearbook publications. The Yearbook of 2019 covers the period 2010–18 and provides sectoral VA levels directly. The Yearbook of 2011 covers the period 2002–10, however there is a slight jump in the overlap year, presumably due to GDP revisions, and as a result the trends for this period are used to backwards extrapolate the sectoral VA series from the more recent source. For the period 1990–2002, all sectoral current and constant price VA are backwards extrapolated using trends from the UN Official Country Data (UN OCD). Pre-1992, the UN data is less disaggregated and only provides 'main aggregates', therefore the missing sub-sectors are backwards extrapolated using the trends of their parent sectors for this short period. The one exception to the above is that 'Real Estate' and 'Business Services' VA are never separated for Bangladesh, therefore the ratio of VA for these two sectors for Pakistan is applied to the Bangladesh data going back until 2006. Prior to 2006, the ratio of VA of these two sectors is held constant. All 'annual' data covers fiscal years rather than calendar years. Therefore, Employment data which is reported as 19XX or 20XX actually covers the period 1 July 19XX-1 to 30 June 19XX, etc. Note that this is not the case with the employment data.

Bolivia

Employment

Period	Sectoral data sources
2012	Population census (in ISIC rev. 4 classification)
2013–18	Trend using Encuesta Continua de Hogares
1990–2011	Trend using the GGDC 10SD

^{*} Population census includes persons employed 7+.

Value added

Period	Sectoral data sources
1990–2019	Value added at current prices, ISIC rev 4 classification
1990–2019	Value added at constant prices, ISIC rev 4 classification

^{*} Value added series from 1990 to 2019 obtained from the Statistical Office (INE, accessed June 2020)

^{*} The sectoral data in the Encuesta Continua de Hogares is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Botswana

Employment

Period	Sectoral data sources
2014–18	Productivity-Based Trends
1990–2018	Trend in EAP in Agriculture
2009–14	Trends from Annual Formal Sector Labour Statistics Reports
2006–09	Trends from ILO Modelled Estimates
1990–2006	Trends from Establishment Surveys
2011	2011 Population Census, IPUMS Microdata
2006	2006 Labour Force Survey
2001	2001 Population Census, IPUMS Microdata
1991	1991 Population Census, IPUMS Microdata
1991 and 2001	Agricultural Level Estimates from McCaig et al. (2015).

- Benchmark levels in 2011, 2001, 1999 (PC), and 2006 (LFS)
- Agricultural benchmark levels are from McCaig et al. (2015)
- Census year benchmarks split from ISIC3 to ISIC4 using IPUMS microdata.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- From 2014, all other sectors extrapolations use Productivity-Based Trends.
- From 2009–14, all other sectors interpolations follow trends from Annual Formal Sector Labour Statistics Reports.
- From 2006–09, all other sectors interpolations follow trends from ILO Modelled Estimates.
- From 1990–2006, all other sectors interpolations follow trends from Establishment Survey data held by the ILO.

Botswana publishes a population census (PC) every decade, with the most recent release in 2011. Other benchmark censuses in the relevant time period are 1991 and 2001. A reputable NSI labour force survey from 2006 is also used as a benchmark for levels. However, the LFS is unreliable for agricultural employment figures as the time of year it was held is inconsistent with the PCs, and

seasonal agricultural labour migration is commonplace in Botswana. Therefore, the methodology of the 10 Sector Database (10SD) is repeated and the 2006 benchmark estimate for agriculture is taken from the estimates of McCaig et al. (2015). From 2009 to 2014, the NSI released annual labour statistics reports, these covered only the formal sector, however in the absence of better data these are used to provide trends for extrapolation and interpolation between benchmark sectoral levels during this time-span. From 2014, no primary labour force statistics are available of any kind, and productivity-based estimates are used to extrapolate the trend for the final three years; these three years of the data should therefore be treated with caution. From 1990-2008, Establishment Survey data has been retained and is available from the ILO, trends from these are used for interpolation during this time-span, with the exception of 2006-08 when these ES figures are implausible, and ILO modelled estimates are therefore substituted. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. All data from the Botswana NSI, and all secondary data, is always and everywhere in ISIC.3 sectoral classification. However, a sizeable sample of microdata is available from IPUMS for each of the PC years which allows for sectoral decomposition into ISIC.4, which is therefore done in each of the benchmark years. No microdata accompanies the 2006 LFS, so these disaggregation shares are taken as the averages of the 2001 and 2011 shares. Outside of benchmark years, these disaggregated sectors are assumed to grow at the rate of their ISIC 3. Parent sectors. For 1990–96, some sectors are missing from the Establishment Surveys; therefore Financial Services and Real Estate Services sectors are both assumed to have grown at the rate of other services during this period.

Value added

Period	Sectoral data sources
1994–2018	2018 NSI 'National Statistical Accounts Bulletins' Current Prices UN Official Country Data (UN OCD)
1994–2018	2018 NSI 'National Statistical Accounts Bulletins' Constant Prices UN Official Country Data (UN OCD)
1990–94	UN Official Country Data (UN OCD)

- Current price data in levels were available from the NSI for the period 1994–2018 in ISIC.3. These were split into ISIC.4 using sub-shares from UN official country data.
- Constant price data in levels were available from the NSI for the period 1994–2018 in ISIC.3. These were rebased to 2015 prices and split into ISIC.4 using sub-shares from UN official country data. These were then used to construct the price indices.
- Both series were backwards extrapolated for the period 1990–94 using trends from UN official country data.

Botswana NSI has published official sector-disaggregated GDP data from 1994 in both current and constant prices. Please note that some slight NSI revisions means this data differs slightly from the 10SD, which is from the same source, and other secondary sources. Constant price data from the NSI is in 2006 prices and was therefore rebased to 2015 prices. All data from the Botswana

NSI is always and everywhere in ISIC.3 sectoral classification and therefore sectoral decomposition into ISIC.4 is performed using the UN Official Country Data, which is more disaggregated, although some sub sectors can be calculated only as a residual. The exception is Real Estate, which is not separated from Financial and Business Services in any data source. Therefore, the share of Financial and Business Services which is Real Estate assumed to be the same as in Mauritius, and these shares are applied to the aggregate sectors. The UN Official Country Data is used for the period 1990–94 for which NSI data is not available.

Brazil

Employment

Period	Sectoral data sources
2010	Population census (in ISIC rev. 4 classification)
2011–18	Trend from Pesquisa Nacional por Amostra de Domicílios (PNAD)
1990–2009	Trend from GGDC 10SD

^{*} Population census includes persons employed 10+.

Value added

Period	Sectoral data sources
2018–19	Trend from Trimestral national account series (current and constant prices; ISIC rev 4)
2010–17	National accounts series (current and constant prices; ISIC rev 4)
2000–09	Trend from national accounts series (current and constant prices; Classificação Nacional de Atividades Econômicas)
1990–99	Trend from GGDC 10SD

^{*} For 2011, trend from the Pesquisa Nacional por Amostra de Domicílios (PNAD) is used. For 2012–18 trend from Pesquisa Nacional por Amostra de Domicílios – Continua is used. An overlapping year is available. Data is is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Burkina Faso

Employment

Period	Sectoral data sources
2014–18	Trends from ILO Modelled Estimates
1990–2018	Trend in EAP in Agriculture
2018	2018 Labour Force Survey
2014	2014 Multisector Survey
1990–2014	EASD Based Trends
2010	2010 Labour Force Survey
2006	2006 Population Census
2003	2003 Labour Force Survey
1994	1994 Multisector Survey

- Benchmark levels from 2018, 2014, 2010, 2003, and 1994 LFS as well as 2006 PC.
- Agriculture Extra- and Interpolations use EAP in Agriculture Trends.
- Post-2014, all other sectors interpolation uses trends from ILO Modelled Estimates.
- Pre-2014, all other sectors extra- and interpolations use trends from Expanded African Sector Database (EASD).
- 2018 and 2014 LFS benchmarks do not apply for agriculture since conducted in dry season

The NSI reports a large range of different potential sectoral employment benchmarks. These include the 2018 LFS ('Enquête Régionale Intégrée sur l'Emploi et le Secteur Informel'), the 2014 and 1994 Multisector Surveys ('Enquête Multisectorielle Continue'), the 2006 PC as well as the LFS for 2010, 2007, 2005, and 2003 reported in the INSD Annuaire Statistique 2017. The earlier PC for 1996 is available as a IPUMS sub-sample and was only used for splitting the pre-2006 benchmark values for the aggregate ISIC 3 sectors 'Transport and Communication' as well as 'Real Estate and Business Services' into the respectively more disaggregated ISIC 4 sectors. Similar transformations after 2006 have been conducted based on the 2018 sub-sector shares. From the available potential benchmark levels, 2018, 2014, 2010, 2006, 2003, and 1994 could be used consistently over time. The 2007 and 2005 LFS levels had to be dropped due to inconsistencies with the preferred 2006 PC.

Pre-2014, all sectors are backwards extrapolated using trends from the Expanded Africa Transformation Database (EASD)—as the EASD is in ISIC.3, the ISIC.4 sub-sectors are assumed to grow at the same rate as their ISIC.3 parent sectors in between benchmark years. The exception

is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. Since both the 2014 and 2018 LFS have been conducted in the dry season (La baisse de la proportion des actifs occupés dans le secteur agricole en 2014 comparativement aux années précédentes est liée en partie à la période de collecte des données qui s'est déroulée en saison sèche.' – INSD Annuaire Statistique 2017, p.118), both benchmark levels were exclusively used for non-agricultural employment levels only. Due to the very extreme drops in the EAP in agriculture and ILO agricultural employment shares from above 80 percent in 2006 to less than 30 percent in 2014 (relatively constant afterwards), it seems that both estimates are substantially influenced by this change in the underlying season and thus reproduce this artificial decline in agricultural employment. Furthermore, both series seem to not significantly rely on the (harvest season) 2010 and (dry season) 2018 benchmarks. By using the former, the ETD employment series largely reduces the (2006-10) fall in agricultural employment suggested by the EAP in agriculture. In an alternative specification we have extrapolated using an estimate for the economically active population in agriculture from the AFDB Socio Economic Database (as done in the EASD). However, the large period of eight years of the extrapolation results in an unrealistic overshooting of the total employment number and the labour force participation rate. Therefore, the previous specification (2010 benchmark and EAP in agriculture extrapolation with reduced drop in agricultural employment) is considered preferable.

Value added

Period	Sectoral data sources
2018	Sectoral Current and Constant Price VA from NSI 2018 Accounts, SNA 2008
1999–2017	Sectoral Current and Constant Price VA from NSI Publication, SNA 2008
1990–99	Trends from EASD

- 2018 Current and Constant Sectoral VA comes directly from NSI 2018 National Accounts.
- 1999–2017 Current and Constant Sectoral VA comes directly from NSI statistical publication revising VA to SNA2008.
- Pre-1999 backwards extrapolation uses trends from Expanded Africa Sector Database (EASD)
- NSI Constant Price levels aggregated to 12 ISIC.4 sectors from deeper disaggregation by creating aggregate-sector price indices based on weighted averages.

he Burkina Faso NSI has recently switched to System of National Accounts revision 2008 (SNA2008) and released a publication retrospectively applying this revision back to 1999. The provides the constant and current price VA levels for the period 1999–2017, where it is noted that the entries post-2016 are provisional, but have not yet been re-revised. As 'Public Administration' and 'Other Services' are not separated in this report, the shares required to separate them are applied from shares reported in a NSI report of the 2018 National Accounts. The figures were forwards extrapolated to 2018 using a trend from the NSI report of the 2018 National Accounts. The current price sector VA levels are used directly and the constant price VA levels are combined

into the 12 broader ISIC.4 sectors by creating weighted average price indices from the sub-sectors based on their current price VA weights, for example to combine 'Trade Services' with 'Hotels and Restaurants'. Pre-1999, the current and constant price sectoral VA was backwards extrapolated using trends from the Expanded African Sector Database (EASD), whereby the ISIC.4 sub-sectors were assumed to follow the same trends as their ISIC.3 parent sectors. The revision to SNA2008 (from SNA1993) leads to figures and trends which are somewhat different from the EASD and other older sources. The biggest revision comes in the Mining Sector—it seems that prior to the SNA revision, the NSI reported current price Mining VA as the constant price sector VA, this is no longer the case and therefore represents an improvement—however, the mining sector VA series remains very volatile with some large jumps—these may represent genuine swings in mining activity or be related to conflicts in the country, or may be NSI errors.

Cambodia

Employment

Period	Sectoral data sources
2017–18	Productivity-Based Trend
1990–2017	Trend in EAP in Agriculture
2013–16	Household Socio-Economic Surveys
1997–2016	Trends from Self-Constructed Series
2007–11	Household Socio-Economic Surveys
2008	2008 Population Census
2001	2001 Labour Force Survey
2000	2000 Labour Force Survey
1998	1998 Population Census
1997	1997 Household Survey
1993–97	2006 NSI Statistical Yearbook
1990–93	Productivity-Based Trends

- Benchmark Levels from 2008 and 1998 Population Censuses.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- 2017 all other sectors forward extrapolated using Productivity-Based Trends.

- 1997–2016, all other sectors interpolation uses trends from a self-constructed series. This series is built from sectoral employment datapoints from 2013–16 Household Surveys, 2007–11 Household Surveys, 1997 Household Survey and Labour Force Surveys in 2001 and 2000, with linear interpolation between datapoints.
- 1993–97, interpolation uses trends from retrospective figures published in 2006 Statistical Yearbook.
- Pre-1993 backwards extrapolation uses Productivity-Based Trends.
- Pre-2007, split from ISIC.3 to ISIC.4 assumes constant sub-sector shares.

Cambodia performs a population census every 10 years—the most recent was in 2018, but unfortunately the census report has not yet been released. The 2008 and 1998 Population Censuses form the key sectoral employment benchmark years. Due to high frequency Household Socio-Economic Surveys which were released annually between 2013-16 and 2007-11, interpolations between benchmark years after 1997 are done using trends from a self-constructed series based on datapoints from these HS and also from Labour Force Surveys in 2001 and 2002 and an additional HS in 1997. This series takes sectoral shares the surveys as datapoints (12 different years in total) and linearly interpolates between them. These surveys are not considered reliable enough to use for benchmark levels, so they are used instead to create a separate series, the trends from which are used to interpolate between the PC benchmarks. Between 1993-97, sectoral employment is interpolated using trends from retrospective sectoral employment data published in the 2006 Statistical Yearbook from the NSI. Pre-1993, backwards extrapolation is done using trends in labour productivity. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. Post-2007, all original data is reported in ISIC.4, but pre-2007 it is always in ISIC.4, therefore the ISIC.3 to ISIC.4 split assumes sub-sectors grow at the same rate as their parent sectors prior to 2007.

Value added

Period	Sectoral data sources
1990–2018	Sectoral Current and Constant Price VA from UN OCD

- Current and constant price levels and price indices of sectoral VA from UN Official Country Data.
- Checked against VA data from NSI and almost identical.
- Current price VA ISIC.3 to ISIC.4 split uses sub-sector employment shares of parent sector.
- Constant price VA ISIC.3 to ISIC.4 split uses the parent sector price index for each subsector.

Cambodian sectoral VA in current and constant prices, alongside price indices, are available for the entire time period from the UN Official Country Data, and these are used as the sectoral VA levels. These are checked for accuracy against figures from the NSI and are almost identical in the years when NSI data is available—therefore, the UN OCD data is preferred as it covers the entire time period and the constant price series and price indices are already based to 2015 (as opposed to the NSI data, which is based to 2009). The sectoral VA data is always and everywhere reported

in ISIC.3 classification, therefore the split from ISIC.3 to ISIC.4 of the current price data is performed by using the employment shares of the ISIC.4 sub-sectors in their ISIC.3 parent sectors; for example, the share of 'Transport and Communication' current price VA which is 'Transport' is set equal to the share of 'Transport and Communication' employment which is 'Transport', etc. The constant price ISIC.3 to ISIC.4 split is performed assuming ISIC.4 sub-sectors to share the same price index as their ISIC.3 parent sectors, and applying these price indices to the current price VA.

Cameroon

Employment

Period	Sectoral data sources
2014–18	Productivity-Based Trends
1990–2017	Agriculture Employment Levels from EAP in agriculture
1991–2014	ILO Modelled Estimates Trends
1986–91	Trends from EASD
2014	2014 Household Survey
2007	2007 Household Survey, Broad Sector Shares from 2007 Labour Report
2005	2005 Population Census, IPUMS Microdata
2001	2001 Household Survey
1986	1986 Household Survey

- Benchmark Levels in 2014, 2007, 2001, and (out of sample) 1986 from Household Surveys and in 2005 from PC.
- 2007 Household Survey disaggregated totals normalized to broad 'three-sector' aggregates from 2007 Labour Report.
- All Agriculture Employment Levels from EAP in Agriculture.
- From 2014, all other sectors Extra- and Inter-polations use Productivity-Based Trends.
- From 1991-2014, all other sectors Extra- and Inter-polations use Trends from ILO Modelled Estimates.
- From 1986-1991, all other sectors Extra- and Inter-polations use Trends from Expanded African Sector Database (EASD). Figures are reported only from 1990, however the

interpolation was done between 1986 and 2001 to incorporate information from the 1986 HS.

- 2005 PC Benchmarks split to ISIC.4 using IPUMS microdata.
- 2007, 2001, and 1986 benchmark ISIC.3 to ISIC.4 splits assume constant sub-sectors from the 2005 split.

Cameroon held only one population census within the sample period, in 2005. Other sectoral employment benchmark years are 2014, 2007, 2001, and 1986 from Household Survey data retained by the ILO. The levels from the 2007 Household Survey were normalized to match broad sector aggregates ('Primary', 'Secondary', and 'Tertiary') from a 2007 Labour Report, as the latter is believed to be more comprehensive. 1986 is outside of the period covered by this database, and the figures are presented only from 1990 onwards, however this benchmark was still used due to a lack of any quality/reliable sources of benchmark data in the 1990s—the unsatisfactory alternative would have been an 11-year backwards extrapolation from 2001. The 2005 PC employs non-standard sectoral classification similar to ISIC.3, however a sizeable sample of microdata is available from IPUMS for 2005 which allows for clean sectoral decomposition into ISIC.4. The 2014 HS is sufficiently disaggregated that it can also be cleanly reassembled into ISIC.4. The 2007, 2001 and 1986 HS levels cannot be disaggregated beyond ISIC.3, and therefore the split to ISIC.4 in these years uses the 2005 sub-sector shares. The sectoral employment figures are forwardsextrapolated from 2014 using trends from sectoral productivity-based estimates, as no more detailed information is available. Between 1991-2012, interpolations are done using ILO modelled estimates. Between 1986 and 1991, the sectoral employment levels are interpolated using trends from the Expanded African Sector Database (EASD). The exception is Agriculture, for which EAP in agriculture are used as levels for Agricultural Employment Throughout. This is because Agriculture employment appears to be systematically undercounted in the primary sources. Note that these final sectoral employment figures differ from those in the EASD in two major ways. First, it was possible to include the figures for the Government Services sector which is missing from the EASD by use of the 2014 HS data and a ratio with the Transport Services sector calculated from the 2005 IPUMS microdata—however, the implication of this is that from 2005 backwards, the ratio between Transport Services and Government Services remains constant. Second, the Agriculture sector data follows a very different pattern from that in the EASD reflecting more recently available benchmarks and information—however, this new pattern much more closely matches that in the ILO figures and the broad sector aggregates from the NSI and therefore would seem to be accurate.

Value added

Period	Sectoral data sources
2011–18	Sectoral Current and Constant Price VA from NSI Report. Use SNA 2008.
1993–2011	Trends from UN OCD Current and Constant Price VA.
1990–93	Trends from EASD

• 2011–18 Current and Constant Sectoral VA comes directly from NSI Report.

- Value added was recently revised from SNA1993 to SNA2008, hence VA totals are lower than EASD and other earlier data sources.
- 1993–2011, current and constant price VA is extrapolated backwards using trends from the UN OCD figures, in order to keep the full series in SNA 2008.
- Pre-1993, current and constant price VA is extrapolated backwards using trends from the Expanded African Sector Database (EASD), in order to keep the full series in SNA 2008. These figures are in ISIC.3 and are therefore split to ISIC.4 assuming constant 1993 shares.
- Current Price VA rebased from 2005 to 2015 CFA.
- All annual totals checked for accuracy against those from NSI.

The Cameroon NSI recently switched from the 1993 to the 2008 System of National Accounts which resulted in a downward revision of GDP growth rate in recent years. The 2008 SNA sectoral current and constant VA figures are available in official reports from the NSI for the period 2011 and 2018, and these are used directly as sectoral VA levels for this period. As the constant price series was in 2005 prices, this was rebased to be in 2015 prices. To retain consistency with the 2008 SNA, these figures were then backwards extrapolated to 1993 using trends from the UN OCD sectoral VA figures (some levels of which are still in SNA 1993) and from 1990–93 using trends from the Expanded African Sector Database (EASD). As the EASD is in ISIC.3, these last three years of backwards extrapolation assume constant sub-sector shares from 1993 backwards in order to make the ISIC.4 split. Note that, due to the SNA 2008 revision which is applied consistently to the entire time period using this extrapolation method, the sectoral VA totals are a little lower than in the EASD and some other older data-sources—this reflects the most up-to-date NSI estimates. The total VA sums in each year were compared with the totals from the NSI, which provides annual figures for GDP net of taxes and subsidies in SNA 2008 for the entire time period, and are extremely accurate.

Chile

Employment

Period	Sectoral data sources
2017	Population census (in ISIC rev. 4 classification; persons employed 15+)
2012–16; 2018	Trend from the Encuesta de Caracterización Socioeconómica Nacional (CASEN)
1990–2011	Trend from GGDC 10SD

^{*} For 2018 and 2012–16, the trend from the Encuesta de Caracterización Socioeconómica is used. Overlapping years are available. Data is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Value added

Period	Sectoral data sources
2013–19	Trimestral National Accounts (ISIC rev 4 classification; current and constant prices)
1996–2012	Historical National Accounts series (ISIC rev 4 classification; current and constant prices)
1990–95	Trend from GGDC 10SD

^{*} National accounts data for 1996–2012 and 2013–19 obtained from the Central Bank of Chile (accessed June 2020).

China

Employment

Period	Sectoral data sources
1990–2018	China Statistical Yearbooks: Employed Persons by three strata of industry.
2003–18	China Statistical Yearbooks: Employed Persons in Urban Units by sector.
2010	2010 Population Census
1990–2002	China Statistical Yearbook 2005: Employed Persons by Sector
2000	2000 Population Census

- Benchmark levels in 2000 and 2010 calculated by applying population census *shares* to statistical yearbook broad-category *levels*.
- 2003–18 inter- and extra-polations use trends from statistical yearbook sectoral employment in urban units data.
- 2002 extrapolated backwards from 2003 assuming each sub-sector grew at rate of broad aggregate parent industry.
- Pre-2002 inter- and extra-polations use trends from employment persons per sector data available in the 2005 edition of the statistical yearbook.

China holds population censuses every decade, typically available one or two years after the census year. 2000 and 2010 censuses provide benchmark years in terms of sectoral shares. Annual

employment levels are available from the NSI in the China Statistical Yearbooks, but for the much of the sample period (from 2002) these are only in very broad sectoral classifications of three aggregate sectors: 'Primary', 'Secondary', and 'Tertiary'. Bosworth and Collins (2008) however argue that the Statistical Yearbooks provide accurate employment data for China and that the overall employment levels are more accurate than then Population Censuses. Therefore, the procedure for generating the 2000 and 2010 sectoral employment benchmark levels in ISIC.4 is to apply the population census *shares* to the three Statistical Yearbook broad category *levels*.

Between 1990–2002, detailed sectoral employment data are available from the 2005 publication of the statistical yearbook, these trends are therefore used for all extra- and inter-polations until 2001. For the period 2003–18, interpolation and forwards extrapolation were done using trends from the only available primary sectoral employment data, which was sectoral employment in urban units, again from the statistical yearbooks. Sectoral employment for 2002, the year between the two series, was extrapolated backwards from the 2003 employment in urban units assuming each sector grew at the rate of its parent industry. Finally, in each year sectoral employment levels were normalized so that the broad aggregate totals matched those in the three-sector annual statistical yearbook data, considered the most accurate for overall levels.

Value added

Period	Sectoral data sources
2018	China Statistical Yearbook 2019: Sectoral GDP at current prices
2004–17	China Statistical Yearbooks (various releases): Current Price VA Data
1990–2004	CIP Database: Current Price VA Data
1990–2017	UNSD National Accounts Official Country Data: Constant Price VA Data
2017–18	China Statistical Yearbook 2019: Sectoral GDP at constant prices

- 2004–17 sectoral VA current price levels from Chinese Statistical Yearbooks.
- Extrapolation of sectoral VA current price for 2018 based on more aggregated information on sectoral GDP provided in Chinese Statistical Yearbook 2019.
- Pre-2004 backwards extrapolation of sectoral VA in current prices uses trends from VA data manually constructed from CIP database.
- 1990–2010 sectoral VA constant price levels calculated by applying a manually constructed price index from the CIP database to the current prices. Rebased to 2015.
- 2010–16 forwards extrapolation of sectoral VA in constant prices uses trends from Chinese Statistical Yearbook broader aggregate data, with sub-sectors assumed to have same price indices as parent sectors.

Sectoral VA data in current prices was available in the Chinese Statistical Yearbooks for the entire sample period, however it is only sufficiently disaggregated to allow for ISIC.4 classification from

2004 onwards, so this data provides the sectoral VA levels from 2004. The latest release of the statistical yearbook does not yet contain information on sectoral VA for 2018. Thus, growth rates from a more aggregated series on sectoral GDP have been used for extrapolation. Prior to 2004, it was possible to construct the ISIC.4 sector disaggregated current price VA data from the China Industrial Productivity (CIP) Database by subtracting industry intermediate inputs from industry total outputs and then collating the industries into the ISIC.4 sectors. These figures then provided the trends for the extrapolation backwards from 2004.

Constant price data was less readily available in the yearbooks, since the sectoral disaggregation was not sufficient for any of the years. Therefore, the calculation of the price deflators is based on the National Accounts Official Country Data of the UN Statistics Division (UNSD). UNSD does not provide price deflators for 2018 (and for some sectors also not for 2017). For extrapolation, information on sectoral GDP at constant prices (base year 2015) has been retrieved from the China Statistical Yearbook 2019. Since this GDP data is provided in more aggregated sectors some assumptions had to be made: Mining, manufacturing and utilities as well as business, government and other services had to be assumed to follow the same trends over time.

Colombia

Employment

Period	Sectoral data sources
2010–18	Employment matrices
1990–2009	Trend from GGDC 10SD

^{*} For 2010–18, employment matrices are used that directly underlie the national accounts. These are obtained from the Statistical Office (DANE, Cuentas Nacionales; accessed June 2020).

Value added

Period	Sectoral data sources
2005–19	National accounts series (current and constant prices; ISIC rev 4)
1990–2004	Trend from GGDC 10SD

^{*} Source 2005–19: DANE, Cuentas Nacionales, series actualized on 15 May 2020 (accessed June 2020).

Costa Rica

Employment

Period	Sectoral data sources
2011	Population census (in ISIC rev. 4 classification; persons employed 15+)
2012–19	Trend from the Encuesta Nacional de Hogares (ENAHO)
1990–2010	Trend from GGDC 10SD

^{*} For 2012–19, the trend from the Encuesta Nacional de Hogares (ENAHO) is used. Overlapping year is available. Data is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Period	Sectoral data sources
1991–2019	National Accounts (ISIC rev 4; current and constant prices)
1990	Trend from GGDC 10 SD

^{*} National accounts data obtained from the Central Bank of Costa Rica (accessed June 2020).

Ecuador

Employment

Period	Sectoral data sources
1950, 1962, 1982, 1990, 2001, 2010	Population census
2011–18	Trend from Encuesta de Empleo, Desempleo y Subempleo (ENEMDU)
2002–09	Interpolation between 2001 and 2010 population census based on sectoral trends from Encuesta de Empleo, Desempleo y Subempleo (ENEMDU)
1991–2000	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1990 and 2001.Agriculture interpolated using trend from agricultural employment series.
1983–89	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1982 and 1990.Agriculture interpolated using trend from agricultural employment series.
1963–81	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1962 and 1982. Agriculture interpolated using trend from agricultural employment series.
1951–61	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1950 and 1962.

^{*} Source 1950 census: Labor Law and Practice in Ecuador. US Department of Labor. BLS. Original source: Banco Central de Ecuador, Memoria del Gerente General Correspondiente el Ejercito de 1960 (Quito, 1961), p.89.

^{*} Source 1962, 1982, 1990, 2001, 2010: tabulations using iPums International (Minnesota Population Center, 2019)

^{*} For 2012–19, the trend from the Encuesta de Empleo, Desempleo y Subempleo (ENEMDU) is used. Overlapping year is available. Data is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the

unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

* For 2002–09, sectoral employment trends are interpolated using the Encuesta de Empleo, Desempleo y Subempleo (ENEMDU). Data is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Period	Sectoral data sources
2007–18	National Accounts (ISIC rev 4, current and constant prices)
1965–2006	Trend from Historical National Accounts (ISIC rev 4, current and constant prices)
1950–64	Trend from Series historicas del crecimiento de america Latina (Cuadernos de la CEPAL) for Ecuador. Constant prices only

^{*} Note: values in millions of US dollars. Ecuador dollarized in 2000.

^{*} Source national accounts data 1965–2018: Central Bank of Ecuador (accessed June 2020)

Egypt

Employment

Period	Sectoral data sources
2018	Egyptian Statistical Yearbook, 2018 sectoral employment
2006–18	Egyptian Statistical Yearbooks, Total Employment
2006–18	Productivity-Based Trends
2006–18	Trend in EAP in Agriculture
2012	Egyptian Statistical Yearbook, 2012 sectoral employment.
2006	2006 Population Census
1990–2006	10SD Based Trends

- Benchmark Sectoral Employment Levels in 2018 and 2012 from Statistical Yearbook and 2006 from Population Census.
- From 2006–18, total employment minus agriculture uses trends from 'Annual Labour Force Status' figures in Statistical Yearbooks.
- From 2006–18, non-Agricultural Sector interpolations use Productivity-Based Trends and then normalized to the Total Employment figure.
- From 2006–18, Agricultural Sector interpolations use EAP in Agriculture Trends and are not normalized.
- Pre-2006 backwards extrapolation uses trends from the 10 Sector Database (10SD).
- Pre-2006 ISIC.4 sub-sectors assumed to follow same trends as ISIC.3 parent sectors.
- Large jump in Mining VA between 1990 and 1991 due to Gulf War and effect on oil prices.

Egypt conducts a population census (PC) every ten years, the most recent in 2017. However, the report on the 2017 PC has still not been released, and detailed data from the 1996 PC is no longer publicly available. The main benchmark for the employment series is therefore the sectoral employment levels reported in detail in the 2006 PC. The Egyptian NSI also publishes estimates of sectoral employment in the Statistical Yearbook on Labor Force, with the 2013 and 2019 releases providing sectoral employment data for 2012 and 2018 - these serve as additional benchmarks. Between 2006-2018, interpolation of *total* employment between the benchmark years is based on trends from the annual estimates of labour force status from the Statistical Yearbooks, with the exception of Agriculture, which is interpolated in this period using trends in economic active population in agriculture. Sectoral employment of all other sectors between 2006 and 2018 is interpolated using trends in labour productivity and then normalized to the total employment resulting from the Statistical Yearbook trends. Pre-2006, backwards extrapolation uses trends from

the 10-Sector Database (10SD). As the 10SD is in ISIC.3, it is assumed that prior to 2006, ISIC.4 sub-sectors follow the same trends as their ISIC.4 parent sectors. The large jump in Mining VA (current and constant price) between 1990 and 1991 is genuine and is due to the effect of the Gulf War on world oil prices (Hamilton 2013).

Value added

Period	Sectoral data sources
1990–2018	Sectoral Current Price VA from Ministry National Accounts
1990–2003	Sectoral Current Price VA from UN OCD
2007–18	Sectoral Current and Constant Price 'GDP at Factor Cost' from Central Bank of Egypt
1990–2007	Broad Aggregate Sector Current and Constant Price VA from UN OCD

- 1990–2018 sectoral current price VA levels from 'Ministry of Planning and Economic Development' National Account Data.
- Non-standard sectoral classifications assembled to ISIC.4 by using 'private' and 'public' sectoral VA splits in National Accounts and, pre-2003, using sectoral current price VA from the UN Official Country Data (OCD).
- Pre-2002, the current price VA split between Mining and Manufacturing sectors is assumed to be constant.
- 2007–18 sectoral constant price VA data from Central Bank of Egypt.
- Prior-2007, backwards extrapolation of constant price value added is uses trends from the UN OCD Estimates of Main Aggregates, where sub-sectors follow parent sector trends.

The Egyptian Ministry of Planning and Economic Development has published an annual series of sectoral GDP in current prices from 1987 onwards. For all years and sectors, private and public value added is reported separately. Unfortunately, the definition of sectors changed several times between 1990 and 2018. Other than between 2003-11, private insurance is not separated from social insurance, and they are therefore split using the private and public VA shares, with the former placed in 'Financial Services' and the latter in 'Public Administration'. Pre-2003, the 'Mining' and 'Manufacturing' sectors are not separately reported and are instead mixed into two other sectors: 'Industry and Mining', and 'Petroleum and Petroleum Products'. The relative sizes of the 'Mining' and 'Manufacturing' sectors are therefore taken from UN Official Country Data (OCD) and used to split the value added provided by the ministry into clean ISIC.4 classification. As the UN data does not go earlier than 2002, a constant sub-sector split is assumed prior to this year. Prior to 2003, 'Public Administration' and 'Other Services' are not separately reported in the Ministry data, therefore the share which is public sector is taken as 'Public Administration' and the share which is private sector is taken as 'Other Services'. The Central Bank of Egypt provides 'Sectoral GDP at Factor Cost' data in both constant and current prices from 2007. This data is used for calculating sectoral price deflators, which are rebased to 2015. As there is no official

country data available for sectoral constant value added before 2007, price deflators have to be extrapolated backwards. This is done using the National Accounts Estimates of Main Aggregates provided by the UN OCD. The current and constant value added of the Main Aggregates are reported in broad sectors, common trends are therefore assumed for the ISIC.4 sub-sectors—this is akin to assuming a constant price index across these (relatively small) sub-sectors.

Ethiopia

Employment

Period	Sectoral data sources
2008–18	Trends from ILO Modelled Estimates
2013	NSI Labour Force Survey ISIC 4, except for agriculture and manufacturing
2011–18	Manufacturing employment using combination of LMSM, SSI, and LSMS-ISA
2008–18	Trend in EAP in Agriculture
2007	2007 Population Census
	2005 Labour Force Survey ISIC 3.1
1990–2006	10SD Based Trends

- Benchmark level for 2013 from the National Labour Force Survey (LFS) in ISIC 4.
- Benchmark level for 2007 from the total employment in 2007 Population Census, disaggregated by using sectoral shares in 2005 LFS in ISIC 3.1 format.
- From 2008 to 2018, all Agriculture extra- and interpolations use EAP in agriculture trends, except for 2013.
- From 2008 to 2018, all other sectors interpolations use ILO modelled estimates.
- Pre-2007, all sectors are extrapolated backward by using 10 Sector Database Trends.
- Pre-2007, ISIC 3 to ISIC 4 split assumes parent sector trends.

Ethiopia conducted three population and housing censuses (PHC) in 1984, 1994, and 2007. In addition, the National Statistical Office (NSI) organized Labour Force Surveys (LFS) in 1999, 2005, and 2013. Therefore, 2013 LFS and 2007 PHC are used for benchmark sectoral employment levels. Whilst the 2013 LFS is in ISIC Rev. 4 format, the 2007 PHC only provides total employment, which is disaggregated by using 2005 LFS in ISIC Rev. 3 format and mapped to ISIC 4 by using 2013 LFS shares for transport, communication and business, and real estate services. Therefore, the 2005 sub-sector employment shares are applied to the 2007 total employment level. From 2008 to 2012, as there is no official sectoral employment data source available, therefore the ILO modelled estimates growth trend has been used for interpolation. From 2014 onwards, all

sectoral employment is forwards extrapolated using trends from the ILO Modelled Estimates. The exception is the agriculture sector, which is at all times interpolated and extrapolated by using trends from the economically active population in agriculture. For the pre-2007 period, all sectors are extrapolated backwards by using trends from the 10 Sector Database (10 SD). As the 10SD is in ISIC Rev. 3 sectoral classification, the trends of parent sectors were applied to their sub-sectors during their extrapolation procedure. Finally, the LFS employment age classification is 10+, unfortunately there is no detailed data to derive the 15+ levels.

Manufacturing employment is estimated separately for 2011–18 and levels are extrapolated backwards to 1990 using the 10SD. The trend in manufacturing employment between the 2005 and 2013 NLFS suggests manufacturing employment growth of 2.7 per cent annually, which is lower than population growth rate of 3.1 per cent and total employment growth rate of 3.8 per cent in NLFS for this period. Furthermore, this growth rate conflicts with other sources, which indicate higher growth rates in manufacturing employment in recent years. For example, using data of SSI for 2006 and 2014, the annual growth rate is 14.6 per cent. UEU data for 2010 and 2014 gives us an annual growth rate of 10.3 per cent, and LMSM (which is a small component of total manufacturing employment) data for 2010–15 gives us an annual growth rate of 15.3 per cent.

Instead, we use alternative sources following Diao et al. (2020). Namely we combine the manufacturing workers reported in the Large and Medium-Scale Manufacturing (LMSM) Census (including temporary workers, 2011–17), the non-food manufacturing workers from the Small Scale Industry (SSI) survey (excluding seasonal workers, rounds 2008, and 2014), and the urban and rural food manufacturing workers reported in the Living Standards Measurement Study - Integrated Surveys on Agriculture (2012 and 2016).

Period	Sectoral data sources
1997–2018	UN OCD – Current Prices ISIC 3
2016–18	UN OCD - Constant Prices ISIC 3 (2016 base year)
2000–16	UN OCD - Constant Prices ISIC 3 (2011 base year)
1997–2006	UN OCD - Constant Prices ISIC 3 (2000 base year)
1990–2000	10 SD Based Trends

- 2000–18 current value added levels in ISIC 3 from the UN OCD are used as benchmark.
- Parent sectors in ISIC 3 are disaggregated by using Kenya's ISIC 4 level shares for transportation and storage, communication, business, and real estate services.
- 2000–18 constant value added levels are also retrieved from the UN OCD with three different base years: 2000, 2011, and 2016.
- Pre-2000 backwards extrapolated using 10SD trends, ISIC 3 to ISIC4 split assumes parent sector trends.

 Price indices are calculated by using sub-sectoral shares for agriculture, trade services, government services, and other services.

The Ministry of Finance and Economic Development is responsible for compiling the national accounts in Ethiopia, however, the detailed data is not accessible online. UN OCD provides gross value added by industries at current and constant prices from 1997 to 2018 in line with the SNA 93 methodology and in ISIC Rev. 3 format. From 2000 to 2018, the gross value added at current prices from UN OCD are used as benchmark values since the data before 2000 do not tally with the new series. For the current value added series, parent sectors for transportation and storage, communication, business and real estate services are disaggregated by using neighbour country Kenya's ISIC 4 level shares. Sectoral price indices are calculated by using UN OCD current and constant value added figures, and the base year is converted to 2015. For the sectors which the detailed sub-sectoral level data is available (i.e. agriculture, trade services, government services, and other services), the price indices are weighted by sub-sectoral shares. For the price indices of the parent sectors in ISIC 3, the adjusted current value added series (disaggregated by using Kenya's shares) are divided by parent sector constant value added series to create ISIC 4 level price indices. Pre-2000 sectoral current value added series and price indices are extrapolated backwards using trends from the 10 Sector Database (10SD), where ISIC 4 sub-sectors were assumed to grow at the same rate as their ISIC 3 parent sectors. The constant value added series are calculated by using official current value added series and estimated price indices for all sectors. Total current and constant value added data and price deflators are compared with IMF World Economic Outlook figures to check the consistency.

Ghana

Employment

Period	Sectoral data sources
2000–17	Productivity-Based Trends
1990–2017	Trend in EAP in Agriculture
2015	2015 NSI Labour Force Survey
2010	2010 Population Census
2000	2000 Population Census
1990–2000	10SD Based Trends

- Benchmark Levels in 2015 (from LFS), 2010 and 2000 (PC)
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends
- From 2000, all other sectors Extra- and Inter-polations use Productivity-Based Trends
- Pre-2000, all other sectors Extra- and Inter-polations use 10 Sector Database Trends (so as to incorporate information from 1984 census)
- Pre-2010, ISIC 3 to ISIC4 split assumes constant sub-sector shares

Ghana holds population censuses every decade, typically available one or two years after the census year. 2000 and 2010 censuses provide benchmark years, with information from the out-of-sample 1984 census also included by means of backward extrapolation using 10 Sector Database (10SD) trends. A reputable 2015 labour force survey (LFS) provides the final benchmark year for sectoral composition. Sectoral shares are taken from each census and the 2015 LFS and applied to employment totals. An updated report on the 2000 census ensures that the adult employment age categorization is now consistently 15+ across all benchmark sources. In 2000 and 2010, employment totals come directly from the censuses, however for the 2015 LFS survey this would require too much extrapolation. As many secondary sources demonstrate highly implausible total employment trends for Ghana, the employment share of total population is held constant from 2010 onwards and applied to the more plausible total population figures from the Penn World Tables (PWTs). As all data prior to 2010 is only available in ISIC revision 3 categories, the intrasectoral splits of Transport and Communications, and Financial Intermediation and Real Estate, are held constant at their 2010 shares. Backward extrapolation from 2000 to 1990 is done using sectoral trends from the 10SD so as to preserve information from earlier benchmark years, interpolation between benchmark years and extrapolation from 2015 are done using sectoral productivity-based estimates, as no more detailed information is available. The exception is Agriculture, for which numbers of Economically Active Population in Agriculture trends are used for all extrapolation and interpolation outside benchmark years.

Value added

Period	Sectoral data sources
2006–17	UN Official Country Data (UN OCD) Current and Constant Prices
1990–2006	UN OCD Current and Constant Prices

- Current value added levels and price indices from UN OCD
- Value added was revised in 2018 (from SNA1993 to SNA2008), hence VA is much higher than in 10SD and other earlier data sources
- SNA2008 is consistently applied for entirety of 1990–2017 by extrapolating back from 2006 (first year of new system) using trends of VA under old system
- Pre-2006, ISIC 3 to ISIC4 split assumes constant sub-sector shares

UN Official Country data is used for current price sectoral value added, and sectoral price indices. This UN data from 2006 onwards follows a System of National Accounts (SNA) revision when Ghana switched from SNA1993 to SNA2008, which resulted in value added increasing dramatically from previous estimates, usually by around 25 per cent—this explains the observed large deviation from the 10SD and other earlier data sources. To maintain consistency in SNA system, pre-2006 sectoral value added is backwards extrapolated using the trends of the SNA1993 figures, but from the 2006 benchmark. Going backwards, the intra-sectoral splits of Transport and Communications, and Financial Intermediation and Real Estate, are held constant at their 2006 shares as all earlier sectoral value added is in strictly ISIC revision 3 categories. Constant price VA is the sectoral current price VA divided by the sectoral price index.

Hong Kong

Employment

Period	Sectoral data sources
1990–2018	Annual Digests of Statistics from NSI. (Biennial releases from 1993)
1990–2018	Trend in EAP in Agriculture

- Annual sectoral levels from NSI Annual Digests of Statistics for entire period.
- Some sectors disentangled using 'persons engaged excluding civil servants' subclassification of these statistical digests.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- Rapid decline in Manufacturing Employment Share from early 1990s is due to relocation of physical manufacturing to Pearl River Delta region in China PCR.

Hong Kong National Statistical Institute (NSI) publishes annual statistical digests which are a compendium of census and other official statistical data. The actual census and by-census years are every 5 years from 2016 backwards. As each edition also includes the data for the previous five years, the biennial editions released each two years from 1993 onwards were used. The exception is Agriculture, for which numbers of Economically Active Population in Agriculture trends are used for all extrapolation and interpolation outside benchmark census years. Intra-sectoral split from ISIC.3 sectors 'Transport and Communication' and 'Financial and Business Services' to ISIC.4 categories performed using shares of 'persons engaged excluding civil servants', as only this data is available at the ISIC.4 level of disaggregation, but these shares are applied to the broader sectoral aggregates of 'total employed persons.' The very small 'Mining and Quarrying' sector shares were also retrieved from this data. The rapid decline in the Manufacturing Employment Share from the early 1990s, which in fact started even before, is genuine and is due to the relocation of manufacturing processes (of firms which remained headquartered in Hong Kong) across the border with China (PRC) to Pearl River Delta cities such as Shenzhen and Guangzhou. This trend is analysed in Sit (1998), which also presents very similar manufacturing employment figures for the early 90s.

Period	Sectoral data sources
2000–18	2018 NSI 'Gross Domestic Product' Publication. Current Prices
1990–2000	Annual Digests of Statistics from NSI. (Biennial releases from 1993). Current Prices
2000–17	'Other Services' Current Prices from Asian Development Bank
2000–13	'Agriculture' and 'Mining and Quarrying' Current Prices from UN Official Country Data (UN OCD)
2000–18	Constant Prices from UN Official Country Data (UN OCD)
2000–17	'Other Services' Constant Prices from Asian Development Bank
1990–2000	Annual Digests of Statistics from NSI. (Biennial releases from 1993). Constant Prices
1990–2000	Constant Price Data from 10SD

- 2000–18 Sectoral Current Price VA Levels from National Accounts
- 1990–2000 Sectoral Current Price VA Trends Backward Extrapolated from NSI Annual Digests of Statistics
- 2000–17 Current Price VA of 'Other Services' sector from ADB key indicators
- 1990–2000 'Other Services' backwards extrapolated using trends of 'Public Administration'
- 2014–18 Current Price VA of 'Agriculture' and 'Mining and Quarrying' extrapolated forwards from 2013 UN Official Country Data levels using parent sector trends.
- 2000–13 Current Price VA Levels of 'Agriculture' and 'Mining and Quarrying' from UN Official Country Data
- 2000–18 Sectoral Constant Price Levels VA from UN Official Country Data
- 1990–2000 Sectoral Constant Price VA backwards extrapolated using Trends from NSI Annual Digests of Statistics
- 2000–17 Constant Price VA of 'Other Services' sector from ADB key indicators
- 1990–2000 'Communication and Business Services' assembled from weighted averages of 10 Sector Database (10SD) sectoral aggregates with weights from UN current prices.

From 2000, Hong Kong NSI published Gross Domestic Product data which is subdivided into the sectoral level—GDP production side figures are used. Real Estate includes 'Ownership of Premises' (imputed rents). Pre-2000, these figures were published in the Annual Digests of Statistics, and these trends were used for backwards extrapolation from the earliest year of the National Account data, 2000, so as to ensure synchronicity. Agriculture and Mining & Quarrying sectors are not separately distinguished in the NSI data, as Mining & Quarrying is an almost negligible activity in Hong Kong, however UN National Accounts data was used to disaggregate them as shares of the total NSI aggregate figures until 2013, and then from 2013 onwards a constant share split is assumed, and they are forwards extrapolated using the parent sector trends. Constant price levels are from the UN national accounts data, as NSI real GDP series' employ chained prices. Agriculture and Mining & Quarrying are split using the current price disaggregation, as no constant price disaggregation can be found, however Mining & Quarrying sector is so small that this should not prove an issue. No 'Other Services' data was available from any NSI or UN source, so the figures from the Asian Development Bank (ADB) are used from 2000-17, pre-2000 it is backwards extrapolated assuming the same trend as the 'Public Administration' sector. 'Communication and Business Services' constant price VA pre-2000 was assembled by applying the current price sub-sectoral shares from the UN to the 10 Sector Database (10SD) aggregate totals in constant prices.

India

Employment

Period	Sectoral data sources	
2016–18	Trend from constant VA Sectoral Data (Constant Productivity Assumption)	
2016–18	Total Employment Trend from Conference Board Total Economy Database	
1990–2016	Sectoral Employment Levels from India-KLEMS Database	

- From 1990–2016, sectoral employment Levels from the India-KLEMS Database.
- From 2016–18, sectoral employment forwards extrapolated using trends of constant price sectoral VA.
- From 2016–18, total employment forwards extrapolated using trends from the Total Economy Database from The Conference Board.
- From 1990–2016, source data is in ISIC.3 and is reassembled into ISIC.4 by reallocating subcategories. The 'Real Estate' Sector has not been disentangled from 'Other Services'.

For the Indian sectoral employment data levels, it was very important to use a data source which is properly inclusive of the informal sector. Unfortunately, this is not the case for the NSI publications, and therefore sectoral employment levels from the India-KLEMS database are preferred from 1990–2016, the final year for which this data is currently available. The forwards extrapolation from 2016–18 assumes constant labour productivity across all sectors; that is, the extrapolation is performed using trends for the sectoral current price VA data. The total

employment level is then extrapolated using the trend of Total Employment from the Total Economy Database of the Conference Board and the sectoral employment levels are appropriately normalized. Whilst the India-KLEMS data is in ISIC.3 classification, it is possible to reassemble it to ISIC.4 by making some assumptions about the mapping of the ISIC.3 deeper aggregate subcategories—specifically, that 'Post and Telecommunication' captures all of 'Communication', and that 'Recycling and Publishing' is placed in 'Manufacturing' instead of 'Communication', the result being the 'Business Services', which includes 'Communication', may be very slightly undercounted. It was not possible to separately disentangle employment in the 'Real Estate' sector and this therefore remains combined in 'Other Services'.

Value added

Period	Sectoral data sources	
2016–18	Trend from Ministry Current and Constant Sectoral VA Data	
1990–2016	Current and Constant Sectoral VA Levels from India-KLEMS Database	
1990–2016	'Real Estate' Current Price VA from UN OCD	

- Data covers fiscal, not calendar years. So runs from 1st April to 30th of March.
- From 1990–2016, sectoral current and constant price VA levels from the India-KLEMS Database.
- From 2016–18, sectoral VA forwards extrapolated using trends of current and constant price VA from Ministry National Accounts Data Broad (8) Sector Aggregates. ISIC.4 sub-sectors assumed to follow same trends as their broader aggregate parent sectors.
- From 1990–2016, source data is in ISIC.3 and is reassembled into ISIC.4 by reallocating subcategories. The 'Real Estate' Sector is extracted using UN OCD data, directly in the case of current price VA, assuming same price index as 'Other Services' in case of constant price VA.

The sectoral VA data made available by the Ministry of Statistics and Programme Implementation (MOSPI) is poorly disaggregated and comprises only eight broad aggregate sectors. Therefore, sectoral current and constant price VA levels from the India-KLEMS database are preferred from 1990–2016, the final year for which this data is currently available. The forwards extrapolation from 2016–18 is done using trends from the Ministry broad aggregate statistics—the ISIC.4 subsectors are therefore assumed to share a common trend with their broader aggregate parent sectors for this period. Whilst the India-KLEMS data is in ISIC.3 classification, it is possible to reassemble it to ISIC.4 by making some assumptions about the mapping of the ISIC.3 deeper aggregate subcategories—specifically, that 'Post and Telecommunication' captures all of 'Communication', and that 'Recycling and Publishing' is placed in 'Manufacturing' instead of 'Communication', the result being the 'Business Services', which includes 'Communication', may be very slightly undercounted. The 'Real Estate' sector could not be disentangled with any such assumptions, and therefore the share of total current price VA which is 'Real Estate' from the UN Official Country Data (OCD) for India is used to extract 'Real Estate' VA for the period 1990–2016. In the case of constant price VA, the UN OCD extracted current price VA for 'Real Estate' is converted to

constant prices using the price index of 'Other Services'. All 'annual' data covers fiscal years rather than calendar years. Therefore, VA data which is reported as 19XX or 20XX actually covers the period 1st April 19XX to 30th March 19XX+1.

Indonesia

Employment

Period	Sectoral data sources	
2005–18	Bi-Annual LFS from NSI	
1990–2005	Annual LFS from NSI	

- From 2011–18, sectoral employment Levels from the NSI bi-annual LFS, averaged across the two bi-annual releases.
- From 2005–11, sectoral employment Levels from the NSI bi-annual LFS, averaged across the two bi-annual releases.
- From 2005–11, 'Business Services' and 'Real Estate Activities' sectoral employment split from local classification to ISIC.4 by backwards extrapolating from 2011 levels using aggregate sector trends. 'Other Services' backwards extrapolated using overall employment trends.
- From 1990–2005 sectoral employment Levels from the NSI annual LFS, ISIC.4 split done as above.
- There was no LFS in 1995, so 1995 levels are average of 1994 and 1996 levels.

Indonesia NSI publishes population censuses, however employment data is severely sectorally aggregated, so in this case census data is used only as a comparative check. Indonesia produces regular and high-quality labour force surveys, published annually until 2005 and bi-annually after (February and August). In the years where two surveys are available, the averages of sectoral employment levels across the two surveys are calculated. From 2011, LFS are in ISIC.4 sectors, so employment levels can be utilized directly. Prior to 2011, Indonesia used their own system of sectoral classification, which is similar to ISIC.3, these were disaggregated by backwards extrapolation from the 2011 shares at the trends of the combined parent sectors in the cases of Business Services and Real Estate Activities, and at the overall employment trend in the case of Other Services. No LFS was produced in 1995, so 1995 figures are the averages of 1994 and 1996.

Value added

Period	Sectoral data sources	
2000–18	NSI Official GDP Data, Current Prices	
2000–18	NSI Official GDP Data, Constant Prices	
1990–2000	WIOD Socio-Economic Accounts, Current Prices	
1990–2000	WIOD Socio-Economic Accounts, Constant Prices	

- 2010–18 sectoral VA current and constant price levels from NSI National Accounts. Constant price levels rebased to 2015 prices.
- 2000–10 sectoral VA current and constant price levels from NSI National Accounts. Constant price levels rebased to 2015 prices. Disaggregated to ISIC.4 'Business Services' and 'Real Estate Activities' sectors by backwards extrapolating from 2011 levels using aggregate sector trends. 'Other Services' backwards extrapolated using overall VA trends.
- 1990–2000 all sectors current and constant price VA backwards extrapolated using the trends from the WIOD socio-economic accounts.

Indonesia NSI has published official sector-disaggregated GDP data from 2000 in both current and constant prices. Constant price series were rebased from 2010 to 2015 prices. From 2010 onwards, sector classification has followed ISIC.4. Prior to 2010, Indonesia used their own system of sectoral classification, which is similar to ISIC.3, these were disaggregated by backwards extrapolation from the 2011 shares at the trends of the combined parent sectors in the cases of Business Services and Real Estate Activities, and at the overall VA trend in the case of Other Services. Both constant and current price series prior to 2000 are backwards extrapolated using the trends from the 10 Sector Database (10SD), which itself utilized trends from the World Input-Output Database Socio-Economic Accounts (WIOD SEAs) due to severe limitations of NSI data.

Israel

Employment

Period	Sectoral data sources	
1972, 1983	Population census	
2006–14	OECD STAN database, ISIC rev 4.	
1995–2005	Trend from OECD STAN database, ISIC rev 3.1.	
2015–18	Trend from Labour Data Based on Reports of NII	
1984–94	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1983 and 1995. Agricultural interpolated using trend from agricultural employment series Benchmarked to total employment which is interpolated using PWT 9.1	
1973–82	Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 1972 and 1983. Agriculture interpolated using trend from agricultural employment series. Benchmarked to total employment, which is interpolated using PWT 9.1	

^{*} Source 1972 and 1983 census: online tabulations at iPUMS international (Minnesota Population Center, 2019). Note, the tabulations include a large category of persons employed for which the sector of employment is unknown. These are excluded from the estimates. Sectors B and C are split using relative labour productivity for 1995. Similar split is made for sectors J to U.

^{*} The OECD STAN database in ISIC rev. 4 classification from 2006 to 2014 is used as benchmark data, because it appears the only available source that distinguishes mining from manufacturing (both for value added and employment).

Value added

Period	Sectoral data sources	
2000–17	National Accounts (ISIC rev 4, current and constant prices)	
2000–08 and 2011–14	Split B (mining) and C (manufacturing) using various versions of the OECD STAN database.	
1970–99 and 2018	Trend from UN national account series (ISIC rev. 3.1)	

^{*} Source national accounts data 2000–17: UN official country data. Millions of new Israeli sheqels.

Japan

Employment

Period	Sectoral data sources	
2015–18	Annual LFS from NSI	
1994–2015	JIP Database: Sectoral Employment	
1990–94	World KLEMS Employment Data	

- 1994–2015 sector employment levels from JIP Database.
- Post-2015 extrapolation forwards using NSI annual LFS trends.
- Pre-1994 extrapolation backwards using World KLEMS employment data trends.
- 2011 (Fukushima disaster year) data smoothed in primary data sources.

Japan conducts a population census every five years, the most recent release being 2015. However, census employment totals were small relative to other sources, so for the period 1994–2015 sectoral data from the Japan Industrial Productivity (JIP) Database are preferred as they are more plausible and more consistent with other sources. 2011 employment totals are smoothed in the official data due to the disruptive effect of the 2011 earthquake and Fukushima disaster on statistics and data collection—this smoothing is retained. From 2015, sectoral employment data is forwards

^{*} Sectors B and C are not distinguished in the UN official country data. For 2000–08 and 2011–14 these sectors are distinguished in the OECD STAN database (2000–08 in ISIC rev 3.1; 2011–14 in ISIC rev. 4). For value added at current prices, we use the shares from the OECD STAN database for these years, and linearly interpolate shares between 2008 and 2011, and hold shares constant after 2014. For value added at constant prices, we only have price deflators for 2000–08 for B and C separately. We use these and assume the same price deflator for B and C in the years thereafter.

extrapolated using trends from annual labour force surveys from the NSI. Prior to 1994, sectoral employment data is backwards extrapolated using trends from the World KLEMS employment data, as this is the only sufficiently sector disaggregated data from this period.

Value added

Period	Sectoral data sources	
2015–18	NSI National Accounts Annual Report 2018, current and constant price data.	
1994–2015	JIP Database: Sectoral Value added current and constant price data.	
1990–94	World KLEMS Productivity Data, current and constant price data.	

- 1994–2015 sector VA current price levels and price indices from JIP Database, 2011 SNA.
- Post-2015 extrapolation forwards using trends of current price sectoral VA and price indices data from the 2018 NSI National Accounts Annual Report.
- Pre-1994 extrapolation backwards using World KLEMS productivity data sectoral VA trends in constant and current prices, 'Communication and Business Services' sector manually aggregated.
- All data consistently in 2011 SNA due to extrapolation.

The sectoral current price data levels and price indices used to construct the constant price data levels were taken from the Japanese Industrial Productivity (JIP) Database, which uses the 2011 system of national accounts (SNA). As all other data is extrapolated from these levels, all data is effectively transformed to 2011 SNA. Both the current prices and price indices are extrapolated forwards from 2015 using trends from the sectoral VA data published in the 2018 National Accounts Annual Report, in the case of the price indices these are extracted from the constant chained-prices system utilized by the NSI. Pre-1994, both the current prices and price indices are extrapolated backwards using trends from the World KLEMS productivity data, as this is the most sector disaggregated data from this period. 'Communications and Businesses Services' is manually aggregated for this period by combining the appropriate sub-sectors.

Kenya

Employment

Period	Sectoral data sources	
2008–18	Annual Economic Surveys from NSI	
2008–18	Trend in EAP in Agriculture	
1990–2010	10 Sector Database	

- Benchmark Levels for Period 1990–2010 from 10 Sector Database (10SD).
- Split from ISIC 3 to ISIC 4 from 2008–10 uses shares from Annual Economic Surveys (ES) in these years, pre-2008 assumed constant sub-sector shares of parent sectors.
- Agriculture forwards extrapolated from 2010–18 using EAP in Agriculture Trends.
- All other sectors forwards extrapolated from 2010–18 using trends from Annual Economic Surveys (ES).

Kenya has conducted a population census every ten years, the most recent being 2019, however the preliminary full report of the 2019 census has not been published as of the time of writing, and the full report of the 2009 census report total employment but do not report contains some issues with the sectoral employment data. Additionally, the Kenyan NSI has published Annual Economic Surveys (ES) for most of the period 1990–2018. These include information on wage labour in the public and private sectors, as well as information on employment in the informal sector in manufacturing, construction, trade services, transport and communications and other services. The 10 Sector Database (10SD) sectoral employment data is underpinned by benchmarks Labour Force Surveys in 1999 and 2005 and additional primary sources which are no longer available from the NSI, with interpolations performed using the ES trends—therefore, the 10SD employment figures are taken as the sectoral employment levels for the period 1990-2010 as they contain more primary information than is currently available. This approach ensures that any under-coverage in the ES does not distort the level figures. As the 10SD is in ISIC 3, the split to ISIC 4 is performed for the years 2008–10 using disaggregated sectoral shares from the ES. Prior to 2008, the ES are not sufficiently disaggregated to make this split, so going backwards the ISIC 4 shares of ISIC 3 parent sectors are held constant at their 2008 ratios. From 2010-18, employment in 'Agriculture' is forwards extrapolated using trends from on Economically Active Persons in Agriculture—this series is preferred as the ES may insufficiently cover informal employment in agriculture. All other sectors are forwards extrapolated for the period 2010-18 using trends from the ISIC 4 sectoral employment data in the Annual Economic Surveys (ES).

Period	Sectoral data sources	
1996–2018	Sectoral Current and Constant Price VA from UN OCD.	
1990–96	Trends from 10SD	

- 1996–2018 Sectoral Current and Constant Price VA Levels from UN Official Country Data (UN OCD)
- 1990–96 Sectoral Current and Constant Price VA backwards extrapolated using trends from the 10 Sector Database (10SD).
- 1990–96 ISIC 4 sub-sector VA assumed to follow the same trends as their ISIC 3 parent sectors.

Constant and current price sectoral VA data is available for Kenya from both the NSI and the UN Official Country Database (UN OCD). For the years when figures from both sources are available, they are identical, however the UN OCD data covers a more extensive time period, 1996–2018, and for this reason are taken as the benchmark sectoral VA levels for this period. Prior to 1996, the sectoral current and constant price VA are backwards extrapolated using trends from the 10 Sector Database (10SD), which are underpinned by National Accounts figures collated at the time of construction. As the 10SD is in ISIC 3 classification, it is assumed that prior to 1996 the ISIC 4 sub-sectors shares a common trend with their parent sectors. In the case of 'Communication and Business Services', which crosses two ISIC 3 parent sectors, as 'Business Services' is by far the larger component, trends from the parent sector 'Finance, Real Estate and Business Activities' are used for this entire sub-sector.

South Korea

Employment

Period	Sectoral data sources	
1990–2018	NSI Labour Force Surveys	
1990–2004	Asia KLEMS Employment Data	

- 1990–2018 sectoral employment levels from NSI annual LFS.
- 1990–2004 Asia KLEMS disaggregated sectoral employment data used to split sectors from ISIC.3 to ISIC.4.

South Korea produces a population census (PC) every five years, the most recent being 2015. Additionally, the NSI published high quality annual Labour Force Surveys (LFS) entitled Economically Active Population Surveys. When compared, and compared also to other sources, the PC estimates for certain sectors (Agriculture and Other Services) differ widely and the numbers are implausible, therefore level data from the LFS are preferred. It should be noted that the South Korean total employment to population ratio reported across all sources is very high, and from 2015 is above the 50 per cent threshold usually considered an indicator of possible implausibility as outlined in the general ETD methodology. However, this ratio is very consistent across primary and secondary sources, and so is treated as accurate. Prior to 2004, all sectoral disaggregation is in ISIC.3 format, however the Asia KLEMS research consortium provide a database which is further disaggregated than the LFS data and is based directly on data from the NSI. From this data it was possible to construct subcomponent employment shares of the parent sectors which are split or re-aggregated in ISIC.4, and these shares were applied to the LFS levels in order to perform the ISIC.4 disaggregation for the pre-2004 period.

Value added

Period	Sectoral data sources	Notes
2000–18	NSI Official GDP Data, '2015 Standard', Current Prices	Current Price Levels
2000–18	NSI Official GDP Data, '2015 Standard', Price Indices	Price Index Levels
1990–2000	NSI Official GDP Data, '2010 Standard', Current Prices	Current Price Trends
1990–2000	NSI Official GDP Data, '2010 Standard', Constant Prices	Constant Price Trends

- 2000–18 sectoral VA current and constant price levels from NSI National Accounts, using '2015 Standard' accounting system. Constant price levels calculated with price index.
- 1990–2000 sectoral VA current and constant prices backwards extrapolated from last year of '2015 Standard' in using the '2010 Standard' accounting system trends from NSI National Accounts.

The South Korea NSI has published annual sectoral value added data in both current and constant prices for the entire time period. However, two different national accounting systems, the '2015 Standard' and '2010 Standard', are used throughout the time period, with only data from 2000 onwards reported in the newer '2015 Standard' but for the entire period 1990-2018 in the '2010 Standard'. The '2015 Standard' levels are used for the period from 2000, as this is now the officially preferred system, and for the pre-2000 period the '2015 Standard' sectoral levels are backwards extrapolated using the '2010 Standard' sectoral trends, thus rendered the VA data consistent in the most recent format. In some cases, the published sectoral VA data was further disaggregated than ISIC.4, so these subcategories have been appropriately combined. Price indices were only available in the '2015 Standard' from 2000 onwards, and sectoral constant price VA data was available from 1990, but in the '2010 Standard'. Therefore, the current and constant price data from 1990–2000 was first combined to generate price indices in the '2010 Standard' for this period, and the '2015 Standard' price indices were then backwards extrapolated from 2000 using the trends of these constructed price indices. The price index data was in some cases highly disaggregated by sector, therefore sub sector-specific annual price changes and the industry shares of the sub sector in total current value added of the parent sector were calculated, and the aggregate price indices for the parent sectors were then constructed as weighted sums of the price indices of the component sub sectors.

Laos

Employment

Period	Sectoral data sources
2017	2017 Labour Force Survey
2015–17	Trend from Average Rate of Growth between 2010 and 2017 LFS.
2015	2015 Population Census
1990–2015	Productivity-Based Trends
1990–2015	Trend in EAP in Agriculture
1990–2015	Total Employment Levels from PWTs
2010	2010 Labour Force Survey
2005	2005 Population Census
1995	1995 Population Census

- Benchmark Levels from 2015, 2005, and 1995 Population Censuses.
- 2015–17 all sectors except 'Real Estate' forwards extrapolated using the average annual sectoral growth rates between 2010 and 2017 Labour Force Surveys.
- 1990–2015 Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- 1990–2015 all other sectors Extra- and Inter-polations use Productivity-Based Trends. Productivity-Based Trends used for 'Real Estate' for the entire period 1990–2017.
- All non-benchmark year sectoral employment normalized such that sum matches Penn World Table (PWT) total employment.
- No 2005 benchmark for 'Real Estate', interpolated instead.
- Pre-1995, split from ISIC.3 to ISIC.4 assumes same sub-sector shares as 2005 PC or 2010 LFS.

Laos performs a population census every 10 years and the 2015, 2005, and 1995 Population Censuses form the key sectoral employment benchmark years. The average annual growth rate of each sector except 'Real Estate' between 2010 and 2017 is calculated using 2017 and 2010 Labour Force surveys, which are not sufficiently comprehensive to provide benchmark levels, these annual growth rates are then used to extrapolate each sector forwards from 2015–17. Pre-2015, all interpolation and backwards extrapolation is done using trends from productivity estimates. The exception is Agriculture, for which EAP in agriculture trends are used. For 'Real Estate', productivity-based trends are also used for the 2015–17 forwards extrapolation, this is because the Real Estate Sector is missing from the 2017 LFS. As 'Real Estate' employment is not separately

reported in the 2005 PC, there is no 2005 benchmark for this sector and it is instead extrapolated over—this should not be a problem, as the Real Estate sector is very small. Outside benchmark years, all sectoral employment is normalized such that their sum equals the total employment figure reported in the Penn World Tables (PWT). Almost all sources are in ISIC.4 classification and do not require reaggregation, the exception is the 1995 PC which is in ISIC.3, therefore the ISIC.3 to ISIC.4 split is performed using the sub-sector shares from the 2005 PC, or the 2010 LFS in the case of separating 'Real Estate' from 'Business Services'.

Value added

Period	Sectoral data sources
2009–18	Sectoral Current Price VA from NSI National Accounts
2015–18	Sectoral Constant Price VA from NSI National Accounts, rebased from 2012
1992–2015	Sectoral Current and Constant Price VA from UN OCD
1990–92	Broad Aggregate Sector Current and Constant Price VA from UN OCD

- 2009–18 Current price sectoral VA levels from NSI National Accounts.
- 2009–14, NSI current price sectoral VA spilt to ISIC.4 using sub-sector shares from UN Official Country Data.
- 1992–2009 Current price sectoral VA trends from UN OCD.
- 2015–18 Constant price levels from NSI National Accounts, rebased to 2015 from 2012.
- 1992–2015 Constant price sectoral VA trends from UN Official Country Data.
- 1990–92 Current price sectoral VA trends from UN OCD Estimates of Main Aggregates, where sub-sectors follow parent sector trends.

The Laos NSI provides current price sectoral VA data from 2009–18 and these levels are used for this period. Constant price sectoral VA data is also available from the NSI for the period 1992–2018, however there is a change in base year and a break in 2015—therefore, only the levels from 2015–18 are used, and these are rebased to 2015 prices. Between 1992–2009 for the sectoral current price VA and 1992–2015 for the sectoral constant price VA, the NSI levels are backwards extrapolated using trends from the UN Official Country Data (OCD) sectoral VA data. Sub-sector shares from the UN OCD data are also used to split to ISIC.4 the period (2009–14) of the NSI current price VA data which is in ISIC.3. There is a break in the UN series for both current and constant VA in 2002—this is smoothed by interpolating over this year using broader sector aggregates, therefore common trends are assumed for the sub-sectors. Between 1992–2001, ISIC.4 sub-sectors are assumed to follow the same trends as their ISIC.3 parent sectors. Pre-1992, backwards extrapolation is done using the National Accounts Estimates of Main Aggregates provided by the UN OCD. The current and constant value added of the Main Aggregates are

reported in broad sectors, common trends are therefore assumed for the ISIC.4 sub-sectors—this is akin to assuming a constant price index across these (relatively small) sub-sectors.

Lesotho

Employment

Period	Sectoral data sources
2015–18	Productivity-Based Trends
1990–2015	Sectoral Employment from EASD
2015	2015/16 Continuous Multipurpose Survey from NSI
2011	Demographic Survey from NSI

- From 1990–2015, sectoral employment levels in ISIC 3 are from the Expanded Africa Sector Database (EASD).
- 2015–18 forwards extrapolation performed using Productivity-Based Trends.
- 2015 Multipurpose Survey and 2011 Demographic survey used to perform this ISIC 3 to ISIC 4 split in these years; outside these years ISIC 4 sub-sectors follow the trend of their parent sector.

Lesotho conducts a population census every 10 years, the most recent being 2016, but unfortunately these population censuses do not extensively cover the labour market and do not provide sectoral employment figures. Sectoral Employment levels are therefore taken directly from the Expanded African Sector Database (EASD), which is built from additional primary sources from the Lesotho NSI. As the EASD is in ISIC 3 categorization, the split to ISIC 4 is performed using sectorally disaggregated data from a 2015 'Continuous Multipurpose Survey' and 2011 Demographic Survey, both from the NSI. Both of these sources also underly the EASD data and are therefore consistent. Outside these two years, the ISIC 3 to ISIC 4 split is performed assuming constant sub-sector shares. Finally, all twelve sectors are forwards extrapolated from 2015–18 using trends based on estimated growth of sectoral productivity. Note that the Lesotho NSI employment definition is always age 10+, it is not possible to adjust the data to the preferred 15+ employment definition.

Value added

Period	Sectoral data sources
2007–18	Sectoral Current and Constant Price VA Data from National Accounts
2005–11	Sectoral Current and Constant Price VA Data from NSI Socio-Economic Database
1990–2007	Sectoral Current and Constant Price VA Data from World Bank African Development Indicators

- From 2007–18, sectoral Current and Constant Price VA levels used directly from the National Accounts.
- Pre-2007, sectoral Current and Constant Price VA backwards extrapolated using trends from World Bank African Development Indicators Lesotho data.
- As World Bank data does not include 'Business Services' VA, and combines
 'Communication & Transport' as in ISIC 3, these sectors are extrapolated back to 2005
 using alternative sectoral VA data from the NSI. Pre-2005, their sectoral shares are held
 constant.
- 'Business Services' is also not separately reported in the National Accounts constant price data, so assumed to share a common price index with 'Communication'.

Sectoral VA in current and constant prices is available from the National Accounts (NA) for the period 2007–18, and these data are used as the sectoral VA levels. The NA constant price figures do not include 'Business Services', and therefore the constant price VA for this sector is calculated by applying the price index of the 'Communication' sub-sector. Pre-2007, all sectoral constant and current price VA is backwards extrapolated using trends from the World Bank African Development Indicators for Lesotho. As these series' do not include 'Business Services', and do not separately report 'Transport' and 'Communication' these sectors are backwards extrapolated trends from additional sectoral VA data from a separate NSI release. From 2005 backwards, the shares of these missing sub-sectors are held constant. The 'Real Estate' VA definition is always the 'Ownership of Dwellings' VA. The WB constant price data is in 2004 prices, but as only the trends from this data are used and applied to the NA levels which are in 2015 prices, constant 2015 prices are maintained throughout.

Malawi

Employment

Period	Sectoral data sources
2018	2018 Population Census
1990–2018	Trend in EAP in Agriculture
2008–18	ILO Modelled Estimates
2003–15	Annual Economic Surveys
2008	2008 Population Census
1990–2008	10SD Based Trends
1998	1998 Population Census

- Benchmark levels in 1998, 2008, and 2018 adapted from Population Censuses.
- 2018 census contained misclassifications in 'Trade Services' and 'Other Services'. Fixed by summing them and then assuming same ratio as in 2008.
- The manufacturing employment share drops from 4.3 per cent in 2008 PC to 1.5 per cent in 2018 PC. This conflicts with a manufacturing employment share of 4.4 per cent in the 2016/17 IHS4. It also conflicts with the 5.1 per cent in the 2013 LFS. For 2018, we recalculated sectoral employment using shares from the 2013 LFS for agr, min, manuf, elec, const, and serv, with services sector detail and total emp level from 2018 PC.
- 1998 and 2008 censuses split from ISIC.3 to ISIC.4 using surrounding year averages of shares from Annual Economic Surveys sectoral employment data.
- All Agriculture Extra- and Inter-polations use EAP in agriculture trends.
- From 2008–18, all other sectors interpolations follow trends from ILO Modelled Estimates.
- From 1998–2008, all other sectors interpolations follow trends from 10SD, split using Annual Economic Survey sub-sector shares from 2003 (assumed constant pre-2003).
- Prior to 1998, backwards extrapolation follows trends from 10SD, ISIC 3 to ISIC4 split assumes constant sub-sector shares.

Malawi conducts a population census every 10 years, the most recent being in 2018 from which the data is now available. The census years 1998, 2008, and 2018 form the benchmark years. Furthermore, disaggregated sectoral employment data has been published by the NSI annually in the Annual Economic survey from the period from 2003–15, however these data show implausible year-to-year volatility in terms of levels. The 2018 census sectoral data was in ISIC.4 classification, however there was an inconsistency with the 'Trade Services' and 'Other Services' sector, whereby informal employment in trade services was incorrectly classified as other services employment in

the original document. To address this, the sum of the two sub-sectors was taken, and then resplit between the two sub-sectors using the 2008 shares. This therefore assumes a constant ratio of 'Trade Services' to 'Other Services' in 2018 as in 2008, but is more accurate than the misclassified version. Furthermore, the manufacturing employment share drops from 4.3 per cent in 2008 PC to 1.5 per cent in 2018 PC. This conflicts with a manufacturing employment share of 4.4 per cent in the 2016/17 IHS4. It also conflicts with the 5.1 per cent in the 2013 LFS. For 2018, we recalculated sectoral employment using shares from the 2013 LFS for agr, min, manuf, elec, const, and serv, with services sector detail and total emp level from 2018PC. The other two benchmark census years (1998 and 2008) are in ISIC.3 classification, these were therefore split into ISIC.4 by using the sub-sector shares from the Annual Economic Surveys. To account for the aforementioned volatility, the disaggregated shares were taken as an average of the years surrounding and including the benchmark years. This explains the construction of the sectoral employment in levels of three benchmark years. The sectoral employment of the non-Agriculture sectors was interpolated between 2008-18 using trends from the ILO Modelled Estimates. The sectoral employment of the non-Agriculture sectors was interpolated between 1998-2008 using trends from the 10 Sector Database (10SD), where the ISIC.3 to ISIC.4 split was done again using the Annual Economic Surveys shares from 2003, when these surveys became available. Prior to 2003, constant sub-sector shares of the ISIC.3 parent sector are assumed. Prior to 1998, backwards extrapolation was also done using the trends from the 10SD, again assuming constant sub-sector shares of their ISIC.3 parent sectors. The exception is Agriculture, for which numbers of Economically Active Population in Agriculture trends are used for all extrapolation and interpolation outside benchmark years.

Period	Sectoral data sources
2002–18	UN Official Country Data (UN OCD), current prices
2003–18	UN Official Country Data (UN OCD), constant prices
1990–2003	10SD Based Trends, constant prices
1999–2002	10SD Based Trends, current prices

- From 2002–18, current value added levels from UN OCD
- From 2003–18, price indices constructed from constant value added levels from UN OCD. Rebased to constant 2015 prices.
- Primary data assumes common price index across sectors from 2012 onwards, this assumption had to be adopted.
- Small correction made to 10SD 'Electricity, gas, and water supply' sector constant price data in 2003 and 2004.
- Pre-2003 constant price sectoral VA and pre-2002 current price sectoral VA backwards extrapolated using trends from 10SD. ISIC.4 to ISIC.3 split was performed with retained microdata.

Malawi NSI has published official sector-disaggregated GDP data sporadically from 2002, in current prices, and 2003, in constant prices. However, full data for this period is available from the UN Official Country Data, which is consistent with the NSI data for the years when such data is available. Therefore, the UN OCD data is used for the current price levels from 2002 and to construct the price indices from 2003. It should be noted that from 2012, the constant price data published by the NSI and also held by the UN assumed a constant price deflator across all sectors—this convention has had to be maintained as there is no alternative data available. All price indices and constant price series were rebased to 2015 prices. Also note that a small error in the 10 Sector Database (10SD) price deflators and constant price series was detected, whereby 'Electricity, gas, and water supply' sector did not include the 'Water supply' VA for the years 2003 and 2004; this has been corrected in the ETD data. Prior to 2002 in the case of the current price sectoral VA data, and 2003 in the case of the constant price sectoral VA data, all series were backwards extrapolated using trends from the 10SD. The 10SD data was in ISIC.3 classification, however sufficient microdata had been stored in the 10SD working files that it was possible to perform the split to ISIC.4 without assumptions.

Malaysia

Employment

Period	Sectoral data sources
2010–18	Labour Force Survey
1990–2009	Trend from GGDC 10SD

^{*} Labour Force Survey data is from the Malaysian Department of Statistics, reported in the ILO Labour Statistics Database (accessed June 2020).

Period	Sectoral data sources
1990–2017	UN OCD (current and constant prices)
2018	Trend from ADB Key Indicators

^{*} For 2018 we use the trend from the ADB Key Indicators 2019, which reports detailed value added by sector in current and constant prices for Malaysia.

Mauritius

Employment

Period	Sectoral data sources
1990–2017	NSI Historical Labour Force Series
2003–06	Productivity-Based Trend in Mining Sector
2011	2011 PC Benchmark
2000	2000 PC Benchmark
1990	1990 PC Benchmark

- Benchmark Levels in 1990, 2000, and 2011 (PC)
- All extra- and inter-polations follow trends from NSI Historical Labour Force Series
- Implausible series behaviour in 'Mining and Quarrying' between 2003–06 smoothed with productivity-based trends.
- 1994–2006, ISIC.3 split to ISIC.4 using parent sector trends applied backwards to last year of disaggregated split.
- 1990–94, ISIC.2 split to ISIC.4 using parent sector trends applied backwards to last year of disaggregated split.

Mauritius conducts a census (PC) approximately every decade, the most recent being in 2011, and these are used to provide sectoral benchmark levels in 1990, 2000, and 2011. The PC industry classifications are very detailed and they have been smoothly aggregated into the ISIC.4 classifications. In addition, the NSI releases an annually updated series of historical labour force statistics which is used to provide the trends for all between benchmark interpolation and extrapolation from 2011 onwards. These series, however, shift industry classification systems and were ISIC.3 from 1995-2006 and ISIC.2 prior to 1994. The following procedure was used to disaggregate the series: combined sectors were first identified, and the sectoral employment levels in the first period of a new system were extrapolated one period backwards using the total employment growth rate between the two years; further backwards extrapolation was then conducted using the growth rate of the parent sectors under the older classification. In the case of the Business Services sector, which comprises elements of the former Real estate & Business and Transport & Communication sectors, the growth rate used for backwards extrapolation is the weighted average of these two parent sectors. Between the years 2003 and 2006, reported employment in the Mining sector demonstrates large and erratic jumps which are both intuitively implausible and do not correspond with any other data source, therefore this period of Mining sector employment is smoothed by interpolation using sectoral productivity-based trends.

Value added

Period	Sectoral data sources
1990–2018	UN Official Country Data (UN OCD) Current and Constant Prices

- 1990–2018 Sectoral VA levels in constant and current prices from UN Official Country Data
- Pre-2006, ISIC.3 to ISIC.4 split assumes constant sub-sector shares.

Sectoral VA data in both current and constant prices is available from the Mauritius NSI, however for the majority of the time period it follows only a loose ISIC.3 style classification system which includes inconsistencies in the treatment of some sub-sectors in different years. UN Official Country data is therefore the best available source for both current price sectoral value added and sectoral price indices and is used to construct the current and constant prices sectoral VA series. Pre-2006, the intra-sectoral splits of Transport and Communications, and Financial Intermediation and Real Estate, are held constant at their 2006 shares as all earlier sectoral value added is in strictly ISIC revision 3 categories. Constant price VA is the sectoral current price VA divided by the sectoral price index. Both price deflators and constant price VA for 1990 and 1991 could not be reported due to a missing overlap between the UN series up to 1991 and the one from 1992 onwards.

Mexico

Employment

Period	Sectoral data sources
2005–19	Encuesta Nacional de Ocupación y Empleo (ENOE)
1990–2004	Trend from GGDC 10SD

^{*} Sector employment by detailed sector and ISIC rev 4 classification for 2005–19 is from the Encuesta Nacional de Ocupación y Empleo, published by the Statistical Office (INEGI, accessed June 2020).

Period	Sectoral data sources
1993–2019	National Accounts
1990–92	Trend from GGDC 10SD

^{*} National accounts data for 1993–2019 by detailed ISIC rev 4 classification from INEGI (accessed June 2020).

Morocco

Employment

Period	Sectoral data sources
1999–2017	Annual Statistical Yearbooks from NSI
2004	IPUMS Microdata
1990–99	10SD Based Trends

- From 1999–17, benchmark levels of sectoral employment data from Annual Statistical Yearbooks (*Annuaire Statistique du Maroc*).
- Non-standard Sectoral Classification converted to ISIC.4, 'Communication and Business Services', 'Financial Services', and 'Real Estate' extracted assuming constant parent-sector shares from 2004 IPUMS Microdata.
- Pre-1999, backwards extrapolation uses sectoral trends from 10 Sector Database (10SD), ISIC.4 sub-sectors assumed to follow same trends as their ISIC.4 parent sectors.

The Moroccan NSI has published annual sectoral employment data as part of their Annual Statistical Yearbook (*Annuaire Statistique du Maroc*) for the entire period from 1999–2017, and these supply the sectoral employment levels in each of these years. The sectoral classification is nonstandard but follows closely ISIC.4, and for the most part can be easily reaggregated. The exception is the nonstandard 'Trade, Storage and Communication' and 'Finance, Insurance, Real Estate and Business Services'—from these parent sectors, the ISIC.4 sub-sectors 'Communication and Business Services', 'Financial Services', and 'Real Estate' are extracted by applying sub-sector shares calculated from a sizeable sample of microdata is available from IPUMS for 2004—therefore, these sub-sector shares are assumed to remain constant at their 2004 proportions. Pre-1999, sectoral employment is backwards extrapolated using trends from the 10 Sector Database (10SD), whereby ISIC.4 sub-sectors are assumed to follow the same trends as their ISIC.3 parent sectors.

Value added

Period	Sectoral data sources
2007–18	Sectoral Current and Constant Price VA Data from UN OCD, SNA 2008
1998–2007	Trends from Sectoral Current and Constant Price VA Data from UN OCD, SNA 1993
1990–98	Trends from Sectoral Current and Constant Price VA Data from UN OCD, SNA 1968
1990–2018	Share of Real Estate in VA from Egypt

- Current and constant price sectoral VA data from UN OCD for entire time period.
- From 2007–18, VA data follows SNA 2008—therefore, level data used.
- Pre-2007, sectoral VA data backwards extrapolated using trends from UN OCD data due to different SNA systems.
- Pre-1998, many Services sub-sectors are not separately distinguished, therefore the service sub-sectors retain constant shares of overall Services VA from 1998 backwards.
- Pre-1998, 'Other Services' is not separately distinguished; therefore, it is assumed to follow the same trend as overall GDP.

The UN Official Country Data (OCD) for Morocco provides sectoral VA data in both current and constant prices for the entire time period. However, there are two changes in System of National Accounts (SNA) employed across the period. From 2007-18, the sectoral VA data follows SNA2008, therefore the levels are used for this time period. From 1998–2007, the data is reported in SNA1993, and prior to 1998 it is reported in SNA 1968. To ensure all sectoral current and constant price data is consistently in SNA2008, for the period pre-2007 the sectoral VA is backwards extrapolated from the 2007 levels using trends from the sectoral VA data using the older SNA systems. This results in all data being consistent with the most recent accounting system applied by the Morocco NSI – SNA2008. For the period pre-1998, VA is not separately reported for many of the 'Services' sub-sectors and is instead aggregated—therefore, the shares of 'Transport services', 'Communication and Business services', and 'Financial Services' in this aggregate umbrella sector are held constant at their 1998 proportions—this is akin to assuming these three sectoral VA series follow identical trends for the period pre-1998. Additionally, the 'Other Services' sector is not separately distinguished pre-1998, therefore for this period it is backwards extrapolated from 1998 assuming that it followed the same trend as overall GDP. Finally, the share of VA which is 'Real Estate' is nowhere separated in any of the source data—it is therefore extracted assuming that is comprises the same share of aggregate 'Business Services' as in Egypt.

Mozambique

Employment

Period	Sectoral data sources
2017	2017 Population Census
1997–2017	Trends from Self-Constructed Series
1990–2017	Trend in EAP in Agriculture
2015	2015 Household Survey
2008	2008 Household Survey
2007	2007 Population Census, IPUMS Micro Data
2004	2004 Labour Force Survey
2002	2002 Household Survey
1997	1997 Population Census, IPUMS Microdata
1991–97	Productivity-Based Trends

- Benchmark Levels from 2017, 2007, and 1997 Population Censuses.
- 2017 PC Agricultural Employment level not used, instead 2015 Household Survey provides the latest Agriculture Sector benchmark.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- 1997–2017, all other sectors interpolation uses trends from a self-constructed series. This series is built from sectoral employment datapoints from 2002, 2004, 2008, and 2015 Labour Force Surveys and Household Surveys and linear interpolation.
- Pre-1997, backwards extrapolation uses Productivity-Based Trends.
- IPUMS microdata allows clean ISIC.4 split for census years, split in LFS and HS years split assumes constant sub-sector shares from 2007 PC.
- No data for 1990 due to Civil War.

Mozambique has performed a population census every 10 years, and the 2017, 2007, and 1997 censuses provide the benchmark years for levels of sectoral employment. However, the Agricultural employment level of the 2017 PC is unrealistic, perhaps due to a change in the question text in this census which refers to a 'place of work' and might therefore lead to underreporting of home production. Therefore, 2015 becomes a benchmark year for Agricultural employment instead, with the level taken from a 2015 Household Survey. Due to a lack of even

secondary sources of sectoral employment levels at an annual frequency, interpolations between benchmark years after 1997 are done using trends from a self-constructed series. This series takes sectoral shares from 2015 and 2008 household surveys and 2004 and 2002 labour force surveys as datapoints and linearly interpolates between them. These surveys are not considered reliable enough to use for benchmark levels, so they are used instead to create a separate series, the trends from which are used to interpolate between the PC benchmarks. Pre-1997, sectoral employment is backwards extrapolated using trends from productivity-based sectoral employment estimates. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. The 2017 PC is in ISIC.3 classification, however the 2015 HS is in ISIC.4, so the 2017 sectoral employment levels were split to ISIC.4 using the subsector shares from the 2015 HS. As the 2007 and 1997 census data was retrieved from IPUMS, which also preserve census microdata, it was possible to cleanly split these census years into ISIC.4 classification. In construction of the secondary series, however, the sectoral shares from the HS and LFS were split to ISIC.4 assuming constant sub-sector shares from the 2007 PC. As 1990 was a Civil War year in Mozambique, there is no reliable data for this year and to extrapolate it would be inappropriate given the exceptional economic conditions.

Value added

Period	Sectoral data sources
1991–2018	Sectoral current and constant Price VA from NSI.
1991–2018	Shares of sector J+M+N, K and L are used to disaggregate NSI data
1990–91	Trend from EASD

- 1991–2018 Current and Constant Price Sectoral VA comes directly from the 2020 national accounts estimate of NSI.
- 1990–91 trend from EASD which is also based on AfDB estimates of VA in current and constant prices.
- 1991–2017 Constant and current Price VA from UN Official Country Data used to split 'Business Services' and 'Real Estate'.
- Note there was a civil war in 1990 so the 1990 estimate may not be reliable.

The Mozambique NSI has released current price sectoral VA data for the entire period 1991–2019, and this is used directly as VA levels. However, as 'Business Services' and 'Real Estate' sectoral VA are not separated in the National Accounts, current price sectoral shares from the UN Official Country Data (OCD) are used to separate them from 2002–18, during which time they are separately reported by the UN—pre-2002, a constant split is assumed. Constant price sectoral VA for the entire period 1991–2018 is taken directly from the NSI national accounts estimate, rebased from 2014 to 2015 and used in the construction of price indices. 'Communication and Information' and 'Real Estate' have a constant price index as in the source data. The VA in current and constant prices are extrapolated backwards using trend from EASD

Myanmar

Employment

Period	Sectoral data sources
2017–18	2017/18 Labour Force Survey
1990–2017	Trend in EAP in Agriculture
1992–2017	Trends from ILO Modelled Estimates
2015	2015 Labour Force Survey
1997–98	1997/98 Labour Force Survey
1992–94	Annual Labour Force Surveys
1990–92	Linear Interpolation
1990	1990 Labour Force Survey

- Benchmark Levels from 2017–18, 2015, 1997–98, 1992–94. and 1990 Labour Force Surveys
- All Agriculture interpolations use EAP in Agriculture Trends.
- 1992–2017, All other sectors interpolations use trends from ILO Modelled Estimates.
- 1990–92 uses a linear interpolation; sectoral employment levels in 1991 are a simple average of 1990 and 1992 levels.
- 1990–98 LFS data are insufficiently disaggregated to perform a clean ISIC.4 split; therefore, split assumes sub-sectors are same shares of their parent sectors as in 2014 Population Census.

Only one Myanmar population census (PC) was conducted during the period 1990–2018; this was for 2014. Additional potential benchmark years come from the Labour Force Surveys (LFS) which the Myanmar NSI has performed regularly—these benchmarks are 2018, 2017, 2015, 1998, 1997, 1994, 1992, and 1990. The 2014 PC contains a large share of employed persons in the industry 'Not Stated' category and it is certainly too large to be an 'Other Services' residual. Even if the numbers from this category are dropped and the twelve sectoral shares are drawn from the remaining persons employed, the Census employment numbers (especially for manufacturing) are inconsistent with the other 8 LFS levels. In order to be able to secure these other benchmark levels, the 2014 Census levels had to be dropped. Between benchmark years from 1992–2017, sectoral employment interpolations are done using trends from ILO Modelled Estimates. Between the 1990 and 1992 benchmark years, a simple linear interpolation provides the 1991 levels—this is because 1991 is missing from the ILO data and all other sources—so the 1991 sectoral employment levels are a simple average of those from the 1990 and 1992 LFSs. The exception is Agriculture, for which EAP in agriculture trends are used for all interpolation between benchmark years. The LFS data between 1990 and 1998 are not sufficiently disaggregated to allow a clean split

and reassembly into ISIC4; therefore, in the absence of other data, the (relatively small) sectors which need to be split are disentangled by using the sub-sector shares of parent sectors from the 2014 PC, which is the most disaggregated data source. Finally, inconsistencies for the mining and quarrying employment data between the 2017 and 2018 LFS required us to drop the 2018 employment number for this sector and replace it with an extrapolation from the 2017 LFS level using the annual ILO employment estimates.

Value added

Period	Sectoral data sources
1990–2018	Sectoral Current and Constant Price VA from UN OCD
1990–2018	Sectoral Current Price VA from Myanmar 'Planning Department', for comparison
1990–2018	Shares of smaller 'service' sectors in total services from Thailand

- 1990–2018 Sectoral Current and Constant Price VA Data Levels from UN OCD, current price levels checked against those from Myanmar Planning Department.
- UN OCD data reports Energy in 'Mining and Quarrying' sector; there is a jump in this sector between 2010 and 2011 which cannot be reasonably smoothed.
- UN OCD data is not sufficiently disaggregated for ISIC 4 classification. Smaller service sector shares ('Business Services' to 'Other Services') are taken as their shares of overall services in Thailand.
- The price deflators of these smaller sectors are weighted averages of the broader price deflators, based on current price VA weights.

The sectoral current and constant price VA data from the UN Official Country Database (UN OCD) are preferred to those released by the Myanmar Planning Department as the constant price data provided by the latter is of poor quality—there is incomplete coverage and base years regularly change without the overlap years necessary for rebasing. The Planning Department current price series are broadly consistent with those of the UN OCD except for a different treatment of 'Energy' VA, which will be discussed. In order to generate consistent price indices, it is preferable to use the current and constant price VA data from the same source—hence, the UN OCD data is preferred for both. In the UN data, 'Energy' VA is placed in the 'Mining and Quarrying' sector; in the Planning Department data, it is reported separately. There is a jump in the 'Energy' data between 2010 and 2011 which cannot be reasonably smoothed—this would be present whether this VA was placed in 'Mining and Quarrying' or 'Utilities', so the UN decision to place it in the former is retained. The UN OCD data is not sufficiently disaggregated to allow some of the smaller ISIC 4 service sectors to be disentangled—specifically, 'Business Services', 'Financial Services', 'Real Estate', 'Government Services', and 'Other Services'. To extract these sectors, their share of overall services in a neighbouring country for which such data is available (Thailand) are calculated and these shares are applied to the total services VA in Myanmar. The assumption is therefore that the services sector of Myanmar has a similar structure to that of Thailand. In the case of the constant price data, the price indices for sub-sectors are taken as the weighted average of their parent sector price index, whereby the weights are based on their shares of current price VA. The

constant price sub-sectoral data is then calculated by applying these price indices to the current price data.

Namibia

Employment

Period	Sectoral data sources
2018, 2016, 2012–14, 2008, 2004, 2000, 1997	NSI Labour Force Surveys
2017, 2015	Productivity-Based Interpolations
1990–2012	Trends from ILO Modelled Estimates, except agriculture
1990–2012	Trend in EAP in agriculture
1991	1991 Population Census

- Benchmark Levels in 2018, 2016, 2012–14, 2008, 2004, 2000, and 1997 from NSI Labour Force Surveys (LFS) and in 1991 from Population Census (PC).
- 2015 and 2017 sectoral employment interpolated using trends of productivity.
- Pre-2012, interpolations and backwards extrapolations between benchmark years for non-agricultural sectors use trends from ILO Modelled Estimates.
- Pre-2012 interpolations and backwards extrapolations between benchmark years for agriculture use trends from ILO Modelled Estimates.
- Pre-2012, the ISIC 3 to ISIC 4 split assumed constant sub-sector shares of ISIC 3 parent sectors.

Namibia has performed population censuses (PC) in 1991, 2001, and 2011. Additionally, the NSI has released regular Labour Force Surveys with a relatively high frequency from 1997 onwards. As the 2001 and 2011 census employment data differ from both the surrounding LFS figures and those reported in other secondary sources, the LFSs are the preferred source of benchmark sectoral employment levels and provide benchmarks years in 2018, 2016, 2012–14, 2008, 2004, 2000, and 1997. The 1991 Population Census (PC) provides a final benchmark year. One exception is that the employment in 'Agriculture' is undercounted in the 2008 LFS, therefore the 2008 level data for this sector only is dropped and instead interpolated over as described below. In the more recent period, the only years without an LFS are 2017 and 2015, therefore these years are interpolated over using trends of sectoral productivity growth. Prior to 2012, the LFSs are less frequent and therefore all interpolations (and backwards extrapolation of 1990) are performed using trends from the ILO Modelled Estimates for non-agriculture sectors and trends from EAP in agriculture. Prior to 2012, all primary and secondary source data is in ISIC 3 classification, therefore the split to ISIC 4 is performed assuming that the ISIC 4 sub-sector shares of ISIC 3 parent sectors remained constant at their 2012 ratios.

Period	Sectoral data sources
1990–2018	Sectoral Current and Constant Price VA Data NSI National Accounts

- Current and constant price sectoral VA levels data taken directly from NSI National Accounts for entire time period.
- Pre-2000, 'Real Estate' VA is not reported separately, so the ratio of 'Real Estate' to 'Business Services' is held constant at the 2000 ratio.

The Namibian NSI provides complete and fully sector-disaggregated current and constant price VA data for the entire time period 1990–2018, and these levels are taken directly. The only exception is that 'Real Estate' VA is not reported separately from that of 'Business Services' prior to 2000, so the ratio of 'Real Estate' to 'Business Services' is held constant at the 2000 ratio. All constant price VA data is rebased from 2010 to 2015 prices.

Nepal

Employment

Period	Sectoral data sources
2018	2018 Labour Force Survey
1990–2018	Trends for ILO Modelled Estimates
2011	2011 Population Census
2008	2008 Labour Force Survey
1999	1999 Labour Force Survey

- Nepalese Fiscal Year runs July 15 XXXX to July 14 XXXX+1. UN Convention is to attribute all to year XXXX+1, this is followed here (in contrast to NSI convention to attribute all to XXXX)
- Benchmark levels from 2018, 2008, and 1999 Labour Force Surveys.
- 1990–2018 interpolations and backwards extrapolation use trends from ILO Modelled Estimates.
- Between benchmark years, ISIC 3 to ISIC 4 split based on relative labour productivity.
- 'Agriculture' and 'Other Services' levels dropped from 2018 benchmark year as levels are unrealistic; forwards extrapolated over instead. 2011 Population Census provides a replacement benchmark for 'Other Services', which is also dropped from the 2008 benchmark year for the same reason.

Nepal has conducted a population census every 10 years with the most recent being in 2011. However, due to more complete and specific employment data, Labour Force Surveys (LFS) from the NSI are the preferred source of benchmark levels. LFSs from 2018, 2008, and 1999 provide the sectoral employment level benchmark years, with two exceptions. 'Agriculture' employment numbers are not realistic in the 2018 LFS as they yield total employment sums which do not coincide with any other total employment sources, therefore 'Agriculture' is dropped from the 2018 benchmark and instead extrapolated from the 2008 benchmark. 'Other Services' employment is also dropped from the 2018 and 2008 benchmark years as the subcategories are not comprehensive and some employment is missing; instead, an alternative benchmark year for 'Other Services' employment level is drawn from the 2011 Population Census (PC), and 2008 and 2018 are instead inter/extrapolated. All interpolations and backwards extrapolations are performed using trends from the ILO Modelled Estimates of sectoral employment. If this ILO data is only in ISIC 3, the split to ISIC 4 in between the benchmark years is performed by weighting the parent sector trends on the basis of the relative labour productivities of the sub-sectors. All 'annual' data covers fiscal years rather than calendar years. Therefore, Employment data which is reported as 19XX or 20XX actually covers the period 15 July 19XX-1 to 14 July 19XX, etc. This approach matches the UN but is the opposite to that applied by the NSI.

Value added

Period	Sectoral data sources
1990–2018	Sectoral Constant Price VA Data from UN OCD
2001–18	Sectoral Current Price VA Data from UN OCD
2001–18	NSI Current Price VA Data for 'Public Administration' sector
2005 and 2001	World Input-Output Database (WIOD) Current Price VA Data
1990–2000	Current Price VA Data from UN 'Main Aggregates'

- Nepalese Fiscal Year runs July 15 XXXX to July 14 XXXX+1. UN Convention is to attribute all to year XXXX+1, this is followed here (in contrast to NSI convention to attribute all to XXXX)
- 1990–2018 Sectoral Constant Price VA Data taken directly from the UN OCD, in levels from 2001-onwards; applying trends pre-2001 to account for changes in the System of National Accounts (SNA).
- 2001–18 Sectoral Current Price VA Data taken directly from the UN OCD, in levels from 2001-onwards, but 'Public Administration' sector is missing. This sector is added from the NSI current price VA data, which is otherwise identical to the UN data.
- 1990–2001 Sectoral Current Price VA Data backwards extrapolated using trends from UN 'Main Aggregates' Data, where sub-sectors are assumed to follow same trends as their parent sectors.

 All VA data is in ISIC 3, therefore ISIC 3 to ISIC 4 split is performed for years 2005 and 2011 using sub-sector shares from those two releases of WIOD and held constant outside these years.

Sectoral VA in current and constant prices is available from the UN Official Country Database (OCD) for the period 1990-2018 and are used directly as sectoral VA levels for the period 2001-18. Prior to 2001, the sectoral constant price VA is backwards extrapolated using trends from sectoral VA data also from the UN OCD but complied under a different system of national accounts (SNA). This is equivalent to rendering all VA data consistently in SNA 1993. The sectoral current price VA is backwards extrapolated using trends from the UN 'Main Aggregates' Dataset, which is more aggregated than the UN OCD data, therefore sub-sectors are assumed to follow their parent sector trends. Additionally, the 'Public Administration, Education, & Health Services' current price VA data is missing from the UN OCD constant price figures, this is therefore taken directly from the NSI figures for the period 2001-18 (the NSI figures and UN figures match exactly other than this omission by the UN). Prior to 2001, the trend of the broad 'Services' sector is applied. As all VA data from both the UN and NSI is in ISIC 3, the ISIC 3 to ISIC 4 split is performed using the sub-sector shares from the 2005 and 2011 releases of the World Input-Output Tables (WIOD), as the only available VA data for Nepal which is disaggregated beyond ISIC 3. Post-2011 and pre-2005, ISIC 4 sub-sector shares are held constant; in between 2011 and 2005 they are linearly interpolated. All 'annual' data covers fiscal years rather than calendar years. Therefore, sectoral VA data which is reported as 19XX or 20XX actually covers the period 15 July 19XX-1 to 14 July 19XX, etc. This approach matches the UN but is the opposite to that applied by the NSI.

Nigeria

Employment

Period	Sectoral data sources
2009–18	Trends from ILO Modelled Estimates
1990–2018	Trend in EAP in Agriculture
2017	2017 Household Survey
2009	2009 Labour Force Survey
1990–2009	10SD Based Trends
2003	Agricultural Employment Level from 2003 Labour Force Survey

- Benchmark Levels from 2017 Household Survey and 2009 Labour Force Survey.
- Additional Benchmark for Agricultural Employment Level from 2003 Labour Force Survey.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.

- From 2009–18, all other sectors Extra- and Inter-polations use trends from ILO Modelled Estimates.
- Pre-2009, all other sectors Extra- and Inter-polations use trends from 10 Sector Database (10SD).
- Pre-2010, ISIC 3 to ISIC4 split assumes constant sub-sector shares.

Unfortunately, the Nigerian Population Censuses are of no use for providing sectoral employment benchmarks due to a complete lack of sector disaggregation. A 2017 highly disaggregated and large sample Household Survey released by the NSI provides the first benchmark year, and a 2009 Labour Force Survey provides the second benchmark year. Other Household and Labour Force surveys were too inconsistent or not sufficiently disaggregated to be considered for use as benchmarks, however the total agricultural employment level from a 2003 LFS was used as an additional benchmark level in that sector. Both the 2017 and 2009 benchmark surveys were sufficiently disaggregated to allow clean transformation into ISIC.4. Between 2009-2018, all interand extra-polations are done using trends from ILO Modelled Estimates. Pre-2009, all sectors are backwards extrapolated using trends from the 10 Sector Database (10SD)—as the 10SD is in ISIC.3, the intra-sectoral splits of 'Transport and Communications' and 'Financial Intermediation and Real Estate' are held constant at their 2009 shares. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years.

Value added

Period	Sectoral data sources
1990–2018	Sectoral Current and Constant Price VA from NSI.

- 1990–2018 Current and Constant Sectoral VA comes directly from NSI sector disaggregated VA data which is identical across different NSI reports.
- NSI Constant Price levels aggregated to 12 ISIC.4 sectors from deeper disaggregation by creating aggregate-sector price indices based on weighted averages.
- NSI Constant Price data rebased from 2010 to 2015 prices.

The Nigeria NSI has released highly sector-disaggregated VA data in ISIC.4 subcategories the entire sample period. Due to concerns about data accuracy, the VA data was cross checked across different NSI sources and reports and are fully consistent. The current price sector VA levels are therefore used directly, and the constant price VA levels are combined into the 12 broader ISIC.4 sectors by creating weighted average price indices from the sub-sectors based on their current price VA weights. Additionally, they were rebased from constant 2010 to 2015 prices. Note that Nigerian GDP has been subject to frequent and large upward revisions across recent years; the figures used are consistent with the most up-to-date revision and may therefore appear substantially larger than sectoral VA reported in earlier datasets.

Pakistan

Employment

Period	Sectoral data sources
2000–18	NSI Labour Force Surveys
2001, 2003, 2005, 2012, 2016, 2017	Productivity-Based Trends
2001, 2003, 2005, 2012, 2016, 2017	Agricultural Trends
1990–99	Productivity-Based Trends
1990–99	Agricultural Trends

- Benchmark Levels in 2000, 2002, 2004, 2006–11, 2013–15, 2018 (from LFS).
- For some aggregate sectors from 2000 to 2011, benchmark years split using shares from the closest LFSs in which the detailed data is available.
- In 2001, 2003, 2005, 2012, 2016, and 2017, where the LFSs are not available, all sectors are interpolated by Productivity-Based Trends except for agriculture.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- From 1990–99, all other sectors interpolations use Productivity-Based Trends.

Following the first census which was held in 1951 following independence, Pakistan has been conducting population censuses in every decade. The fifth population census was held in 1998 instead of 1991 and the latest census was in 2017. However, neither of the censuses is available online and the final report on the Population and Housing Census 2017 is yet to be published. Therefore, the Labour Force Surveys are used for the benchmark level estimates from 2000 to 2018 with gaps in several years (2001, 2003, 2005, 2012, 2016, and 2017). The gap years are filled with labour productivity interpolation method by using the closest years' benchmark level LFSs. Also, for some years and sectors, LFS employment data is aggregated in broad sectors. Therefore, the broad level employment data are split into ISIC 4 by using sub-sectoral shares of the closest LFSs in which the detailed data is available. From 1990 to 1999, because there is no official sectoral employment data source available, labour productivity growth between 2000 and 2007 has been used for extrapolation. The only exception is the agriculture sector, which is interpolated and extrapolated by using the agricultural employment trends. Finally, the LFS employment age classification is 10+ and there is no detailed data to derive the 15+ data.

Period	Sectoral data sources
2006–18	UN Official Country Data (UN OCD) Current and Constant Prices ISIC 4
1990–2005	UN Official Country Data (UN OCD) Current and Constant Prices ISIC 3

- 2006–18 current value added levels and price indices from UN OCD, checked against less-disaggregated NSI figures and IMF figures.
- Pre-2006 value added levels and price indices are also from UN OCD in ISIC.3 format, therefore ISIC.3 to ISIC.4 split assumes sub-sectors grow at parent sector trends.

Pakistan NSI publishes the annual national accounts in accordance with the UN System of National Accounts (SNA) 2008, but only limited sectoral details can be obtained from the official NSI website. Therefore, UN Official Country data was used for the current price sectoral value added and sectoral price indices but was checked against the broader NSI data to ensure it is consistent. The current price data and price indices were also checked against data from the IMF and are consistent. As the value added data for 1990–2005 is in ISIC.3 format, the trends of parent sectors were applied to their sub-sectors during the backwards-extrapolation procedure. Specifically, 'Communication and Business Services' was assumed to grow at the same rate as the sum of 'Transport and Communications' and 'Financial Services', 'Real Estate' was assumed to grow at the same rate as 'Financial Services' and 'Other Services' was assumed to grow at the same rate as the sum of 'Public Administration' and 'Other community, social and personal services'.

Peru

Employment

Period	Sectoral data sources
2017	Population census (ISIC rev 4 classification; 14+)
2011–16; 2018	Trend from Encuesta Nacional de Hogares (ENAHO, version 3)
1990–2010	Trend from GGDC 10SD

^{*} For 2011–16 and 2018, the trend from the Encuesta Nacional de Hogares (ENAHO, version 3) is used. Overlapping years are available. Data is obtained from the Socio-Economic Database for Latin America and the Caribbean (SEDLAC, version June 2020). This data is benchmarked to total employment growth. Total employment growth is the economically active population minus the unemployed, which is obtained from CEPALSTAT (statistics and social indicators, accessed June 2020).

Period	Sectoral data sources
2007–19	National accounts (ISC rev 4; current and constant prices)
1990–2006	Trend from GGDC 10SD

^{*} For the period from 2007–19, national accounts data is obtained from the Statistical Office (Instituto Nacional de Estadística e Informática, accessed June 2020).

The Philippines

Employment

Period	Sectoral data sources
2001–18	Annual LFS from NSI
1990–2001	Trends from NSI Labour Statistics Retained by ILO

- From 2001–18, sectoral employment Levels from the NSI annual Labour Force Survey
- From 1990–2001 sectoral employment backwards extrapolated using trends from trends from Labour Statistics retained by the ILO, drawn from earlier LFS.
- From 1990–2011, source data is in ISIC3. The split to ISIC.4 is performed assuming subsectors retain their constant 2011 shares of their parent sectors for the period 2001–11, and assuming sub-sectors follow their parent sector trends pre 2001.

The NSI of the Philippines has made available annual Labour Force Surveys from 2001 onwards, sectoral employment levels are drawn from these surveys. This approach is preferred to mixing with employment levels from the population censuses, which are released every five years, as the LFS is specifically targeted at measuring labour force variables and employs a constant employment definition and methodological approach. Prior to 2001, annual LFS were also conducted; these data are no longer available directly from the NSI but were retained from the ILO. Due to some inconsistency between the levels of the two series, the direct NSI employment levels were backwards extrapolated using trends from the ILO retained sectoral data. From 2011, the LFS have been released in clean ISIC.4 classification; prior to 2011, data is in ISIC.3, though with some subcategories also reported from which ISIC.4 sectors could be assembled. However, constructing the 'Business Services' sector from that portion contained within 'Transport and Communication' and that portion contained within 'Real Estate, Renting and Business Services' was possible only by assuming each sub-sector comprised a constant proportion if the parent sector from 2011 backwards. Prior to 2001, in cases when it was not possible to cleanly assemble the ISIC.4 sub-sectors from the ILO retained data, the backwards extrapolation was performed assuming ISIC.4 sub-sectors shared the trends of their ISIC.3 parent sectors. The two procedures are completely analogous.

Period	Sectoral data sources
1998–2018	NSI Official GDP Data, Current and Constant Prices
1990–98	Current and Constant Price Trends from GDP data from precursor-NSI

- 1998–2018 sectoral VA current and constant price levels from NSI National Accounts Official GDP Data.
- 1990–98 all sectors current and constant price VA backwards extrapolated using trends from sectoral GDP data released by a precursor-NSI, the 'National Statistical Coordination Board'.
- Pre-1998, the ISIC.3 to ISIC.4 split assumed sub-sector trends match their ISIC.4 parent sectors.

The Philippines NSI has published official sector-disaggregated GDP data from 1998 in both current and constant prices. Whilst data is not always reported in ISIC.4 categorization, it is sufficiently disaggregated that it can be cleanly reassembled into the twelve ISIC.4 sectors. Prior to 1998, sectoral GDP data was released by an earlier manifestation of the NSI called the 'National Statistical Coordination Board'; this data is no longer publicly available but was retained in the construction of the 10 Sector Database (10SD). As the sectoral VA levels do not connect smoothly to the current-NSI data, the current-NSI sectoral current and constant price data were backwards extrapolated using trends from this precursor-NSI data. As these precursor NSI data were in ISIC.3 classification, the backwards extrapolation assumes ISIC.4 sub-sectors followed the same trends as their ISIC.3 parent sectors from 1998 backwards.

Rwanda

Employment

Period	Sectoral data sources	
2016–18	NSI Labour Force Surveys	
1990–2018	Trend in EAP in Agriculture	
1990–2016	Productivity-Based Trends	
2012	2012 Population Census	
2002	2002 Population Census	
1991	1991 Population Census	

- Benchmark Levels for all sectors in 2012, 2002, and 1991 from Population Censuses and for all sectors except Agriculture in 2018, 2017, and 2016 from Labour Force Surveys.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends, including 2012–18.
- From 1990, all other sectors Extra- and Inter-polations use Productivity-Based Trends.
- 2002 and 1991 census sectoral levels are split from broader aggregates to ISIC.4 assuming constant 2012 sub-sector shares.

Rwanda holds a population census approximately every ten years, the most recent being 2012, and the 2012, 2002, and 1991 PCs provide the main benchmark years for sectoral employment levels across all sectors. Additionally, from 2016 onwards, the Rwanda NSI has performed an annual labour force survey—therefore, the 2016, 2017, and 2018 releases of this LFS form additional benchmark years for employment levels in all sectors except agriculture. As these LFSs appears to systematically undercount agricultural employment, the Agriculture numbers are dropped in favour of extrapolating forwards from the 2012 census agricultural employment count. Between 1990–2016, all inter- and extra-polations are done using trends from sectoral productivity-based estimates. The exception is Agriculture, for which numbers of Economically Active Population in Agriculture trends are used for all extrapolation and interpolation outside benchmark years, including forwards extrapolation through to 2018 due to the lack of reliability of the Agricultural employment numbers in the 2016-18 LFSs. The 2002 census is only in ISIC.3 sectoral classification, and the 1991 census utilizes even broader sector aggregates, therefore the intrasectoral splits of Transport and Communications, and Financial Intermediation and Real Estate, are held constant at their 2012 shares when performing the split to ISIC.4. The censuses report sectoral employment data across different age classifications, with 16+ being the closest to our preferred 15+ classification, therefore 16+ is the employment age classification of the benchmark year levels. The sectoral employment totals in all years are compared against other databases and are broadly consistent.

Value added

Period	Sectoral data sources
1999–2018	Sectoral Current and Constant Price VA from NSI.
1990–99	Trends from UN OCD Current and Constant Price VA.

- 1999–2018 Current and Constant Sectoral VA comes directly from NSI sector disaggregated VA data.
- 1990–99, current and constant price VA is extrapolated backwards using trends from the UN OCD figures.
- NSI Constant Price levels aggregated to 12 ISIC.4 sectors from deeper disaggregation by creating aggregate-sector price indices based on weighted averages.

The Rwanda NSI has released highly sector-disaggregated VA data in ISIC.4 subcategories from 1999 onwards. The current price sector VA levels are therefore used directly for this period, the constant price VA levels are combined into the 12 broader ISIC.4 sectors by creating weighted

average price indices from the sub-sectors based on their constant price VA weights, and then applying these to the current price levels. Pre-1999, the sectoral VA figures are backwards extrapolated using trends from the UN OCD current and constant price sectoral VA data, these are also sufficiently disaggregated as to be easily shaped into ISIC.4. The total VA sums in each year were compared with the totals from the IMF World Economic Outlook database (IMF-WEO), which provides annual figures for GDP net of taxes and subsidies for the entire time period, and are extremely accurate, both in current and constant local prices.

Senegal

Employment

Period	Sectoral data sources	
2005	Situation Economique et Sociale of Sénégal (SES)	
2011	Household Survey	
2017	Enquête Régionale Intégrée si l'Emploi et le Secteur Informel (ER ESI) Sénégal, 2017	
1990–2004	Trend from GGDC 10SD	

^{*} Total persons engaged for 2005 is based on SES 2005 and refers to persons aged 17+. Total employment was extrapolated to 2017 using PWT 9.1. 2018 was extrapolated using the 'Note analyse comptes nationaux 2018' from the Statistical Office (ANSD).

^{*} For 2011 and 2017, the sectoral shares from the household survey and the ERI-ESI were applied to total persons engaged (as calculated see above). For mining, the 2011 household survey reports a high employment share that differs substantially from the 2005 SES and 2017 ERI-ESI. Mining employment in 2011 is estimated as the average employment from the 2005 SES and 2017 ERI-ESI.

^{*} For 2006–10, and 2012–16: Interpolation for non-agricultural sectors using average sectoral productivity growth rates between 2005 and 2011, and between 2011 and 2017 respectively. Agriculture interpolated using trend from agricultural employment series. Sectoral estimates are benchmarked to total employment.

^{*} For 2018: extrapolation for non-agricultural sectors using average sectoral productivity growth rates between 2011 and 2017. Agriculture interpolated using trend from agricultural employment series. Sectoral estimates are benchmarked to total employment in 2018.

Period	Sectoral data sources	
1990–2017	UN OCD (current and constant prices)	
2018	Note analyse comptes nationaux 2018	

^{* 2018} data obtained from 'Note analyse comptes nationaux 2018' published by the Statistical Office (ANSD, see Table 7 and 8).

Singapore

Employment

Period	Sectoral data sources
2002–18	Annual LFS from NSI in Yearbook of Manpower Statistics
2011–18	Annual services statistics (In Yearbook of Statistics Singapore 2019, pp.151–52)
1990–2018	ILO Modelled Estimates

- 2008–18 Sectoral employment levels from annual LFS (given in SSIC 2015- comparable to ISIC.4)
- 2008–18 shares from ILO modelled estimates used to disentangle 'Agriculture', 'Mining' and 'Utilities' sectors.
- 2002–08 Backcasting using growth rates of LFS (in SSIC 2005) & 10 SD
 - o 10SD only used for Agriculture, Utilities and Mining (not given in LFS)
- Pre-2007, ISIC 3 to ISIC4 split assumes constant sub-sector shares. 'Public Administration' assumed to follow trend of 'Other Services'.
- 1990–2002 all sectors Extrapolations use trends from 10SD

Singapore now conducts a census (PC) every decade, with the most recent being 2010. Prior to 2000, censuses were conducted every five years. From 2002 onwards, high quality Labour Force Surveys (LFS) are available amongst the data in the Yearbook of Manpower Statistics. As the employment definition is more comprehensive in the LFS than the PC and the frequency is annual, these LFS figures are preferred for the sectoral employment levels. Mining & Quarrying; Agriculture; and Electricity, Gas, & Water Supply are not separated in any data from the NSI as these sectors are extremely small in Singapore; therefore, the shares from ILO modelled estimates were applied to the NSI aggregates in order to disaggregate these sectors. Singapore uses its own sectoral classification system (SSIC 2015), which is comparable to ISIC rev. 4. Prior to 2008, it used SSIC 2005, which is similar to ISIC.3, these were disaggregated by backwards extrapolation

from the 2007 shares at the trends of the combined parent sectors in the cases of Transport Services; Trade services, hotels & restaurants; Business Services; and Real Estate Activities, and at the employment trend of Other Services in the case of Public Administration & Defence, Education, Health & Social Work. Prior to 2002, employment data is obtained by backcasting using the growth rates from the 10 Sector Database (10SD). The sectoral disaggregation to ISIC.4 is done exactly as for the period 2002–07. Population censuses are not used as benchmarks since they only report employed residents, not taking into account the large numbers of employees commuting from neighbouring countries to Singapore every day. Hence, population census data tends to be highly underreported. Labour force surveys are therefore relied upon.

Value added

Period	Sectoral data sources	
1990–2018	NSI Official GDP Data, current prices	
2000–17	NSI Official Annual Services Statistics, current prices	
1990–2000	UN National Accounts Data, current prices	
1990–2018	UN National Accounts Data, price indices	

- 1990–2018 current price sectoral VA from NSI National Accounts.
- 2000–17 several sectors disaggregated using current price shares from NSA Annual Services Statistics.
- 1990–2000 several sectors disaggregated using current price shares from UN National Accounts Data.
- 1990–2018 constant price sectoral VA calculated using sectoral price indices from UN National Accounts Data.

Singapore NSI has published annual sectoral value added data in current prices for the entire time period, and these levels are used. However, some service sectors are not disaggregated, specifically Communication & business services; Real estate activities; Public Administration & Defence, Education, Health & Social work; and Other services. A more detailed account of Annual Services Statistics has been published annually from 2000, and these shares are applied to the VA levels to disaggregate these sectors. The disaggregation for 2018 still had to be based on the 2017 sector shares. Also, Agriculture and Mining are separated using the same shares as in the 10SD. Prior to 2000, these sectors are disaggregated using the shares from the UN National Accounts data. As Singapore does not publish constant price data at the sectoral level, sectoral price indices from the UN National Accounts data were used to generate the constant price sectoral VA for the entire time period. No price indices were available for Mining & Quarrying and Public Administration & Defence, Education, Health & Social work; therefore, the price indices for Agriculture and Other Services were used, respectively.

South Africa

Employment

Period	Sectoral data sources	
2008–18	Quarterly Labour Force Surveys from NSI	
2007	Productivity-Based Trends	
2001–07	Biannual Labour Force Surveys from NSI	
1990–2001	10SD Based Trends	

- From 2008–18, sectoral employment levels are taken from Quarterly Labour Force Surveys (QLFS) from the NSI.
- From 2001–07, sectoral employment is backwards extrapolated using trends from Biannual Labour Force Surveys (LFS) from the NSI.
- Prior to 2000, sectoral employment is backwards extrapolated using trends from the 10 Sector Database (10SD).

Since the 1990s, the South African NSI has conducted specialized and representative labour market surveys that provide sectoral employment figures. These household-based surveys are regarded as the most comprehensive and reliable data sources for the South African labour market, although the Population Censuses (PC) also include labour-related questions. For this reason, household survey data from the LFSs serve as the benchmarks for the construction of the sectoral employment series.

From 2008 onwards, the Quarterly Labour Force Survey (QLFS) has been conducted, covering a sample of approximately 30,000 dwellings. The QLFS reports the industry (3-digit ISIC) in which the interviewed person is engaged, using an age 15+ employment definition. By assigning this detailed employment information to one of the twelve ISIC 4 sectors and taking into account the survey weights, the QLFS can be used to determine the quarterly sectoral employment levels for 2008 to 2018, whereby the small 'Begging' sector is dropped. Yearly employment levels are then calculated as the average of the four quarters, thereby implicitly smoothing over seasonality. However, subsistence farming is not adequately captured by this section of the QLFS and agricultural employment is therefore undercounted. To address this problem, the number of persons involved in subsistence farming and hunting is approximated by the (weighted) number of persons stating in the QLFS to have been engaged in farm work or catching food during the last seven days, although this is a different question of the QLFS from the other sectoral employment question. Even though seven days appear to be a quite short reference period, some seasonality effects can be offset by the fact that the average of four 7-day periods spread over the annual quarters is used. Nevertheless, the problem of potential double counting of persons remains (e.g. a person employed in manufacturing might be simultaneously involved in subsistence farming). Despite these shortcomings, the approximation used is believed to be the best possible one given the available data and is furthermore consistent with the approach in the 10 Sector Database (10SD)—a small potential overcounting of the agricultural sector is preferable to a large undercounting.

From 2001–07, biannual *Labour Force Surveys (LFS)* have been the official sources for labour market statistics in South Africa. Sectoral employment levels can be derived from these LFSs, analogous to the approach regarding the QLFS. Trends in these sectoral employment levels are used to extrapolate sectoral employment backwards from 2008. Due to lack of an overlap year between the QLFS and LFS, the employment levels for 2007 are calculated based on trends in total labour productivity. Additionally, the total of persons engaged is extrapolated from 2008 using the trend of total employment from the 10 Sector Database, and sectoral employment is normalized to this total.

In the 1990s, yearly *October Household Surveys* have been conducted between 1995 and 1999 that also reported some sectoral employment. However, the sectoral detail available is not sufficiently disaggregated and the survey methodology and counts seem to be inconsistent over time. Therefore, sectoral employment prior to 2001 is extrapolated backwards using trends from the 10SD. As the 10SD is in ISIC 3 classification, the ISIC 4 sub-sectors are assumed to follow the same trends as their ISIC 4 parent sectors—this is akin to holding these sub-sectors shares constant at their 2001 LFS shares.

Value added

Period	Sectoral data sources	
1990–2018	UN Official Country Data (UN OCD) Current and Constant Price VA	
1993–2018	Time series data on Quarterly Current and Constant GDP from NSI	
1993–2014	Historical Current and Constant GDP Series from NSI	

- For the entire period 1990–2018, most Sectoral VA levels come from UN Official Country Data (UN OCD) current and constant price sectoral VA data in ISIC 3.
- Additional data from the above NSI sources used to perform elements of the ISIC 3 to ISIC 4 split.
- Due to data limitations, constant industry shares are assumed for distinguishing 'Business Services' and 'Real Estate' before 1993 and after 2014, and for separating 'Government Services' and 'Other Services' before 1993.

The value added figures from the South Africa NSI are not sufficiently sector-disaggregated, so UN Official Country data is therefore the best available source for current and constant price sectoral value added, and provides benchmark levels for the entire time period. However, the sectoral classification is completely in ISIC 3 and does not provide sufficient detail to allow for clean disaggregation into ISIC 4. This split is performed using additional NSI data and some assumptions. In the case of current price sectoral VA, the UN OCD data reports 'Communication' separately, allowing it to be extracted from 'Transport and Communication', but does not provide either 'Business Services' or 'Real Estate' separately. This split is therefore performed using the respective industry shares from a series on historical GDP provided by the NSI for the years 1993 to 2014. Before and after this time period, constant 1993 and constant 2014 ratios of the two subsectors are assumed respectively. Additionally, the UN OCD does not report 'Government Services' and 'Other Services' separately. This split is therefore performed using the respective

industry shares from a series on quarterly GDP provided by the NSI for the years 1993 to 2018. Prior to this period, the 1993 ratio of the two sectors is assumed to remain constant. For the constant price sectoral VA, the same sectors are insufficiently disaggregated. However, as the constant price data is calculated by application of price indices, these indices cannot be aggregated by addition, as in the case of the current VA data, and are instead weighted averages of the price deflators of the ISIC 3 parent sectors with weights based on the relative sizes of the industries. In the time periods when the NSI supporting data is not available, ISIC 4 sub-sectors are assumed to share a common price index with their ISIC 3 parent sector.

Sri Lanka

Employment

Period	Sectoral data sources	
1990–2018	Central Bank of Sri Lanka, Labour Force and Employment Data	
2018	2018 NSI Labour Force Survey	
2002–07, 2009–17	Asian Development Bank: Sectoral employment based on Sri Lankan LFS	
2008	2008 NSI Labour Force Survey (from 2010 Annual Report)	
1990–2018	Trend in EAP in Agriculture	
1990–2002	Productivity-Based Trends	

- Total employment levels for all years are taken from labour force series provided by the Central Bank of Sri Lanka.
- From 2002–17 (exception 2008), the total employment is split into sectors using sectoral employment data provided by the Asian Development Bank.
- 2008 and 2018 Labour Force Survey (LFS) data, retrieved from NSI Annual Reports, used to interpolate 2008 and extrapolate 2018.
- Employment prior to 2002 is extrapolated backwards using trends in agricultural employment for Agriculture sector and total labour productivity trends for all other sectors.

Between 1990 and 2018, there was just one representative population census in Sri Lanka. Therefore, two alternative sources are used to construct the employment series: total employment levels from the Data Library of the Central Bank of Sri Lanka and sectoral employment estimated by the Asian Development Bank (ADB). The series of total employment shows a break due to a change in employment definition in 2011 - before 2011, persons of 10 years and older are included whereas from 2011 onwards, persons of 15 years and older are included. Therefore, the total employment before 2011 is extrapolated backwards, using the trends reported by the ADB (for

2010 to 2011) and the Central Bank Data Library (for all other years). This effectively applies the 15+ employment definition throughout. The ASD data comprises sectoral employment data based on official Sri Lankan Labor Force Surveys (LFS) for 2002 to 2017 and is sufficiently disaggregated to allow for a clean ISIC 4 split. Data for 2008 is missing. The sectoral employment levels are interpolated using information from the LFS Annual Report 2010 which provides sectoral employment for 2007, 2008 and 2009. Some sectors of that report are not sufficiently disaggregated. In this case, average shares for 2007 and 2009 from the main ADB series are applied—these smaller sectors are therefore linearly interpolated across this one missing year. A similar approach is used to extrapolate 2018 employment - trends as listed in the LFS Annual Report 2018 are used and constant 2017 employment shares assumed when the sectoral detail is not sufficient. Prior to 2002, there is no official country data on sectoral employment available. Therefore, prior to 2002, employment in 'Agriculture' is backwards extrapolated using trends from the Economically Active Persons in Agriculture in Sri Lanka, and all other sectors are backwards extrapolated using trends in total labour productivity.

Value added

Period	Sectoral data sources	
2010–18	Current and Constant Price VA from NSI	
2002–10	Current and Constant Price VA from Central Bank of Sri Lanka	
1998–2002	GDP by Industrial Origin at Current and Constant Producer Prices, NSI	
1990–98	Current and Constant Price VA from UN OCD	

- 2010–18 sectoral current and constant price VA levels direct from NSI.
- 2002–10 sectoral current and constant price VA backwards extrapolated using trends from National Accounts data retrieved from Central Bank Data Library.
- 1998–2002 sectoral current and constant price VA backwards extrapolated using trends from GDP by Industrial Origin at Current and Constant Producer Prices data from NSI.
- 1990–98 sectoral current and constant price VA backwards extrapolated using trends from UN Official Country Data (OCD).
- Prior to 2010, the ISIC 3 to ISIC 4 split assumes constant sub-sector shares of ISIC 3 parent sectors.

In a time series of detailed GDP statistics covering 2010 to 2018, the NSI reports sectoral VA in both current and constant prices which is sufficiently sectorally disaggregated to provide level data in ISIC 4. From 2002–10, current and constant price sectoral VA is backwards extrapolated using trends from National Accounts data retrieved from the Data Library of the Central Bank of Sri Lanka. From 1998–2002, current and constant price sectoral VA is backwards extrapolated using trends from a table on GDP by Industrial Origin at Current and Constant Producer Prices provided by the NSI. Prior to 1998, current and constant price sectoral VA is backwards extrapolated using trends from in UNSD National Accounts Official Country Data (UN OCD). As all data prior to 2010 is in ISIC 3 classification, the sectors of 'Transport and Storage', 'Real

Estate', 'Business Services', and 'Financial Services' are not reported separately and therefore the split to ISIC 4 assumes constant 2010 shares—this is akin to assuming that ISIC 4 sub-sectors follow a common trend with their ISIC 3 parent sectors.

Taiwan

Employment

Period	Sectoral data sources
2009–18	Statistical Yearbooks from NSI, from NSI 'Manpower' LFS
1995–2009	WIOD SEAs
1990–94	Bulletins from precursor NSI

- 2009–18 sectoral employment Levels from the NSI 'Manpower' LFS in Statistical Yearbooks.
- 1995–2009 sectoral employment backwards extrapolated using trends from the WIOD socio-economic accounts.
- 1990–94 sectoral employment backwards extrapolated using trends from statistical bulletins from a precursor agency to the current NSI. Data was saved during construction of 10SD.
- Pre-1994, ISIC 3 to ISIC4 split assumes constant sub-sector shares.

Taiwan produces a population census (PC) every ten years, the most recent being 2010, however they do not contain information on employed persons per industry, at least in the English language releases. The NSI also publishes annual statistical yearbooks which are a compendium of census and other official statistical data, the employment date comes from the NSI 'Manpower' Labour Force Surveys (LFS). Sectoral employment figures for the period 1995–2009 are not available from the NSI, so figures from the World Input-Output Database Socio-Economic Accounts (WIOD SEAs) were used. From 1990–94, a precursor NSI published annual statistical bulletins, from which sectoral employment figures could be obtained. Both the statistical yearbooks and WIOD report figures in ISIC.4, so no further disaggregation was necessary. The precursor NSI figures are in ISIC.3, these were disaggregated using their constant employment shares of the parent sector in 1995, and the relevant sub-sectors were assumed to grow at the rates of their parent sectors. The exception is Communication and business services which was had subcomponents in two different parent sectors, this sub-sector was therefore assumed to grow at the weighted average rate of the two parent sectors.

Period	Sectoral data sources	Notes
1990–2018	NSI Official GDP Data	Current Price Levels
		Constant Price Levels, rebased

- 1990–2018 current price sectoral VA from NSI National Accounts.
- 1990–2018 constant price sectoral VA from NSI National Accounts, rebased to 2015 prices.

Taiwan NSI has published annual sectoral value added data in both current and constant prices for the entire time period. All VA figures are reported in ISIC.4, so no further disaggregation was necessary. Constant price data from the NSI is in chained 2016 prices and was therefore rebased to 2015 prices. Some very small sub-sectors of the Other Services sector are not included in the National Accounts figures, specifically Activities of Households as Employers and Activities of Extraterritorial Organizations & Bodies, therefore these are not present in the Other Services Value added.

Tanzania Mainland

Employment

Period	Sectoral data sources
2014–18	Productivity-Based Trends
1990–2018	Trend in EAP in Agriculture
1991–2014	ILO Modelled Estimates Trends
1990	10SD Based Trend
2014	2014 NSI Labour Force Survey
2006	2006 NSI Labour Force Survey
2002	2002 Population Census
1991	1991 NSI Labour Force Survey

- All figures are for Tanzania Mainland only and do not include Zanzibar.
- Benchmark Levels in 2014, 2006, and 1991 from LFS and in 2002 from PC.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- From 2014, all other sectors Extra- and Inter-polations use Productivity-Based Trends.

- From 1991–2014, all other sectors Extra- and Inter-polations use Trends from ILO Modelled Estimates.
- Pre-1991, all other sectors are backwards extrapolated one year using Trend from 10 Sector Database (10SD).
- Pre-2014, ISIC 3 to ISIC4 split assumes constant sub-sector from sector-detailed 2014 LFS.

Tanzania held population censuses in 2012 and 2002, however there was no census in 1992. The censuses have problems for establishing sectoral employment levels as they use highly nonstandard sector classifications and do not disaggregate many of the smaller service and other sectors. A 2014 labour force survey, in pure ISIC.4 classification, was therefore deemed preferable for the later benchmark. Labour Force Surveys in 2006 and 1991 also form benchmark level years, along with the 2002 population census which is adjusted to conventional ISIC.4 categorization by first normalizing using the broad ISIC three aggregate shares for the nearby 2006 LFS, and then assuming a constant ISIC.3 to ISIC.4 split as in the 2014 LFS. All other benchmark years also assume this constant ISIC.3 to ISIC.4 split. The PCs and LFSs use a 10+ employment age definition for the sector disaggregated figures, however they also include broader aggregate figures with the 15+ definition, therefore the sectoral employment levels have been normalized to these broader aggregates where possible such that they are now the 15+ levels. All figures for Tanzania are for the mainland only, and do not include Zanzibar. Whilst the NSI has recently released some separate figures for Zanzibar (in general census figures are available for Zanzibar but LFS figures are not), there are no between-benchmark figures available to add in trends. However, the recent reports suggest the structure of the Zanzibar economy is very different from that of the mainland, with a much smaller agricultural share. The sectoral employment figures are forwardsextrapolated from 2014 using trends from sectoral productivity-based estimates, as no more detailed information is available. Between 1991–2012, interpolations are done using ILO modelled estimates. Pre-1991, the sectoral employment levels are backwards extrapolated one year using the trends from the 10 Sector Database (10SD). The exception is Agriculture, for which numbers of Economically Active Population in Agriculture trends are used for all extrapolation and interpolation outside benchmark years.

Value added

Period	Sectoral data sources
2005–17	UN Official Country Data (UN OCD) Current and Constant Prices in ISIC.4
1990–2005	UN OCD Current and Constant Prices in ISIC.3

- All figures are for Tanzania Mainland only and do not include Zanzibar.
- Current value added levels and price indices from UN OCD.
- Pre-2005, there was sufficiently disaggregated data to cleanly perform the ISIC 3 to ISIC4 split for most sub-sectors; the exception was splitting Financial Intermediation, Real Estate and Business Services for which a constant split was assumed from 2005 backwards.

• Price index splits performed using sector-VA weights from current VA figures.

The value added figures from the Tanzania NSI are not sufficiently sector-disaggregated, so UN Official Country data is therefore the best available source for current price sectoral value added, and sectoral price indices. The UN totals compare well with the NSI broad aggregates. **All figures for Tanzania are for the mainland only, and do not include Zanzibar.** From 2005, the UN figures are in pure ISIC.4 and therefore can be used directly, with sector constant price VA being the current price totals divided by the sectoral price index. Pre-2005, the figures are reported in ISIC.3, however there is sufficient additional sectoral disaggregation such that it is possible to cleanly split most sectors to ISIC.4. The exception is the Financial Intermediation, Real Estate and Business Services sectors, which are therefore split assuming constant shares of the aggregate total from 2005. When disaggregated sectors are split and recombined in the price index data, they are weighted by each sub-sector share of the total aggregate current price VA.

Thailand

Employment

Period	Sectoral data sources
2011–18	NSI Labour Force Surveys ISIC 4
2001–11	NSI Labour Force Surveys ISIC 3.1
1990–2000	National Economic and Social Development Council (NESDC) Labour Force Surveys ISIC 2

- Benchmark levels for 2011–18 from the NSI Labour Force Surveys in ISIC 4 categorization.
- Benchmark levels for 2001–11 from the NSI Labour Force Surveys in disaggregated ISIC 3.1, mapped to ISIC 4.
- For some aggregate sectors from 2001 to 2004, the sectoral employment split assumes constant shares from the 2005 LFS.
- From 1990 to 2000, backwards extrapolation is performed using trends from LFSs retained by the NESDC.
- From 1990 to 2000, LFSs are available only in ISIC 2 categorization. The growth trend of the overall services sector is used for services sub-sectors from Business Services through to Other Services, inclusive.

The Thailand NSI conducts a Population Census (PHC) every ten years, the most recent release being 2010. In addition, the Thai NSI or other public bodies have conducted very regular Labour Force Surveys (LFS) since 1963. The LFSs are used for the benchmark level estimates since the PHCs overestimate some sectors, and the choice of the LFSs is consistent with that made in constructing the 10 Sector Database (10SD). The LFSs were conducted three rounds a per year until 1997 and four rounds per year since then. For each year, the annual data is calculated by averaging available quarterly values—this yields estimates with are both consistent and do not contain seasonality. The LFS methodology has been changed several times; in 2001, 2005, and

2011. From 2001 to 2018, the employment data covers people aged 15 years old and over. The recent LFS methodology covering from 2011 to 2018 is in ISIC Rev. 4 format and compatible with the international standards. From 2001 to 2010, the NSI provides sectoral employment data in disaggregated ISIC Rev. 3.1 format, which can be mapped to ISIC Rev. 4. The 2001 to 2004 LFSs are less sectorally disaggregated, therefore the sectoral employment split assumes constant sub-sectors shares from the 2005 LFS for these years. From 1990 to 2000, sectoral employment is only available in ISIC 2 format, data for which was retained by the National Economic and Social Development Council (NESDC) of Thailand. Therefore, for the period from 1990 to 2000, the sectors are interpolated by using trends from these ISIC Rev. 2 LFS data. The use of trends retains the 15+ employment definition. For this period, the services sub-sectors 'Business Services', 'Financial Services', 'Real Estate', 'Government Services', and 'Other Services' are all assumed to grow at the common trend of the overall services sector.

Value added

Period	Sectoral data sources
1990–2018	NESDC – Sectoral Current Price VA Data ISIC 4
1990–2018	NESDC – Sectoral Constant Price VA Data ISIC 4

- 1990–2018 current and constant value added levels from the NESCD.
- Price indices are calculated by using sub-sectoral shares for utilities, trade services, business services, government services, and other services.

The National Economic and Social Development Council (NESCD) is responsible for publishing the national accounts in Thailand. From 1990 to 2018, the NESCD provides current and constant value added data in compatible with the UN System of National Accounts (SNA) in ISIC Rev. 4 format—these figures are used directly as the sectoral VA levels. Sectoral price indices are calculated by using official current and constant value added figures. For the aggregated sectors (i.e. utilities, trade services, business services, government services, and other services), price indices are calculated by using detailed sectoral level data. Both current and constant value added figures are checked against UN official country data. In addition, total current and constant value added data and price deflators are compared with IMF World Economic Outlook figures to check the consistency.

Tunisia

Employment

Period	Sectoral data sources
2006–18	Trends from Private Sector Employment Data in Tunisian Business Register from NSI
2014	2014 Population Census
2007–12	Annual Labour Force Surveys
1999–2005	Annual Labour Force Surveys
2004	2004 Population Census
1990–99	Trends from ILO Modelled Estimates
1994	Population Census

- Benchmark Years in 2014, 2004, and 1994 from Population Censuses, and 2007–12, and 1999–2005 from annual Labour Force Surveys.
- 2014–18 forwards extrapolation and 2006 interpolation use trends from sectoral Private Sector Employment Data reported in Tunisian Business Register.
- Pre-1999 backwards extrapolation uses trends from ILO Modelled Estimates.
- Some sub-sectors are missing from 2014 PC, these shares are held constant at the 2012 levels, which are extrapolated from the 2004 PC using the LFS trends.
- 'Mining and Quarrying' and 'Utilities' sectors not split in LFS figures, therefore split using ratio from 2004 PC.
- ISIC 3 to ISIC 4 split of the LFS figures uses shares from the more disaggregated Private Sector Employment Data reported in Tunisian Business Register.

Tunisia has conducted a population census (PC) every 10 years, the most recent being in 2014. The 2014, 2004, and 1994 population censuses provide sectoral employment levels benchmark years. Additional levels benchmark years come from annual Labour Force Surveys which were performed between 1999–2005 and 2007–12. Sectoral employment is forwards extrapolated from 2014–18 using trends from Private Sector Employment Data which is available in the Tunisian Business Register published by the NSI; this data provides sectoral employment levels but in the private sector only—it is therefore assumed that public and private within-sector employment grew at the same rate for this period. Trends from this data is also used to interpolate 2006, which is missing from the set of LFSs. Pre-1999, all sectoral interpolations and backwards extrapolations (around the 1994 benchmark PC data) are performed using trends from the ILO modelled estimates. The 2004 PC is fully disaggregated in terms of sectors, however some sectors ('Communication & Business Services', 'Financial Services', and 'Real Estate') are missing from the 2014 PC data. Therefore, for these sectors, they are interpolated over 2014 using the LFS and

then Private Sector Employment trends, based off the 2004 PC benchmark levels. 'Mining and Quarrying' and 'Utilities' are not separated in any of the LFS data, therefore this aggregate sector is split by applying the constant ratio of these two sub-sectors from the 2004 PC data. Otherwise, the LFSs are split from ISIC 3 to ISIC 4 using sub-sector shares from the Private Sector Employment Data.

Value added

Period	Sectoral data sources
2018	Growth Rate of VA in Current Prices from Statistics Monthly Bulletin
2000–18	Sectoral Current and Constant Price VA Data from NSI
1990–2017	Sectoral Current and Constant Price VA Data from UN OCD

- From 2000–18, current and constant price sectoral VA levels data is primarily from the NSI, where constant price data is rebased to 2015 prices.
- From 2000–18, some sectors are disaggregated beyond ISIC 4, and their price indices are combined as weighted averages of the sub-sector price indices based on the relative sizes of the sub-sectors.
- From 1990–2000, current and constant price sectoral VA data is backwards extrapolated using trends from the UN OCD sectoral VA data.
- From 1990–2017, current and constant price VA levels for 'Business Services and Real Estate' come entirely from UN OCD data. As these are nowhere disaggregated, the split is performed using the ratio of the employment numbers for these two sectors, and Real Estate is assumed to share the price index of 'Other Services'.
- For 2018, as this year is missing from the UN current price data, the above sectors are extrapolated one period forward using growth rates from the 2018 Statistics Monthly Bulletin. Real Estate uses the growth rate of Financial Services.
- From 1990–2000, the UN OCD data is in ISIC 3 and not sufficiently disaggregated to split the 'Business Services', 'Financial Services', and 'Real Estate' sectors cleanly. Therefore, these sectors are backwards extrapolated using the common trend of their aggregate employment. This also assumed that they shared a common price index for this period.

Sectoral VA in current and constant prices is available from the NSI for the period 2000–18, and these data are used as the sectoral VA levels. Some sectors are further disaggregated than the ISIC.4 twelve sectors (specifically, 'Mining & Quarrying', 'Extraction of Oil & Refined Petroleum', 'Electricity & Gas', 'Water Supply', 'Trade Services', and 'Hotels & Restaurants')—for the current price series, these can be combined simply by addition. However, for the constant price series, combined price indices are calculated as weighted averages of the sub-sector price indices with the weights based on the relative sizes of the sub-sectors across two-year averages. Furthermore, 'Business Services and Real Estate' is completely missing from the NSI figures, therefore the levels from this combined sector are taken directly from the UN Official Country Data (OCD) sectoral

VA data, and split according to the ratio of total employment in these two sectors. Furthermore, the price index of 'Other Services' is applied to 'Real Estate' to calculate the constant price VA. The exception is 2018, which is not covered in the UN OCD data, therefore 'Business Services' and 'Real Estate' are forwards extrapolated one period using growth rates from a 2018 Monthly Statistical Bulletin; this bulletin provides a direct growth rate for the 'Business Services' sector and also a growth rate for 'Financial Services' which is applied to 'Real Estate', in the absence of a separately reported growth rate for this sector. Pre-1990, all sectoral VA is backwards extrapolated using trends from the UN OCD data. As this data is always in ISIC 3, the ISIC 4 sub-sectors assume a common trend and a common price index with their ISIC 3 parent sectors.

Turkey

Employment

Period	Sectoral data sources
2014–18	NSI Labour Force Surveys ISIC 4
2004–13	NSI Labour Force Surveys ISIC 4
1990–2003	NSI Labour Force Surveys ISIC 2

- Benchmark levels for 2014–18 from the NSI Labour Force Surveys (LFS) in ISIC 4 format.
- From 2004 to 2013, NSI provides ISIC 4 level data, but due to structural breaks in some sectors as a result of methodological changes, growth trends are used for backwards extrapolation across this period.
- From 1990 to 2003, sectoral employment is only available in ISIC 2 format, which was retained by the Turkish Statistical Institute (TurkStat).
- For some aggregate sectors from 1990 to 2003, parent sector growth rates are used.

Turkey has conducted a population census in every 5 years, from 1935 to 2000. Since 2000, an 'address based census' system was adopted and, starting from 2007, Turkey announces population and related statistics annually. While traditional censuses only cover broad sectoral disaggregation in employment and there are substantial differences with the LFS employment levels, the addressbased censuses do not cover sectoral employment data at all. Therefore, Labour Force Surveys (LFS), which have been conducted since 1988, are used for benchmark values as well as for providing the trends for backward extrapolation. The LFS methodology and coverage changed twice; in 2004 and 2014. From 2014 to 2018, the LFS has been published in ISIC Rev. 4 format and fully compatible with the international standards. Although TurkStat also provides ISIC 4 level sectoral disaggregated data from 2004 to 2013, due to major methodological revision in the questionnaire, there is a structural break in 2014 in agriculture and manufacturing sectors. Therefore, the agriculture and manufacturing sectors are backwards extrapolated from 2014 using the trend for growth in the sum of these two sectors. All other sectors use the employment levels from 2004-13. From 1990 to 2003, sectoral employment is only available in ISIC 2 format, which is also derived from TurkStat; therefore, sectoral employment is backwards extrapolated from 2003 using trends from the ISIC 2 data, where ISIC 4 sub-sectors follow the trends of their parent sectors.

Period	Sectoral data sources
1998–2018	NSI – Sectoral Current and Constant Price VA Data ISIC 4
1997	Presidency of Strategy and Budget – Current & Constant Price Shares
1990–97	NSI – Sectoral Current and Constant Price VA Data (Trends)

- 1998–2018 current and constant value added levels from TurkStat (NSI).
- Due to a structural break in the value added series in 1997, less disaggregated sectoral GDP data produced by Presidency of Strategy and Budget is used.
- 1990–97 backwards extrapolated using trend from current and constant value added series from TurkStat (NSI).
- Price indices are calculated by using sub-sectoral shares for utilities, trade services, business services, government services, and other services.

The main source of the national accounts data in Turkey is TurkStat, which provides data from 1968 to 2018 collated by the NSI. From 1998 to 2018, current and constant value added levels from TurkStat are available which are fully compatible with the UN System of National Accounts (SNA) in ISIC Rev. 4 format—these are used directly as sectoral VA levels. Due to a structural break in the value added series in 1997, less disaggregated sectoral GDP data collated and released by Presidency of Strategy and Budget (former Ministry of Development) is used for this year to bridge the two series. From 1990 to 1997, backwards extrapolation uses trends from less disaggregated current and constant value added series from TurkStat. While extrapolating, parent sector growth rates are used for ISIC 4 sub-sectors. Sectoral price indices are calculated by using official current and constant value added figures. For the aggregated sectors (i.e. utilities, trade services, business services, government services, and other services), price indices are calculated by using detailed sectoral level data. Both current and constant value added figures are checked against UN official country data. In addition, total current and constant value added data and price deflators are compared with IMF World Economic Outlook figures to check the consistency.

Uganda

Employment

Period	Sectoral data sources
2017	2017 NSI Labour Force Survey
2012	2012 NSI Labour Force Survey
2003	2003 NSI Labour Force Survey
1990–2018	Productivity-Based Trends
1990–2018	Trend in EAP in Agriculture
1991 and 2003	Employment shares in Tanzania

- Benchmark levels in 2017, 2012, and 2003 from Labour Force Surveys (LFS).
- An additional benchmark is constructed for 1991 based on ILO modelled estimates, because no official country data is available.
- When necessary, sectoral employment is split into the required detail using employment shares from Tanzania.
- Employment between the benchmark years is interpolated based on total labour productivity trends and trends in agricultural employment.

Between 1990 and 2018, Uganda conducted three population censuses (PC). However, except for that of 2002, the censuses do not provide sectoral employment data. Instead, they disaggregate employment by occupational groups which cannot be unambiguously assigned to the ISIC 4 sectors. For this reason, as well as to ensure consistency of methodology and employment definition, NSI Labour Force Surveys are preferred for the sectoral employment level benchmarks. Sectoral employment data from three LFS are available, for 2003, 2012, and 2017, and these serve as benchmark years. The 2003 LFS is in ISIC 3 rather than ISIC 4 classification. Whilst the Ugandan Statistical Abstracts provide more disaggregated data for this year which could potentially be used to perform the split to ISIC 4, these numbers are based on business statistic, which do not include informal or self-employment. This leads for example to a significant underestimation of the employment in transport (which includes informal taxi drivers). For this reason, the split to ISIC 4 was instead performed using sub-sector employment shares from Tanzania, which is both a neighbour of Uganda and has a very similar economic structure in more recent years, for which disaggregated data for both countries is available. The assumption therefore is that the split of all persons engaged in Transport and Communications in Uganda, for example, more closely resembles that of the universe of Tanzania rather than the formal sector of Uganda.

Between 1990 and 2018, all sectoral employment interpolations and forwards extrapolations use trends based on total labour productivity. The exception is Agriculture, for which EAP in agriculture trends are used for all extrapolation and interpolation outside benchmark years. Between the benchmark years 2012 and 2017, substantial changes in the number of persons engaged in 'Agriculture' can be observed. Since this would also result in a sharp drop in the labour force participation rate (below 25 per cent) as well as in the number of total people employed, we

decided to only use the 2017 benchmark for non-agricultural sectors. Employment in Agriculture clearly drops whilst employment in Mining increased rapidly. These employment trends are not matched by trends in the VA of these two sectors, which are much more constant. However, this inconsistency could be explained by an increase in agricultural productivity and by a surge of unproductive small-scale mining in the country as rural workers move from agriculture to informal mining.

For constructing the employment series prior to 2003, ILO modelled estimates for the year 1991 are used as a lower benchmark since there is no official country data available of any kind. As with the 2003 benchmark, the split from ISIC 3 to ISIC 4 is performed by applying the Tanzanian subsector employment shares of their ISIC 3 parent sectors.

Value added

Period	Sectoral data sources
2009–18	Uganda Bureau of Statistics: National Accounts (GDP) sectoral VA in current and constant prices
1990–2008	Current and Constant Price Sectoral VA from UN OCD

- 2008–18 sectoral VA current and constant price levels from NSI National Accounts.
- Prior to 2008, current and constant VA extrapolated using trends from UN Official Country Data (OCD).
- For some sectors, constant sub-sector shares are assumed when disaggregated information is not provided for years prior to 2008.

The Uganda Bureau of Statistics (NSI) publishes data on the National Accounts from 2008 onwards, including both nominal and constant price sectoral VA split in detailed ISIC Rev. 4 sectors. The NSI provides this VA data both in calendar and fiscal (from July to June) years. In order to be consistent with international data sources, the calendar year information is used for the sectoral value added in current prices from 2008 to 2018. However, in the case of the constant price VA data, the NSI does not report a 'calendar base year' for its constant value GDP series, but uses the fiscal year running from July 2009 to June 2010 as the base. Consequently, there is no exact correspondence between current and constant GDP for any of the calendar years. The price deflator of calendar year 2015 is therefore artificially set to one, and the years 2008 to 2018 are then extrapolated using growth rates of the 'calendar year price deflators'—the technique results in sectoral VA in constant 2015 prices.

Prior to 2008, sectoral current and constant price VA is backwards extrapolated using trends from the UNSD National Accounts Official Country Data (UN OCD). Due to changes over time in the systems of national accounts (SNA) and sectoral classification systems (ISIC) utilized by the Ugandan authorities, the UN OCD current and constant price sectoral VA is reported in three different series between 1990 and 2008. From 2000 onwards, the series 100 is available, which is based on SNA 1997 and in ISIC 3. The sectors of real estate and business services are split by applying the constant ISIC 4 shares (reported by the Ugandan NSI) of 2008. From 1997 to 2000, trends from series 30 (based on SNA 1968) are used. Again, the sectors of business services, financial services and real estate are assumed to follow a common trend. Even though information

of the series 30 is also available for years prior to 1997, it was not used due to inconsistencies. Not only is the sectoral disaggregation less detailed in the series 30 for earlier years, but there are implausible breaks in the series from 1996 to 1997, especially in the value added of services. Therefore, for extrapolation before 1997, the series 20 is used which does not show such data leaps. As before, certain sectors are split using constant 1997 shares. The application of trends, rather than levels, from these series effectively renders all VA data in the most recent accounting system used in Uganda – SNA 1997.

Vietnam

Employment

Period	Sectoral data sources
2005, 2007–17	NSI Labour Force Surveys
1990–2018	Trends from ILO Modelled Estimates
1990–2018	Trend in EAP in Agriculture
1995–2004	Labour (<i>Lao động</i>) Publication from NSI
1999	1999 Population Census from NSI, and Census Microdata from IPUMS

- Benchmark levels from 2005 and 2007–17 Labour Force Surveys and 1999 Population Census
- 1990–2018 'Agriculture' interpolations and backwards extrapolation use trends from Economically Active Persons in Agriculture.
- 1995–2005 'Electricity, Gas & Water Supply', 'Mining and Quarrying', and 'Manufacturing' interpolations and backwards extrapolation use trends from Labour (*Lao dông*) Publication from NSI.
- 1990–2018 other sector interpolations and backwards extrapolation use trends from ILO Modelled Estimates.

Vietnam has performed population censuses (PC) in 1999 and 2009. Additionally, the NSI has released regular Labour Force Surveys with a relatively high frequency from 2005 onwards. As the 2009 census employment data differs from both the surrounding LFS figures and those reported in other secondary sources, the LFSs are the preferred source of benchmark sectoral employment levels and provide benchmarks years in 2005 and 2007–17. The 1999 Population Census (PC) provides a final benchmark year, whereby the NSI Census Report is combined with IPUMS microdata to conduct the full sectoral split to ISIC 4. One exception is that the employment in 'Electricity, Gas & Water Supply' is undercounted in the 1999 PC as 'Water Supply' is missing, therefore the 1999 level data for this sector only is dropped and instead interpolated over as described below. Outside and in-between the benchmark years, the interpolations and extrapolations are performed using the following trends. All 'Agriculture' interpolations and extrapolations use trends from the Economically Active Persons in Agriculture data for Vietnam.

Between 1995–2005, the 'Electricity, Gas & Water Supply', 'Mining and Quarrying', and 'Manufacturing' sector interpolations and extrapolations use trends from a Labour (*Lao động*) Publication from NSI which contains data on the Industrial Sectors. Outside this period, these three sector interpolations and extrapolations use trends from the ILO modelled estimates. Between 1990–2018, all interpolations and extrapolations for the remaining six sectors use trends from the ILO modelled estimates throughout.

Value added

Period	Sectoral data sources
1990–2003	Sectoral Current and Constant Price VA Data from NSI, ISIC3
2003–04	UN OCD Current and Constant Price VA, ISIC3
2004–18	Sectoral Current and Constant Price VA Data from NSI, ISIC4

- 1990–2003 and 2004–18 Sectoral Current and Constant Price VA taken directly from National Accounts released from the NSI.
- Bridging' of price deflators and VA in constant prices of both series between 2003 and 2004 using trends from UN Official Country Database (UN OCD) data.

The NSI provides VA data in current and constant national prices for each year of the period 1990–2018. These are reported in two separate series: one covering 1990–2003 (in ISIC rev. 3) and the other for 2004-2018 (in ISIC rev. 4). For value added in current prices the levels of both series could consistently be merged for most sectors. Due to the ISIC rev. 3/ rev. 4 reclassification, some underlying (service) sectoral data/definitions used by the NSI appear to have changed (i.e., JMN, K, and L). In these cases, the more recent NSI series provides the benchmark level for the extrapolation backwards before 2004. For value added in constant prices, the price deflators of both series needed to be linked between 2003 and 2004 using UN OCD data. Since all listed sources report price deflators prior to 2004 in ISIC 3, the most recent NSI series has been used as benchmark and sectoral reclassifications have been conducted using the average sub-sector shares between 2004 and 2006.

Zambia

Employment

Period	Sectoral data sources
2018	2018 NSI Labour Force Survey
2017	2017 NSI Labour Force Survey
2010–17	Productivity-Based Trends
2010–17	Trend in EAP in Agriculture
2010	2010 Population Census
2010	ILO Modelled Estimates Shares
2006	2006 Living Conditions Monitoring Survey
2000	2000 Population Census
2000	ILO Modelled Estimates Shares
1990–2010	10SD Based Trends
1996	1996 Living Conditions Monitoring Survey

- Benchmark Levels in 2017, 2018 (from LFS), 2010, and 2000 (PC), 2006 and 1996 (LCMS).
- Agricultural benchmark levels in 2017 and 2018 from EAP in agriculture
- Some aggregate sectors in 2010 and 2000 benchmark years split using shares from ILO Modelled Estimates.
- All Agriculture Extra- and Inter-polations use EAP in Agriculture Trends.
- From 2010–17, all other sectors interpolations use Productivity-Based Trends.
- Pre 2010, all other sectors interpolations use 10 Sector Database Trends.
- Pre-2010, ISIC 3 to ISIC4 split assumes parent sector trends. Exceptions are 'Other Services' and 'Public Administration', which follow similar sector and overall sector trends, respectively.

Zambia holds population censuses every decade, typically available one or two years after the census year, the most recent release being 2010, and these form benchmark years in 2000 and 2010. The 1990 PC was not used due to severe undercounting of informal employment in key sectors, and severe undercounting of Agricultural employment (with a huge 'Employment Not

Stated' residual). However, the census sectoral employment data is not fully disaggregated, containing only 8 sectors. Parent sectors are therefore split into ISIC.4 by using the sub-sectoral shares from the ILO modelled estimates in each census benchmark year. The census employment age classification is 12+, it is not possible to find 15+ data of such good quality. Additional benchmark years are provided by the 1996 and 2006 Living Conditions Monitoring Survey (LCMS) which employs classifications and methodology very similar to the PCs and is thus consistent with these. Further benchmark years are provided by quality labour force surveys in 2017 and 2018, with the exception of the 'Agriculture' sector, which was undercounted due to the LFS unemployment classification criteria. Therefore, the levels of agricultural employment in these benchmark years are from the data of economically active population in agriculture. LFSs and surveys of other types are available, however these were not utilized as they use different criteria and are inconsistent with nearby census numbers - for example, many use a different employment age classification or are conducted immediately post-harvest. Using them would therefore add artificial volatility to the series resulting from different classifications and/or methodologies rather than the true underlying numbers. A full report of all potential alternative primary data sources, along with reasons why they were not used, is available on request. The exploration of Zambia primary source data was aided by Resnick and Thurlow (2017). Interpolation between 2010 and 2017 was done using sectoral productivity-based estimates, as no more detailed information is available. The exception is again Agriculture, which was interpolated using the EAP in agriculture trend. Interpolation between 1990-2000 and 2000-10 was done using trends from the 10 Sector Database (10SD). As the 10SD is in ISIC.3 sectoral classification, the trends of parent sectors were applied to their sub-sectors during their interpolation procedure. Exceptions were 'Other Services', which was assumed to follow the same trend as 'Community, Social and Personal Services', and 'Public Administration', which was assumed to follow the overall employment trend, both for the period 1990–2000. This is because the 10SD was not comprehensive during this period.

Value added

Period	Sectoral data sources
2018	UN Official Country Data (Broad Sectors)
1994–2017	UN Official Country Data (UN OCD) Current and Constant Prices
1994–2015	NSI Official GDP Data, Current Prices
1990–94	10SD Based Trends

- 1994–2017 current value added levels and price indices from UN OCD, checked against less-disaggregated NSI figures and IMF figures.
- 2018 extrapolated forwards assuming common sub-sector trends from UN OCD broad sectoral data
- Pre-1994 backwards extrapolated using 10SD trends, ISIC 3 to ISIC4 split assumes parent sector trends.

Zambia NSI published official sector-disaggregated GDP data between 1994–2015 in current prices, but is only in ISIC.4 from 2010. Therefore, UN Official Country data was used for the

current price sectoral value added, and sectoral price indices, but was checked against the broader NSI data to ensure it is consistent. The current price data and price indices were also checked against data from the IMF and are consistent. 2018 was extrapolated forwards using trends from UN data that was only available in broader aggregates (7 sectors), therefore a common trend is assumed in sub-sectors. Pre-1994 sectoral current and constant price VA was backwards extrapolated using trends from the 10 Sector Database (10SD), where ISIC.4 sub-sectors were assumed to grow at the same rate as their ISIC.3 parent sectors.