# Methodology for the National Accounts Main Aggregates Database

# CONTENTS

# I. INTRODUCTION

## A. BACKGROUND

1.	The National Accounts Main Aggregates Database (available at http://unstats.un.org/unsd/snaama) presents national accounts data for more than 200 countries and areas of the world. It is the basis for the publication of *National Account Statistics: Analysis of Main Aggregates*[1,2], a publication prepared by the Statistics Division of the Department for Economic and Social Affairs of the United Nations Secretariat with the generous co-operation of national statistical offices. The dissemination of the national accounts data is in accordance with the recommendation of the Statistical Commission at its first session[3] that the Statistics Division should publish regularly the most recent available data on national accounts for as many countries and areas as possible.  The database is updated in December of each year with newly available national accounts data for all countries and areas.

## B. SYSTEM OF NATIONAL ACCOUNTS

2.	The National Accounts Main Aggregates Database is based on the data obtained from the United Nations National Accounts Questionnaire (NAQ) introduced in October 1999, which in turn is based on the *System of National Accounts 1993* (1993 SNA)[4]. The data are supplemented with estimates prepared by the Statistics Division.

3.	The 1993 SNA was unanimously recommended to the United Nations Economic and Social Council by its Statistical Commission at its 24th session in March 1993. Similar to the recommendation made in 1968 for its predecessor, *A System of National Accounts* (1968 SNA)[5], the Council in its resolution 1993/5 of 12 July 1993 recommends that Member States use the 1993 SNA in the international reporting of comparable national accounts data. However, it should be highlighted that the Council went a few steps further in 1993 and also recommends that Member States consider using the 1993 SNA: (a) as the standard for the compilation of their national accounts statistics, (b) to promote the integration of economic and related statistics, and (c) as an analytical tool. In 2003 the Statistical Commission called for an update of the 1993 SNA. The first 17 Chapters of the updated SNA, comprising the accounting rules, the accounts and tables, and their integration was approved by the Statistical Commission in 2008; Chapters 18 to 29, comprising the interpretations and extensions of the accounts and tables of the System, was approved by the Statistical Commission in 2009. The updated SNA, called the *System of National Accounts 2008* (2008 SNA)[6] was finalised in September 2009 and is available on the Statistics Division's website at: http://unstats.un.org/unsd/nationalaccount/sna2008.asp.

## C. SCOPE OF THE DATABASE

4.	The data available through the database are classified into the seven major categories listed below:

*I:  Analysis of the level of total nominal GDP and its breakdown by type of expenditure and gross value added by kind of economic activity and GNI*

- Gross domestic product by type of expenditure in United States dollars by major area, region and country and in national currency by country
- Gross value added by kind of economic activity in United States dollars by major area, region and country and in national currency by country
- Gross national income in United States dollars by major area, region and country and in national currency by country

*II:  Analysis of the level of volume measures of total GDP (in 2015 prices) and its breakdown by type of expenditure and gross value added by kind of economic activity*

- Gross domestic product by type of expenditure in United States dollars by major area, region and country and in national currency by country
- Gross value added by kind of economic activity in United States dollars by major area, region and country and in national currency by country

*III: Analysis of the level of per capita GDP and GNI*
- Estimates of per capita gross domestic product in United States dollars by major area, region and country
- Estimates of per capita gross national income in United States dollars by major area, region and country

*IV: Analysis of the percentage shares of GDP by type of expenditure and gross value added by kind of economic activity*
- Gross domestic product by type of expenditure
- Gross value added by kind of economic activity

*V: Analysis of economic development expressed in terms of volume measures of GDP and its components by type of expenditure and gross value added by kind of economic activity*
- Average rate of growth of gross domestic product by type of expenditure
- Average rate of growth of value added by kind of economic activity

*VI: Analysis of price development reflected by implicit price deflators of GDP*
- Implicit price deflators of gross domestic product in US dollars and in national currency

*VII: Analysis of exchange rates and population*
- IMF exchange rates and other exchange rates used in Analysis of Main Aggregates Database
- Population data by country

5.      The analytical tables presented in the database are based on a homogeneous data series for each country. These data series are based on official data and estimations that have been applied to produce a consistent time series for each country. The design of these data tables facilitates cross-table analysis, as well as, analysis and comparisons of multiple countries or regions.

6.      The data provided in this database are also available at http://data.un.org.


**D. COLLECTION OF DATA**

7.      To collect national accounts data, the Statistics Division annually sends the United Nations National Accounts Questionnaire (UN-NAQ) to countries and areas. The countries are requested to provide the latest available national accounts estimates and to indicate where the scope and coverage of the country estimates differ for conceptual or statistical reasons from the definitions and classifications recommended by the 1993 SNA. This additional meta data information is requested to provide a brief overview of the sources and methods of the compilation of national accounts.  For countries for which data are not directly reported to the Statistics Division, data are supplemented by information gathered from additional correspondence with national statistical offices and from national publications and other sources (see Section II).

8.      In order to lighten the reporting burden of countries, UNSD obtains data from the Organisation for Economic Co-operation and Development (OECD), the United Nations Economic Commission for Europe (ECE) and the Caribbean Community (CARICOM) on behalf of their constituents.

**E. COMPARABILITY OF THE NATIONAL ESTIMATES**

9.      Every effort has been made to present the estimates of the various countries or areas in a form designed to facilitate international comparability. To this end, important differences in concept, scope, coverage and classification have been described in the footnotes for individual countries. Such differences should be taken into account to avoid misleading comparisons.

10.     Data contained in the tables relate to the calendar year for which they are shown, except in several cases. These special cases are posted on the National Accounts Main Aggregates Database website (https://unstats.un.org/unsd/snaama/Metadata/Notes):

**F. NOMENCLATURE**

11.      The information for the countries and areas shown in the database reflect what is provided to the Statistics Division as of November of the previous year.

12. Designations, which have changed in recent years, are as follows:

Hong Kong SAR of China - Pursuant to a Joint Declaration signed on 19 December 1984, the United Kingdom restored Hong Kong to the People's Republic of China with effect from 1 July 1997; the People's Republic of China resumed the exercise of sovereignty over the territory on that date.

Macao SAR of China - Pursuant to a Joint Declaration signed on 13 April 1987, Portugal restored Macao to the People's Republic of China with effect from 20 December 1999; the People's Republic of China resumed the exercise of sovereignty over the territory on that date.

Zaire - All data for the former Zaire are shown under the country name of Democratic Republic of the Congo.

Czech Republic, Slovakia - Data for Czech Republic and Slovakia are shown separately under the appropriate country name. For period prior to 1 January 1993, data for the former Czechoslovakia are shown under the country name Czechoslovakia (Former).

Yugoslavia (Former) - Following the adoption and the promulgation of the Constitutional Charter of Serbia and Montenegro by the Assembly of the Federal Republic of Yugoslavia on 4 February 2003, the name of the State of the Federal Republic of Yugoslavia was changed to Serbia and Montenegro. All data for former Yugoslavia prior to 1 January 1992 refer to the Socialist Federal Republic of Yugoslavia that was then composed of six republics. After that date, when available, data for the republics, Bosnia and Herzegovina, Croatia, Slovenia and North Macedonia are shown separately.  On 3 June 2006, Serbia and Montenegro formally dissolved into Montenegro and Serbia which are now shown separately from 1990 onwards. Kosovo, formerly part of Serbia, is compiling its own National Accounts Statistics and included as a separate territory in this issue, starting with 1990.

USSR (Former) - In 1991, the Union of Soviet Socialist Republics formally dissolved into fifteen independent republics (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan). When available, data are shown for the individual republics. All data for the former USSR are shown under the country name USSR (Former).

Germany - On October 1990, the Federal Republic of Germany and the German Democratic Republic united to form one sovereign State under the designation Germany.

Yemen - In May 1990, Yemen and Democratic Yemen united to form a single State. Since that date they have been represented as one country with the name "Yemen".

Ethiopia, Eritrea – In 1993 Eritrea separated from Ethiopia to form a new state. Ethiopia refers to Ethiopia excluding Eritrea while Ethiopia (Former) refers to Ethiopia including Eritrea.

Sudan, South Sudan – In 2011 South Sudan separated from Sudan to form a new state.  Sudan refers to Sudan excluding South Sudan while Sudan (Former) refers to Sudan including South Sudan.

Netherlands Antilles – In 2010 the Netherlands Antilles dissolved into three separate entities within the Netherlands. Curaçao and Sint Maarten each became constituent states that provide data separately while Bonaire, Sint Eustatius and Saba became a direct part of the Netherlands as special municipalities.

## G. COUNTRY COVERAGE

13.     The 1993 SNA defines economic territory as the relevant geographical area to which the concept of residence is applied. The 1993 SNA also indicates that the economic territory and geographical territory can be different. Within the analytical tables, the economic territory is usually consistent with the geographic territory; the exceptions include:

France - Includes French Guiana, Guadeloupe, Martinique, Mayotte and Réunion.

Cyprus - Excludes Northern Cyprus.

Serbia - Excludes Kosovo and Metohija from 1999 onward.

United Republic of Tanzania - Excludes Zanzibar.

Morocco - Includes Western Sahara.

Indonesia - Excludes Timor-Leste from 1999 onward.

China - China is published in this yearbook in three sections: China (mainland); Hong Kong SAR of China; and Macao SAR of China.

## H. COUNTRY GROUPINGS

14.     The GDP and GNI data in US dollars and growth rates of GDP include aggregations of data by regional groupings as well as individual country data. The GDP and GNI data in national currency, the percentage share of components of GDP and gross value added data, the implicit price deflators, the exchange rates, and the population data only include individual country data.

15.     Standard country and area designations, as well as a basic classification of regional groupings are posted on the United Nations website, https://unstats.un.org/sdgs/indicators/regional-groups. The regional classifications given on the website are employed in this database.

## I. REVISIONS

16.     The figures shown are the most recent estimates and revisions available at the time of compilation. In general, figures for the most recent year are to be regarded as provisional.

## J. DATA DISPLAY

17.     The sums of the components in the tables may not necessarily add up to totals shown because of rounding.

## K. GENERAL INFORMATION

18.     For further information visit the Statistics Division website at http://unstats.un.org/unsd/nationalaccount/. Queries regarding the AMA database or this publication can be sent to sna@un.org

# II. ESTIMATION METHODS

## A. BACKGROUND

1.          This section outlines the methodology employed to obtain a complete data series for each country, as well as for computing growth rates, indices and the regional aggregates.

2.          A basic description of the methodology related to the compilation of official national accounts data is provided in *National Accounts Statistics: Main Aggregates and Detailed Tables*[7,8].  For full details on the 1968, 1993 or 2008 SNA, see *A System of National Accounts* (1968 SNA), *System of National Accounts 1993* (1993 SNA) and *System of National Accounts* 2008 (2008 SNA).

3.          The System of National Accounts (SNA) consists of a coherent, consistent and integrated set of macroeconomic accounts; balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules. It provides a comprehensive accounting framework within which economic data can be compiled and presented in a format that is designed for purposes of economic analysis, decision-taking and policy-making. The accounts themselves present in a condensed way a great mass of detailed information, organized according to economic principles and perceptions, about the working of an economy. They provide a comprehensive and detailed record of the complex economic activities taking place within an economy and of the interaction between the different economic agents, and groups of agents that takes place on markets or elsewhere. In practice the accounts are compiled for a succession of time periods, thus providing a continuing flow of information that is indispensable for the monitoring, analysis and evaluation of the performance of an economy over time. The SNA provides information not only about economic activities, but also about the levels of an economy's productive assets and the wealth of its inhabitants at particular points of time. Finally, the SNA includes an external account that displays the links between an economy and the rest of the world.

## B. DATA SOURCES FOR ESTIMATION IN NATIONAL CURRENCY

4.          Official data, as reported by countries to the United Nations through the Statistics Division's annual UN-NAQ, are published in the *National Accounts Statistics: Main Aggregates and Detailed Tables* publication.

5.          For many countries a full set of official data is not available, thus estimation procedures are employed to obtain estimates for the entire time series. When full data is not available, a hierarchy of other data sources is used to gather information on the national accounts of a country. The data gathered are then either used directly or estimation procedures are applied to obtain the basic statistics presented in this publication.

### B.1 HIERARCHY OF DATA SOURCES

6.          If official data are not available, the selection of data sources is based on following hierarchy:

1) Official publications and websites of national statistical offices, central banks or relevant government ministries;

2) Official statistics disseminated by Eurostat, European Central Bank and the Organization for Economic Cooperation and Development (OECD) for their members;

3) Information provided by Permanent Missions to the United Nations;

4) Economic surveys and estimates prepared by United Nations' Regional Economic Commissions (i.e. UNECE, ECLAC, ESCAP, UNECA and ESCWA);

5) Publications of international organizations with a strong focus on statistical data collection (including regional development banks). The most common sources used for their respective countries are listed below:

   **Asia**: Asian Development Bank, ASEAN, Arab Monetary Fund, Secretariat of the Pacific Community (SPC)

**Africa**: African Development Bank, Afristat, Banque des Etats de l'Afrique Centrale (BEAC), Union Economique Monetaire Ouest Africain (UEMOA)

**Americas**: CARICOM, Caribbean Development Bank, Eastern Caribbean Central Bank (ECCB)

**Other**: OECD for non-member countries  Statistical Committee of the Commonwealth of Independent States

6) Estimates and indicators from other international organizations. The most common sources used are: the International Monetary Fund (IMF) and the World Bank;

7) Publications or websites of specialized groups, the most common sources used are: the Gulf Cooperation Council, the Asia-Pacific Economic Cooperation (APEC), the Committee of Central Bank Governors in SADC; the Islamic Development Bank, and the Statistical Training Centre for Islamic Countries;

8) Economic data from commercial providers and other sources, the most common sources used are: the Economic Intelligence Unit and the United States Central Intelligence Agency;

9) Information from neighbouring countries where no alternative source is available (Switzerland for Liechtenstein; France for Monaco; Italy for San Marino; Spain for Andorra; and some Pacific Islands for other Pacific Islands);

## C. BACKCASTING OF OFFICIAL DATA

7.        From time to time countries provide revised data without revising a full historical time series. In these cases the data series are backcasted to derive a single, consistent time series.

8.        Official data are often reported as multiple sets of time series versions. Each time series version represents a unique methodology used to compile the national accounts data (for example, a difference between two time series versions could reflect a change in currency, a switch from 1968 SNA to 1993 SNA, a change in the office responsible for compiling national accounts, etc.). These time series versions may not be comparable, especially when a country has shifted from the 1968 SNA to 1993 SNA or 2008 SNA.

9.        When a single time series version does not exist for the entire period (1970 to t-1), then estimation procedures are used to backcast the most recently reported time series version. Backcasting is only performed when time series overlap for at least one year. The overlapping year is used to create a ratio; this ratio is then applied backwards to the previous time series version. Note that if there is a change of fiscal year between two official data time series, the older series are converted to the fiscal year type of the most recent time series prior to backcasting.

10.        The same backcasting methods are applied when constant price time series versions include multiple base years or when constant price time series versions are reported as constant prices of the previous year (CPPY). CPPY data are backcasted by using the officially reported current price data and the officially reported constant price data. The data are backcasted into a single series with a fixed base year.

## D. ESTIMATION BASED ON SOURCES OTHER THAN OFFICIAL DATA

11.        The methods involved in preparing data estimates using sources other than official data include trend extrapolation, using appropriate indices for inflating or deflating relevant data series, and share distribution of GDP. A hierarchical assessment is followed to determine which method should be used. Effort is made to keep data estimation methods consistent from year to year.

*D.1 TREND EXTRAPOLATION*

12.        Trend extrapolation is the most frequent method used for estimating data. The trend from an alternative data source is applied to official data or other estimates by applying the growth rate forward or backward (data sources are used according to the hierarchy described in section B).

13.    Trend extrapolation can also be used to form a bridge between two official data series for the purpose of backcasting. This is done when an overlapping year does not exist between two official data time series versions. The alternative source is used to create a time series version that includes an overlapping year with a second official data time series version. The backcasting procedures are then followed using this overlapping year.

14.    In some cases there is no source available for some of the years in the estimation period. In these cases the average trend of the several years preceding or following a data item is used to extrapolate a value for a specific year. If there is missing data for the components of GDP for a period of time in the middle of the time series, then half of the missing years are calculated using the preceding years and the other half are calculated using the following years (when the gap covers an odd number of years then the middle year is calculated as the average of the preceding and following years).

*D.2 PRICE INDICES*

15.    In cases when either data at current prices or constant prices are missing, an appropriate price index may be used to deflate or inflate the relevant data to obtain the missing data. This method is applied only when other reliable data sources are not available. Under this method, GDP is deflated or inflated based on a price index and the components of GDP are calculated using the share to GDP.

*D.3 SHARE DISTRIBUTION OF GDP*

16.    Another method for filling in data gaps is to apply the share distribution of GDP.  Candidates for this method are countries where official GDP data exist, but data for some or all components are missing.  This method requires a secondary data source for GDP and a breakdown of components.  If the information is comparable, the share distribution of GDP from the secondary source is applied to the official GDP data.

17.    If a secondary source is not available, but some of the years of available data include a breakdown by component, then the average share of the preceding or following five-year period is used to estimate missing data. If there are missing data for the components of GDP for a period of time in the middle of the time series, then half of the missing years are calculated using the preceding five years and the other half are calculated using the following five years (when the gap covers an odd number of years then the middle year is calculated as the average of the preceding and following five years).

**E. CONVERSION TO UNITED STATES DOLLARS**

18.    GDP and per capita GDP data are converted to US dollars using appropriate annual monthly average or annual average end of month quotations of exchange rates.  As a rule, market exchange rates (MERs) obtained from the International Monetary Fund publication, *International Financial Statistics* are used. These MERs are averages of the market rates communicated to the International Monetary Fund by the Monetary Authority of each member country or end-of-month quotations in the market of the country. MERs generally consist of three types of rates: a) market rates, determined largely by market forces; b) official rates, determined by government authorities; and c) principal rates, for countries maintaining multiple exchange rates arrangements.

19.    When MERs from the International Monetary Fund are not available United Nations operational rates of exchange are used (United Nations operational rates were established for accounting purposes and are used in official transactions of the United Nations). These rates are based on official, commercial and/or tourist rates of exchange.

20.    National Accounts data expressed in US dollars need to be used with caution as the data may be distorted by fluctuations in exchange rates and domestic inflation movements.  To minimise such distortions, the data are examined to identify countries for which changes in the per capita GDP converted in US dollars are not consistent with the economic developments in the country as reflected by the relative movements of domestic and international inflation. To identify these countries, the GDP per capita of each country is evaluated using a numerical analysis and visual assessment of graphs.

21.    A MER valuation index (MVI) is calculated for each country in order to review changes in the MER using the following formula:

*Assume,*
   $r$      = *growth rate of per capita GDP between period 1 and 2*
   $P_{US}$  = *price changes in the US*
   $E(Y_2)$ = *expected per capita GDP (in US$) in period 2*
   $Y_1$    = *per capita GDP in period 1*

*Then,*

$$E(Y_2) = r \times P_{US} \times Y_1$$

      *and*

$$MVI = Y_2 / E(Y_2)$$

22.    The MER of countries with an MVI above 1.2 or below 0.8 are considered for adjustment. For each country, graphs of the per capita GDP and the growth of the MVI over time are also evaluated to support the outcome of the numerical analysis.

23.    Once possible countries for MER adjustment have been identified, each case is carefully considered taking into account the economic situation in each country during the identified period.

24.    The assumption is that changes in the exchange rate of a country between two periods reflect changes in domestic prices relative to changes in United States prices.  Taking this assumption into consideration PARE rates are calculated for year *t* by adjusting the exchange rate in year *t+n* with the changes, between year *t* and *t+n,* in the GDP deflator in national currency units relative to the US GDP deflator, where *t+n* is a year with a realistic GDP per capita expressed in US dollar (for example, the year after an economic crisis ended). The PARE rate is calculated using the following formula:

*Assume,*
   $x_t$ = *exchange rate for year t*
   $c_t$ = *current price GDP for year t*
   $k_t$ = *constant price GDP for year t*
   $d_t$ = *deflator for year t*

*Then,*

$$d_t = {c_t}/{k_t}$$

      *and*

$$PARE_t = \frac{x_{t+n}}{\left( \dfrac{{d_{t+n}}/{d_t}}{{d_{t+n}^{US}}/{d_t^{US}}} \right)}$$

Where $d^{US}_t$ = deflator for the United States for year t

25.    For example: a country's GDP per capita in 1987 was 11,300 US dollars, while it was 549 in 1979 and 663 in 1990. Between 1984 and 1989 the country suffered from hyperinflation while MERs were not allowed to adjust adequately to market prices. Using 1990 as a base year and applying the PARE rates backwards to 1980 results in a GDP per capita series with a more plausible value of 740 for 1987, the year in question.

26.     Notwithstanding these adjustments, the inter-country comparisons of national accounts data expressed in US dollars should be done with caution as all distortions may not be eliminated.

## F. CONVERSION TO 2015 PRICES

27.     Once all data have been compiled in national currency, the constant price data are converted to 2015 prices. Constant price data in national currency are converted to US dollars using the 2015 exchange rates.

## G. REGIONAL AGGREGATES

28.     The regional aggregates are defined as the sum of the data in US dollars for the countries, areas and territories within the regional grouping. The growth rates and implicit price deflators are calculated from the regional aggregates, not as an average of the country-level growth rates or implicit price deflators.

## H. DATA QUALITY

29.     All official data received by the United Nations Statistics Division are checked for errors prior to incorporation in the United Nations official data database. The checking involves ensuring that aggregate indicators are equal to the sum of their components and that indicators which are provided in multiple tables are represented consistently. Footnotes are added to the data when necessary.

30.     Similarly, the estimated data in this yearbook are checked for consistency by ensuring that aggregate indicators are equal to the sum of their components and that indicators which are represented in multiple tables are represented consistently. The estimates derived for each year are compared to previous years to ensure that estimates are prepared consistently from year to year. Additionally, the growth rate from year to year is analyzed to identify anomalies in the data.

[1]    United Nations, 1968-1981, <u>Yearbook of National Accounts Statistics</u>. 14 volumes. New York: United Nations Publications.

[2]    United Nations, 1982-present, <u>National Accounts Statistics: Analysis of Main Aggregates</u> . New York: United Nations Publications.

[3]    United Nations, 1947, Official Records of the Economic and Social Council Supplement No. 6 (E/264), chap. VIII, para. 42. New York: United Nations Publications.

[4]    Commission of the European Communities, International Monetary Fund, Organisation for Economic Cooperation and Development, United Nations, and World Bank 1993, System of National Accounts 1993. New York: United Nations Publications. Sales No. E.94.XVII.4.

[5]    United Nations, 1968, A System of National Accounts, Studies in Methods, Series F No.2, Rev.3. New York: United Nations Publications.

[6]    European Commission, International Monetary Fund, Organisation for Economic Cooperation and Development, United Nations, and World Bank, 2009, System of National Accounts 2008. New York: United Nations Publications.

[7]    United Nations, 1957-1981, <u>Yearbook of National Accounts Statistics</u>. 25 volumes. New York: United Nations Publications.

[8]    United Nations, 1982-present, <u>National Accounts Statistics: Main Aggregates and Detailed Tables</u>. New York: United Nations Publications.