Methodology brief on 2015-16 rebasing of National Accounts

Note: Pakistan Bureau of Statistics (PBS) will publish the document providing concepts, sources and methods used for 2015-16 rebasing of national accounts by mid February, 2022. The same will be uploaded on the website of the PBS.

Introduction

Pakistan Bureau of Statistics (PBS) compiles and publishes macroeconomic statistics such as Gross Domestic Product (GDP), Gross National Income (GNI), Per Capita Income, Gross Fixed Capital Formation (GFCF), and Expenditure on GDP on annual basis. These statistics play an important role in policy formulation and informed decision making. They are also often highlighted on print, electronic, and social media platforms.

2   The national accounts aggregates are subject to two types of revisions i.e. i) regular revisions ii) comprehensive or major revisions. The objective of these revisions is to include new data, new statistics, new definitions and/or new methods in the system of national accounts.

- The *regular revisions* are made on annual basis. The GDP estimates are published in May every year by incorporating data for six to nine months but projected for the whole financial year i.e. 1st July to 30th June on provisional basis. The provisional estimates are revised next (second) year and are finalized in subsequent third year.
- The *comprehensive or major revisions* are carried out at the time of change of base year/reference year for the compilation of national accounts. The major revisions are required to incorporate improvements in data sources and re-assessment of the contribution of various industries towards national GDP owing to structural changes in the economy as well as various macroeconomic dynamics in national and international horizons.

3.   The Governing Council of Pakistan Bureau of Statistics in its 5th meeting in 2013 issued a policy directive to rebase the National Accounts after every ten years. As a result, it was decided to change the base year for National Accounts from 2005-06 to 2015-16. Under the umbrella of rebasing, PBS has conducted various censuses e.g. Census of Manufacturing Industries, Census of Electricity, Census of Exploration Companies, surveys e.g. Rent Survey, Household Integrated Income, and Consumption Survey, Survey on Small & Household Manufacturing Industries, Survey on Other Private Services as well as several other studies. Further, to ensure consistency among various macroeconomic aggregates, PBS has also changed the reference periods for the compilation of price indices from 2007-08 to 2015-16 and Quantum Index of Manufacturing Industries (QIM) from 2005-06 to 2015-16.

4.   The results of censuses/survey/studies conducted for rebasing purpose were reviewed first internally by compilers/coordinators under the supervision of Member (National Accounts) and then by Technical Review Committee comprising of Deputy Economic Advisor Ministry of Finance, Chief Macro Ministry of Planning, Director Statistics State Bank of Pakistan, Senior Research Economist PIDE, Chairman Statistics Department Quaid-e-Azam University and Industry Experts from 23rd July 2020 to 08th September 2020. The suggestions of the committee were incorporated. In order to make the rebasing methodology in line with international standard, Methodology of Rebasing of National Accounts was

reviewed by World Bank experts (through remote connection) during 9th November 2021 to 9th December 2021.

5.   At the final stage, the National Accounts Committee (NAC), having representatives from various Federal and Provincial governments Ministries/Divisions as well as Public and Private Sector Organizations, in its meeting held on 20th January 2020 under the chairmanship of Mr. Abdul Aziz Uqaili, Secretary, Ministry of Planning Development and Special Initiatives approved the rebasing of national accounts from 2005-06 to 2015-16.

6.   While the change of base of national accounts is a gigantic and challenging task, it also provides an opportunity to enhance the coverage of economic activities and improve the estimation methodologies and sources of data. The Pakistan Bureau of Statistics has capitalized on this opportunity and has made all-out efforts to implement the recommendations of 2008 SNA, explore new sources of data, and enhance the coverage of economic activities described in the Pakistan Standard Industrial Classification (PSIC-2010) adopted from the International Standard Industrial Classifications (ISIC) Rev.4. Efforts have also been made to capture the products in each economic activity as described in the Central Product Classification (CPC) Version 2.

7.   The economy of Pakistan is broadly divided into agriculture, industrial activities and services. While the structure of dissemination of data relating to agriculture has remained the same in 2015-16 rebasing as was during the 2005-06 base, a slight adjustment has been made in the industrial activities due to inclusion of water supply industry (the private sector only) along with electricity and gas industries. However, keeping in view the consistent demand of users and following the structure of PSIC-2010, Services industries have witnessed significant changes in dissemination structure due to separate estimation of various activities as per following detail:
- Accommodation and Food Services Activities (Hotels & Restaurants), which were used to be estimated along with wholesale and retail trade (WRT) in 2005-06 rebasing, have been estimated separately.
- Information and communication industries have been estimated separately in 2015-16 base. In 2005-06 base estimates, the information and communication activities were used to be included in other private services and transport, storage & communication respectively.
- Education, human health and social work activities have also been estimated separately in 2015-16 rebasing which were parts of other private services and general government in 2005-06 rebasing.

Gross Domestic Product

8.   GDP in Pakistan is estimated as per guidelines provided by the SNA. In international analyses and comparisons the GDP at market prices is the most important and most common macro-economic indicator.
- As a measure of aggregated production, GDP is the sum of the gross value added of all resident producers plus any taxes on products not included in the value of their output minus any subsidies on products included in the value of their output.
- GDP at market prices is also equal to the market value of all final uses of goods and services during a year (which includes exports), less the value of imports.
- GDP at market prices is also equal to the sum of primary incomes (payables out of the value added created by production) distributed by resident producers.

- GDP may be measured in national (e.g. rupee) or foreign currency (e.g. US$) or in Purchasing Power Parities (PPP).
- GDP may be measured in prices of the reference year ("current prices") or in prices of a foregone year ("constant prices").

In principle, GDP may be derived in three ways or in combination of them:

9.   **Production Approach:** It measures the contribution to output made by each producer. It is obtained by deducting from the total value of its output the value of goods and services it has purchased from other producers and used up in producing its own output. Total value added by all producers, adjusting taxes and subsidies equals GDP.

Gross Value Added at basic prices= Output at basic prices - Intermediate consumption at purchasers' prices

GDP = Output – Intermediate consumption + Taxes on products – Subsidies on products or

GDP = Gross value added + Taxes on products – Subsidies on products

For the purpose of GDP estimation by industries, the production approach is applied. For some activities, especially for non- market activities, output is measured as the sum of primary incomes (GVA) and intermediate consumption.

10.   **Income Approach:** In this approach, consideration is given to the costs incurred by the producer within his own operation, the income paid out to employees, taxes (less subsidies) on production, consumption of fixed capital, and the operating surplus. All these add up to GDP at market prices.

GDP = Compensation of employees + Consumption of fixed capital + Gross operating surplus / Mixed income + Taxes less subsidies on production and imports

11.   **Expenditure Approach:** This approach looks at the final uses of the output for private consumption, government consumption, capital formation and net of imports & exports.

GDP = Final consumption (Households, NPISH & Government) + Gross capital formation (GFCF, changes in inventories & valuables) + Exports – Imports

The expenditure approach is rudimental as only some of the summands (collective consumption, capital formation and export minus imports) are calculated independently while the biggest summand (private consumption) is calculated as residual vis-a-vis the GDP measured through production approach.

12.   It should be noted that practically the compilation of GVA (output minus intermediate consumption) uses a more detailed economic classification i.e. PSIC. GDP is computed by a combination of production, income and expenditure methods. Production method is applied to compute value added in most of the industries whereas income method is used to work out income accruing from general government and some components of services e.g. membership organization.

13.   The GDP data, in new base year 2015-16, will be released at constant and current basic prices by industries as per following structure:

A.	**Agriculture, Forestry and Fishing (1 to 4)**
	1. Crops (i+ii+iii)
	i) Important Crops
	ii) Other Crops
	iii) Cotton Ginning
	2. Livestock
	3. Forestry
	4. Fishing
B.	**Industrial Activities (1 to 4)**
	1. Mining and Quarrying
	2. Manufacturing (i+ii+iii)
	i) Large Scale
	ii) Small Scale
	iii) Slaughtering
	3 Electricity, Gas and Water supply
	4. Construction
A+B	**Commodity Producing Activities (A+B)**
C.	**Services (1 to 10)**
	1. Wholesale & Retail trade (Including repair and maintenance of motor vehicles and motor cycles
	2. Transportation & Storage
	3. Accommodation and Food Services Activities (Hotels & Restaurants)
	4. Information and Communication
	5. Financial and Insurance Activities
	6. Real Estate Activities (Including Ownership of Dwellings)
	7. Public Administration and Social Security (General Government)
	8. Education
	9. Human Health and Social Work Activities
	10. Other Private Services [i. Professional, scientific, and technical activities, ii) Administrative and support services, iii) Arts, entertainment and recreation, iv) Other service activities including membership organizations, repair of computers and personal household goods, washing, dry cleaning, etc. and v) Households as employers of domestic services].
D.	**GDP {Total of GVA (A+B+C)}**

GDP compilation by Industries
Agriculture, Forestry and Fishing

14.   For compilation purpose this industry is divided into crops, livestock, forestry, and fishing activities. Crops are further divided into important crops i.e. wheat, rice, maize, cotton and sugarcane, other crops e.g. fodder, pulses, vegetables, fruits, etc. and cotton ginning. For the purpose of rebasing of Crops and Livestock, a study "Agriculture Input output 2016-17" has been conducted whose results have been used to update prices of crops, livestock, inputs of crops and other Input-Output ratios. The contribution of plant nurseries, honey bee, cotton ginning, forestry and fishing has also been re-assessed through studies. However, projected population of livestock has been used in the compilation of livestock due to non-availability of results of fresh agriculture/livestock census.

15.   For subsequent year, the sources of output of crops are area and production compiled by provincial crop reporting services whereas inputs e.g. fertilizer off-take, pesticides, water, etc. are provided by the sources annually. The remaining inputs e.g. seeds, ploughing are

estimated by using input-output ratios. The cotton ginning is estimated through production of cotton. The output of livestock is extrapolated through numbers/quantities for the subsequent years given by their respective sources and intermediate consumption is calculated directly from the available input quantities using base year ratios. For forestry, timber is estimated through production received from forest departments and firewood is estimated through fixed growth rate. The output of fishing is extrapolated through quantities for the subsequent years given by the sources. Intermediate consumption for both forestry as well as fishing is estimated through base year ratios. Product and industry-specific WPI deflators are used for conversion from constant to current prices.

Industrial Activities

16.   The industrial activities include mining and quarrying, manufacturing (large-scale, small-scale and slaughtering), electricity, gas and water and construction activities. **Mining and quarrying** industry's contribution in 2015-16 rebasing has been re-assessed through census of oil and gas exploration companies and studies on minerals and stone crushing. The output of this industry for subsequent years has been extrapolated through production of mineral products provided by the mining departments while the intermediate consumption is derived through base year ratios. Product-specific WPIs are used for conversion from constant to current prices.

17.   **Large-Scale Manufacturing (LSM):** The contribution of LSM has been re-assessed through Census of Manufacturing industries (CMI) for the year 2015-16. However, in order to avoid double counting, CMI results have been adjusted for trade services carried out as a secondary by LSM units because in National Accounts trade services are calculated on functional basis under wholesale and retail trade. Similarly, processing of meat has also been deducted from CMI results because this activity is estimated separately as slaughtering in national accounts. The Quantum Index of Large Scale Manufacturing (QIM) with 2015-16 as the base year has been used for extrapolation of GVA at constant prices for subsequent years which has been converted into current prices through a specifically compiled weighted WPI.

18.   **Small-scale manufacturing:** In 2015-16 rebasing, small-scale manufacturing has been estimated through "Small Household and Manufacturing Industries Survey" (SHMI) during 2015. The survey results have been adjusted to the base year 2015-16. Forward extrapolation of GVA of this industry has been an issue. Despite working on different options i.e. informal employment of manufacturing, financing to small business, etc. PBS has to rely on fixed growth rate for this industry due to non-availability of reliable and timely indicators on annual basis. For this purpose, a long-term series of deflators was developed specifically to convert the results of various SHMI into common price. With the consultation of stakeholders, the most recent geometric growth rate i.e.8.87% between 2015-16 and 2006-07 has been adopted for the extrapolation of GVA at constant prices for subsequent years.

19.   **Slaughtering Industry:** The output of this industry consists of meat (mutton, beef and poultry), edible offal and other products (blood, bones, horns, etc.) for which data is provided on annual basis by M/O NFS&R. For rebasing purpose, prices of these products have been collected through a study. The major input of this industry is the live animals and poultry "sold for slaughtering" whose estimates are derived through projections based on Livestock Census 2006. The same have been used due to non-availability of fresh census data. For subsequent year, output of the industry at constant basic prices has been estimated

through production of meat and meat products. The intermediate consumption has been estimated using data on inputs and base year ratios.

20. **Electricity, gas and water supply:** This part consists of electricity generation, transmission & distribution, gas distribution and water supply in private sector. Data on electricity generation and distribution is provided by Water and Power Development Authority (WAPDA), provincial power development companies, public generation companies often abbreviated as "GENCOs", independent power producers (IPPS), K-Electric, Captive units, the electricity distribution companies (DISCOs), renewables and nuclear units. The input structures of four types of electricity products i.e. Hydel generation, Thermal generation, nuclear power and renewable electricity are different from each other. The Census of Electricity Establishments has been conducted to assess the contribution of electricity generation and distribution activities. While exploration of gas is covered under mining and quarrying industry, its distribution is included here for which data is obtained from Sui Northern Gas Pipeline (SNGPL), Sui Southern Gas Company (SSGC) and Mari Gas Company. The contribution of water supply in the private sector (the public sector water supply is included in general government) has been assessed from the user side following the pattern of forestry industry as the data needed for direct valuation through production approach was not available. The uses of the water, refuse/waste collection in industries i.e. agriculture, mining and quarrying, large-scale manufacturing industry, small and household manufacturing industry, construction, etc. have been taken from the surveys and census conducted for rebasing purposes. The output of sewerage, waste collection, treatment, and disposal activities for households has also been estimated using expenditure reported in HIES 2015-16.

21. For subsequent years, output and intermediate consumption of electricity generation and distribution is compiled at current prices using data reported by establishments/enterprises. The treatment of subsidies on products is taken into consideration at the time of distribution by making it part of output. For constant price estimates of electricity generation and distribution, an Implicit Volume Index for Output (IVO), recommended by technical experts of the World Bank, has been applied. The GVA at constant prices is the difference between constant output and constant intermediate consumption. Gas distribution is estimated using data from annual reports and water supply is extrapolated through inter-census (2017 and 1998) growth of urban dwellings.

22. **Construction:** The base year estimates of construction industry have been derived by using data from Construction Survey 2014-15 containing information on construction establishments and private buildings by households. The survey results have been adjusted to the base year 2015-16. The GVA estimates at current prices for subsequent years have been derived by using aggregate growth of construction expenditure at current prices reported by producing industries. WPI building material has been used to derive the value added estimates at constant prices.

Service Industries

23. **Wholesale and retail trade (WRT):** The GVA of WRT is compiled through functional approach whose output is derived by using ratios of marketable supply and trade margins, updated through input-output study conducted for rebasing purpose, applied on the output produced in agriculture, manufacturing as well as imported raw materials, finished and capital goods. The repair and maintenance of motor vehicles has been estimated through

survey on "Other Private Services 2016-17". The GVA of following years has also been derived separately at current and constant prices using output of producing industries and imports through the application of ratios marketable supply and trade margins.

24. **Transport and storage:** This industry is comprised of railways, water, air, pipeline, and road transport, postal services, storage and warehousing activities. These activities have been re-assessed through studies. For subsequent years GVA of road transport is estimated through number of vehicles provided by NTRC while remaining activities are estimated using data provided by sources and base year ratios.

25. **Accommodation and food service activities (Hotels and restaurants):** This industry was used to be included in WRT in old base estimates. The separate contribution of this industry for the base year 2015-16 has been assessed through census/survey of establishments. The GVA of accommodation and food service activities was used to be extrapolated through fixed growth rates i.e. 10% in 1999-2000 rebasing and 4.92% in 2005-06 rebasing due to non-availability of the relevant indicators. In 2015-16 rebasing too, extrapolation of the GVA of this industry is an issue. Keeping in view the current data limitation, a fix growth rate of 4.08% (an inter-census growth rate of urban dwelling for 2 and more rooms) has been used to estimate output and intermediate consumption at constant prices.

26. **Information and Communication:** This industry is comprised of publishing activities, motion pictures, programming and broadcasting, computer programming, consultancy, and information service activities and telecommunications industry. The separate contribution of these activities has been assessed for the first time through studies. For subsequent years the estimates of GVA have been compiled by using data from sources and applying the industry-specific WPI deflators.

27. **Financial and Insurance activities:** This industry is well documented whose data is available regularly on annual basis which has been used to derive the Financial Intermediate Services Indirectly Measured (FISIM), major component of the output, and GVA of Non-FISIM components separately. The contribution of exchange companies and exchange broker's has been assessed through studies. The GVA of following years has been compiled by using annual data provided by the sources. CPI (General) has been used as deflator.

28. **Real Estate Activities (OD):** This industry is comprised of "Ownership of Dwellings" and activities of real estate agents. The output of ownership of dwellings includes actual rent for rented dwellings, the imputed rent for owner-occupied dwellings, the imputed rent for dwellings on subsidized rent, and the imputed rent for rent-free dwellings. In 2015-16 rebasing, the output has been directly estimated from HIES 2015-16. The intermediate consumption of this industry i.e. the cost of repairs and maintenance of dwellings and commission paid to real estate agents for rented dwellings have been estimated from HIES and Rent Survey respectively. The third component i.e. imputed consumption of bank and insurance services (FISIM) is deducted at final stage. The GVA of ownership of dwellings for following years has been estimated at constant prices for urban and rural areas separately by applying inter-census growth of dwellings @4.08% and 2.77% comprising of 2 & more rooms which represent 74.3% and 65.2% of urban and rural dwellings respectively. CPI Rent (urban) and CPI Rent (rural) has been used as deflators. The GVA of real estate agents has been extrapolated at constant prices by applying inter-census growth of urban dwellings

@4.08% comprising of 2 & more rooms which has been converted into current prices by applying CPI Rent (urban).

29.   **Public Administration and Social Security (General Government):** This industry is also well documented whose GVA i.e. sum of compensation of employees and consumption of fixed capital, is based on budget documents of federal, provincial, and district governments and cantonment boards. The data is available annually which has been used to derive the new base estimates of GVA. The contribution of autonomous bodies has been assessed separately through a census. The value-added contribution of autonomous bodies providing educational services at economically significant prices i.e. with market output; has been combined with private sector education and those with non-market output have been added to the general government.   Further, GVA of general government has also been disaggregated into Public Administration, Education, Health and Social Work.

30.   **Education:** To re-assess the contribution of education in 2015-16 Rebasing of National Accounts, PBS has broadly divided education into four major categories including i) Public sector education provided by institutions of federal, provincial, and district governments purely on a non-market basis covered in the budget of respective governments ii) Autonomous bodies engaged in education and falling under federal and provincial governments but with separate budgets iii,) Education provided by non-profit institutions purely on the non-market basis and iv) Education provided in the private sector on a market basis. The contribution of private sector and NGOs has been assessed through surveys. For following years, the GVA of private sector and NGO has been estimated through enrolment of students while of general government is estimated directly through budget documents.

31.   **Human health and social work activities:** This industry has also been compiled in the pattern of education. For following years, the GVA of private sector and NGO have been estimated through number of health personnel's while of general government is estimated directly through budget documents.

32.   **Other Private Services:** In 2015-16 rebasing, Other Private Services is comprise of i) Professional, scientific, and technical activities, ii) Administrative and support services, iii) Arts, entertainment and recreation, iv) Other service activities (activities of membership organizations, repair of computers and personal household goods and other personal service activities including washing, dry cleaning, etc.) and v) Activities of households as employers of domestic services. The contribution of these activities in 2015-16 rebasing has been assessed through a combination of surveys/studies. Based upon data on number of engineers registered with Pakistan Engineering Council (PEC), number of Chartered Accountants, number of veterinary doctors and graduates registered with Pakistan Veterinary Council (PVC), enrolment of vocational institutes, data from PTV, ATV and PBC, base year ratios and fixed growth rates, and using the industry specific deflators, the GVA for following years has been compiled separately at current and constant prices.

Expenditure on GDP

33.   The estimates of expenditure on gross domestic product (GDP) are the total of final uses of goods and services measured in purchaser's value less the value of imports of goods and services. According to 2008 SNA, the principal components of final uses of GDP are:
     i.   Household final consumption expenditure
     ii.   NPISH's final consumption expenditure

iii. General government final consumption expenditure
iv. Gross fixed capital formation
v. Changes in inventories
vi. Acquisition less disposal of valuables
vii. Exports m*inus* Imports

34. **Household final consumption expenditure:** Due to huge gap in the household final consumption figures compiled through HIES surveys and in National Accounts, its estimates have been derived through residual approach in 2015-16 rebasing as was being done in 2005-06 base. The household final consumption has been estimated at Rs. 26107 billion i.e. 79.78% of GDP for 2015-16 in new base estimates as compared Rs.23266 billion i.e.80.02% of GDP in old base estimates.

35. **Final consumption expenditure of non-profit institutions serving households (NPISH):** Non-Profit Institutions Serving Households (NPISHs) comprised of NGO's and membership organizations. The final consumption expenditure of NPISHs are equal to their operating costs and all being individual consumption expenditure in nature. In 2015-16 rebasing, final consumption expenditure of NPISH, has been estimated separately through the known values of output for the first time. Due to non-market nature, the output of NPISH has been imputed through the intermediate consumption expenditure (e.g. electricity, gas, water, fuel, transport, rent, etc.), compensation of employees, and consumption of fixed capital reported by NGO's for the base year survey and membership organizations. The base year output of NPISH i.e. Rs.296.7 billion has been treated as the final consumption expenditure of the NPISH which accounts for 0.91% of the GDP for the new base estimates.

36. **General government final consumption expenditure:** The final consumption expenditure by government is equal to its cost, defined by the sum of compensation of employees of the government, *Plus* purchases by government of materials and other intermediate consumption items, *Plus* consumption of government fixed capital, *Plus* purchases of goods and services by the government for the benefit of households *Plus* other taxes on production *minus* partial payments by households or firms for services provided by government *Plus* non-market output of the central bank. It is compiled through the budget documents of the federal, provincial and district governments and disaggregated according to the classification of the functions of government (COFOG). General government final consumption expenditure has been estimated at Rs.3472 billion i.e.10.61% of GDP for 2015-16 in new base estimates as compared to Rs. 3288 billion i.e. 11.31% in old base estimates.

Gross Fixed Capital Formation (GFCF)

37. There are two types of assets i.e. financial (money, shares etc) and nonfinancial. The non-financial assets are physical in nature and make up the capital stock of a country which is used as a factor of production to generate GDP. Non-financial assets are broadly categorized into non-produced assets such as natural resources, contracts, leases and licenses, and goodwill and marketing assets etc and produced assets which come into existence as outputs from production processes. There are three main types of produced assets: fixed assets, inventories and valuables. Both fixed assets and inventories are assets that are held only by producers for purposes of production. Valuables may be held by any institutional unit and are primarily held as stores of value.

38.   GFCF is concerned with fixed assets which are produced ones and are used repeatedly or continuously in production processes for more than one year. GFCF is measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period plus certain specified expenditure on services that adds to the value of non-produced assets. GFCF may also take the form of improvements to existing fixed assets, such as buildings or computer software that increase their productive capacity, extend their service lives, or both.

39.   GFCF can be broken down by the nature of the product or by investing industry or by type of asset. Their cross classification may also be useful for analysis purpose. In Pakistan we classify the GFCF by investing industry and by type of assets. The types of assets are:

   A.   Material fixed assets
          i.   Dwellings,
          ii.   Other buildings and structures
          iii.   Machinery and equipment
          iv.   Cultivated assets
   B.   Intangible fixed assets
          i.   Mineral exploration
          ii.   Software
          iii.   Literary and artistic originals

40.   Gross fixed capital formation is valued at purchasers' prices, which for the capital goods include transportation and installation charges as well. For the measurement of GFCF in Pakistan all four possibilities or a mixture of them are exploited:
   • Primary data from surveys by asking the investor
   • Secondary data (i.e. without special survey) by utilizing data which are already available (government budgets and government finance statistics, banking statistics, company reports)
   • Commodity flow approach: If information of the investor is not available the amount is derived from the domestic output or import of goods or services which presumably are object of the capital formation.
   • Proxy estimates from variables which are considered to strongly correlate with capital formation e.g. loans from banks and other sources.

Estimation of GFCF

41.   Estimates of GFCF are computed by a combination of commodity flow, expenditure (survey method) and financial approaches. Commodity flow approach which uses the net availability of capital goods in value terms from domestic production and imports and exports duly adjusted for various margins is applied to the following three sectors.

   1. Agriculture (Crops)
   2. Construction
   3. Transport

42.   Expenditure approach (survey method) is applied to the following sectors:
   1. Mining and quarrying
   2. Large scale manufacturing industries (In-production units)
   3. Small and household manufacturing industries

4. Electricity, gas and water
5. Wholesale and retail trade
6. Accommodation and Food Service Activities (Hotels and Restaurants)
7. Information and Communication
8. Financial institutions
9. Housing services, real estate including ownership of dwellings
10. Education
11. Human health and social work
12. Other private services
13. General government sector

43.   Financial approach is used to estimate GFCF in under-construction large scale manufacturing industries and loans disbursed to different industries. Industry wise detailed methodology is given below.

44.   The GFCF is compiled separately for private, public and general government sectors at current and constant prices. The industry-wise methodology for compilation of GFCF estimates in the private sector is described in the following:

45.   **Agriculture, forestry and fishing industry:** Main components of private sector GFCF in agriculture are:
   1. Domestic production and imports of agriculture machinery
   2. Tube wells installed
   3. Cultivated assets (livestock and timber)
   4. Land improvement
   5. Farms and buildings
   6. Wells and bundats
   7. Farm transport
   8. Water courses
   9. Orchards and
   10. Non-monetized GFCF

The GFCF estimates in the agriculture, forestry and fishing industry are compiled separately for crops (Private and public sectors), cotton ginning (new addition in 2015-16 rebasing), livestock, forestry and fishing. For subsequent years, GFCF is based on data of imported agricultural machinery, updated figures of stock of various species of livestock, and fishing crafts and inflated/deflated by industry specific WPIs.

46.   **Mining and quarrying:** The GFCF in mining and quarrying industry has been estimated separately for coal, gas, oil, other minerals by capital assets (tangible & intangible), and exploration costs in line with SNA-2008. For subsequent years, data relating to GFCF is extracted from annual reports of establishments/enterprises.

47.   **Manufacturing:** The GFCF in manufacturing industry is estimated separately for large scale (LSM), small scale and slaughtering industries. GFCF of **LSM** has been estimated by using a combination of expenditure & financial approaches. The expenditure approach is applied for 'in production' units whereas financing approach is applied for the units under construction and not covered in the category of in production units. For the new base year the GFCF comprised of balancing, modernizing and replacement (BMR) of the existing assets by units in production has been estimated through the Census of Manufacturing Industries (CMI)

2015-16 and stands at Rs.465.4 billion. The GFCF by under construction units is estimated through financing approach i.e. loans disbursed by Development Financing Institutions (DFI's) / Scheduled Banks, Leasing & Modarba companies. It is treated as new capacity building and expansion. Existing practice is to use the 50% of these loans for GFCF purpose. Further, the equity equivalent to 50% loans was also assumed as part of GFCF in 2005-06 rebasing. The same practice has been continued for the new base year 2015-16 as well. The rationale is that especially in LSMI the big chunk of capital formation is done during the start-up phase while production (and thus reporting to statistics) has not yet commenced. For GFCF estimates in subsequent years, data is collected through annual census/survey of listed and non-listed companies and financial disbursement made to manufacturing establishment by financial institutions.

48.   The estimates of GFCF in **small-scale manufacturing industry** for the new base year 2015-16 have been derived from the survey on Small and Household Manufacturing Industries 2015. For subsequent years, GFCF has been estimated by using inter-survey fixed growth rate and WPI deflators.

49.   The GFCF in **slaughtering** is made in the construction of buildings, transport equipment, furniture and fixtures, and machinery and equipment. In the absence of direct establishment-based data in the slaughtering industry, the GFCF reported in the 2015-16 CMI under PSIC class 1010-Processing and preserving of meat has been doubled to account for the informal component of the industry. For subsequent years, the GFCF for this industry has been estimated by using the growth rate of meat production and WPI meat as deflator.

50.   **Electricity, gas and water supply industry:** The GFCF in electricity, gas and water supply industry is estimated based upon data from WAPDA, K-Electric, IPPs, CPPs, small hydle power plants, for electricity generation &distribution, SNGPL, SSGC & Mari gas for gas distribution including for CNG and water supply in the private sector (new addition in 2015-16 rebasing). For subsequent years, the GFCF of electricity and gas industries has been estimated by using annual data provided by the sources whereas water supply component has been estimated by applying the growth of financing for fixed investment to private businesses engaged in the industry.

51.   **Construction:** In 2015-16 rebasing, the private sector GFCF in construction industry has been estimated through the Construction Survey 2014-15 (Establishment part). As the public sector GFCF is estimated directly on the basis of annual data on construction expenditure reported by development authorities, therefore, public sector GFCF have been deducted from the survey-based estimates. For subsequent years, GFCF have been estimated using data on imported construction machinery.

52.   **Wholesale, Retail Trade:** The GFCF in wholesale and retail industry has been estimated through surveys i.e. "Other Private Services 2016-17" for repair and maintenance of motor vehicles and study on warehouse and storage industry. For subsequent years, GFCF has been estimated by using the growth of financing for fixed investment to private businesses engaged in the industry.

53.   **Accommodation and Food Service Activities (Hotels and Restaurants):** The GFCF of accommodation and food service activities has been estimated separately through a survey. The growth of financing for fixed investment to private businesses engaged in the industry has been used as an indicator for the GFCF estimates for subsequent years.

54.   **Transportation and Storage:** This industry has witnessed a structural change in the 2015-16 rebasing. The communication, which was used to be included under the heading of "Transport, storage and communication" has been grouped with information as per PSIC 2010. For subsequent years, the GFCF in transportation and storage industry has been estimated by using data on imported and domestically produced and sold machinery and equipment used in the industry.

55.   **Information and Communication:** In the 2005-06 rebasing, the information part was used to cover under "Other Private Services" whereas communication was covered under "Transport, storage and communication". The activities have been re-arranged following the demand of users and industry stakeholders in the wake of growing importance of IT and allied services as well as structure of the PSIC 2010. For subsequent years, the GFCF in information and communication industry has been estimated by using the growth of financing for fixed investment to private businesses engaged in publishing activities, motion pictures, programming and broadcasting, computer programming, consultancy, and information service activities and annual reports of establishments/enterprises engaged in telecommunications industry.

56.   **Financial and insurance activities:** GFCF of this industry in the base year and for subsequent years is compiled through annual data obtained from establishments/enterprises.

57.   **Real Estate Activities (Housing Services):** Real estate activities are comprised of two sub-sectors i.e. Housing services (Ownership of Dwellings) and activities of real estate agents. The estimates of GFCF for the new base year 2015-16 for the ownership of dwellings have been developed by using the information from Construction Survey 2014-15 (Household part). The estimates of GFCF for the Real Estate Agents have been developed by using the information from Survey of "Survey on Other Private Services 2016-17". The GFCF of this industry for subsequent years has been estimated by applying the growth rate of inter-census dwelling with 2 rooms and more and WPI building material as deflator.

58.   **Education:** The GFCF in education industry in private sector has been assessed separately under i) Education provided in the private sector on a market basis estimated through Survey on "Other Private Services 2016-17" ii) Education provided by non-profit institutions estimated through "NGOs Survey 2015-16" purely on the non-market basis. The GFCF of autonomous bodies, estimated through a census, having market output has been combined with private sector and those with non-market output have been added to the general government. The private sector GFCF in this industry at current prices has been estimated through enrolment of students and WPI Building material as deflator.

59.   **Human Health and Social Work Activities:** The GFCF in human health and social work activities has been estimated at the same pattern used for education industry. The private sector GFCF in this industry at current prices for subsequent years has been estimated through number of health personnel's and WPI (General) as deflator.

60.   **Other Private Services:** In 2015-16 rebasing, other private services is comprised of professional, scientific and technical activities, administrative and support service activities, arts, entertainment and recreation, and other service activities (membership organizations, repair of computers and personal and household goods and other personal services activities such as washing, dry-cleaning to textile and fur products, hairdressing and other beauty

treatment, funeral and related activities, astrological and spiritual activities, marriage bureaus, shoe shiners, etc.). For subsequent years, the GFCF has been estimated by using data of number of engineers engaged in professional, scientific and technical activities, information on financing for fixed investment to private businesses engaged in these industries.

61.   **GFCF in Public Sector:**   The GFCF estiamtes in the public sector are compiled using annual data obtained from establishments/enterprices in various industries.

62.   **GFCF in General Government:** GFCF by general government consists of the acquisitions less disposal of fixed assets during an accounting period. The expenditure made by Federal, Provincial, local governments and defence services on fixed assets during the year are accounted as gross fixed capital formation by the institutional sector General Government. The expenditure made on residential construction for military personnel are included as part of fixed capital formation. Data on GFCF has been taken from published budget documents. The GFCF of the General Government has been further disaggregated into three relevant PSIC sections i.e. 84-Public administration and defence, Education and Human health and social work activities. The GFCF of autonomous bodies engaged in the provision of education, health and social work activities but with non-market output has also been included here.

63.   **Changes in inventories and acquisition less disposal of valuables:** The changes in inventories are not directly estimated due to paucity of data and are derived as fixed proportion of GDP @1.6% as the continuity of the previous bases. In Pakistan, valuables are mainly held by households. In 2005-06 rebasing, valuables were not included in the expenditure side of the GDP due to non-availability of relevant data by households and other institutional sectors. In 2015-16 rebasing, valuables have been estimated separately for the year 2015-16 by using information from HIES 2015-16 relating to yearly expenditure of the household on purchase, sales and net additions of gold products, silver products, and precious stones and metals.

64.   **Exports and imports of goods and services:** Like in the balance of payments (BOP), imports and exports of goods are recorded in the SNA at border values i.e. free-on-board (at the exporter's customs frontier). Following the recommendation of the World Bank experts on national accounts, BOP figures of exports and imports of goods and services compiled by the SBP, have been used in the compilation of expenditure on GDP in the new base estimates.

65.   **Net Primary Income (previously called "Net Factor Income")**
According to SNA (2008), "Gross national income (GNI) is defined as GDP plus compensation of employees receivable from abroad plus property income receivable from abroad plus taxes less subsidies on production receivable from abroad less compensation of employees payable abroad less property income payable abroad and less taxes plus subsidies on production payable abroad." (p.333).