GDP by final expenditure approach

An operational guide for using commodity flow approach

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This document is written as training materials for the compilation of GDP by final expenditure approach. The first part of the document discusses basic concepts and methods for deriving main components of final expenditures such as final consumption, gross capital formation, exports and imports. The second part introduces the commodity flow approach for balancing use and supply of products in order to confirm the estimation as well as to estimate the expenditure components when limited information is available.

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Introduction and workshop recommendations

1. This document is written as training materials for the compilation of Gross Domestic Product by final expenditure approach (GDE). It is a follow-up to another document *GDP by production approach*. *GDP by production approach*: A *general introduction with emphasis* on an *integrated economic data collection framework* [1] that focuses on the analysis of production capability and results of production by economic activities. This document elaborates in more details the compilation of final expenditures that make up GDP such as final consumption of households, general government and non-profit institutional serving households (NPISHs), investment in fixed assets (gross capital formation) and net exports. These data are necessary for the analysis of the behaviour of economic institutional sectors of the economy in their consumption and investment decisions.

2. The document is based on the papers presented at the International *Workshop on Measuring GDP by final demand approach* held in Shenzhen, China between 25 and 27 April 2011. The Workshop was sponsored by China's National Bureau of Statistics and the United Nations Statistics Division (UNSD) as part of the project *Statistical Capacity Development in China and other Developing Countries in Asia.*

3. The first part discusses the conceptual foundation and the methods for directly compiling every component of final expenditure. The second part discusses the commodity flow approach to balance supply and uses of commodity in order to ascertain final expenditure that is compiled independently or to derive data that are not available.

4. This workshop was part of a series of events organized under the project on strengthening statistical capacity development in China and other developing countries in Asia, funded by the Chinese Government. It was organized in two parts – international and domestic. The workshop brought together over 90 experts from 16 countries in Asia - Cambodia, China, Hong Kong, India, Indonesia, Korea, Laos, Macao, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam as well as Canada, with different experiences, circumstances and needs. The domestic part of the workshop was organized particularly for the Chinese participants from the National Bureau of Statistics and some of the provincial offices to discuss China's practice in compiling GDP by final demand approach and the reasons for the inconsistencies between the national GDP measured from the production and expenditure sides.

5. Mr. Frederick Ho (Hong Kong), Mr. Arthur Berger (Canada), Mr. Vu Q. Viet (UNSD consultant) and Mrs. Youlia Antonova (UNSD) served as resource persons.

[1] unstats.un.org/unsd/China.../GDP%20by%20production%20approach.pdf

Report and Recommendations of Workshop

1. Measurement of GDP by final demand approach independently rather as a residual.

6. National Statistical Offices were encouraged to measure independently GDP by final expenditure, and to reduce to the minimum possible the measurement of individual expenditure category as a residual between GDP (production) and GDE (expenditure).

2. More focus on direct measurement of inventories

7. Particularly important is the independent measurement of changes in inventories. Ratios of inventories over outputs provide important information on the short-term development of the economy. It is also important that inventories be prepared separately for materials and supplies which are used to compute intermediate consumption; work-in-progress and finished goods which are used to compute gross output.. Some countries that participated in this workshop, unfortunately, still treat changes in inventories as residuals, which include statistical errors.

Estimation of output from sales – an example

	Calculating operations	T_0	T_1	T_2	T_3
Information given					
1. Sales net of taxes and plus subsidies			80	120	272
2. Price index			100	125	200
3. Value of inventory at end of period (book value)		0	40	30	16
4. Change in inventory (book value)	= $(T_i - T_{i-1})$ applied to line (3)		40	-10	-14
Derived data					
5. Value of inventory at constant prices	= Line (3)*100/ line (2)	0	40	24	8
6. Change in inventory at constant prices	= $(T_i - T_{i-1})$ from line (5)		40	-16	-16
7. Change in inventory at current prices	= Line (6) * line (2)/100		40	-20	-32
8. Output at basic price	= Line (1) + line (7)		120	100	240

8. The proper revaluation of inventories at market prices to replace book values as practiced in business accounting is important in correctly measuring inventories and output. The approach to calculate non-farm inventories (on which data on quantity of inventories are not available) as practiced in Canada is recommended. The table above shows an example of revaluing inventories and calculation of output from sales.

3. Use of commodity flow approach recommended

9. The workshop strongly supported the use of commodity flow approach as a systematic and consistent frame for the estimation of GDE. It is a simple form of supply and use tables (SUT), applicable in cases when national accountants do not have full set of data. The approach is based on using the benchmark SUT when it is available; when benchmark SUT is not available, simple ratios based on limited surveys or expert opinions may be used instead.

10. Due to cost constraint and time requirement to process data, detailed SUT is normally prepared for benchmark years only. In between them, an extrapolation by ratios from the base year to the current year should be applied to measure wholesale and retail trade margins, transport margins and taxes on products. The following allocation rules are recommended:

a. Trade and transport margins: Normally margin on a given product is allocated proportionally to the values of products used;
b. Taxes on products: Taxes are distributed proportionally to the values consumed, excluding consumption categories that are either not subject to taxes or subject to tax deduction;
c. Allocation rules for supply of other goods and services destined to final expenditures:
    i. The following information are required and normally available:
        - Industry output in basic prices
        - Product price indexes (producers' price indexes, consumer price indexes, import price indexes and export price indexes
        - Data on exports and imports
        - Preliminary data on general government FCE and GCF
        - Limited information on household FCE
    ii. The following needs to be done:
        - Convert industry output to product output in purchasers' prices
        - Deflate product output
        - Estimate trade and transport margins in constant prices
        - Estimate products consumed as intermediate inputs in constant prices
        - Estimate total products that can be used for GCF and household FCE in constant prices and then reconvert them back to current prices.

4. Acquisitions less disposals of Valuables

11. Acquisitions less disposals of Valuables are part of the SNA assets boundary, however countries are advised that not all items that may be described as precious metals and stones, antiques and other art objects should necessarily be included as valuables in the balance sheet of the owner, which could be a household as well. Only those items regarded **as alternative form of investment (for example gold and paintings instead of financial assets) should be captured**, the remaining part, if owned by households should be recorded as final consumption expenditures of households. Transactions in monetary gold are not treated as final consumption. The SNA2008 defines physical gold bullions as monetary gold when held as reserves by monetary authority. Non-monetary gold as an alternative form of investment could be in principle treated as valuables and can also be used as intermediate consumption (in the production of other goods), added in inventory, and entered into supply through imports or demanded as exports. Exports of non-monetary gold (without production) if recorded must be balanced by negative gross capital formation (or disposal of valuables or reduction in inventories). However, in the case that physical gold held by households as stores of value and transacted with non-residents through country borders, countries may choose to treat it similarly to monetary gold and not recorded as exports and imports when they have not been previously recorded in inventories or assets of valuables. In such a case, the recording of transactions of

gold in exports and imports (which are not produced and not used for the purpose of production in the accounting period) may distort their analytical meaning.

5. Distinguishing fees and taxes

12. Licences and fees - payments of households to government units to obtain various kinds of licences, permits, certificates, passports etc. are not always clear, i.e. whether these are payment for services or de facto taxes.

13. It is recommended that following the SNA 2008, payments by households for licences to own or use vehicles, boats or aircrafts and those for recreational hunting, shooting or fishing are treated as taxes as no actual services are provided by government. Payments for licences to undertake a specific activity such as a taxi licence are treated as a tax on production.

14. Payments by households for all other kinds of licences, permits, certificates, passports, etc. that require government services such as inspection, should treated as purchases of services and included in household consumption expenditure.

6. Owner-occupied dwellings

15. Owner-occupied dwellings – total imputed output value of housing services should be recorded as final consumption expenditure of households. It is important to note that costs of regular maintenance and repair should be treated as intermediate consumption of this activity which provides services of owner-occupied dwellings. Consumption of fixed capital is based on the depreciation of the dwellings.

16. The purchase of dwelling itself should be recorded as gross fixed capital formation.

7. Deflation of FISIM

17. Financial and insurance services, including FISIM, as part of the final consumption expenditure of households, general government and NPISHs in current and constant prices should be estimated according to the SNA 2008 rules. In the absence of an explicit international recommendation for the deflator of FISIM, countries may apply a more conservative approach by using a broad index (such as the GDP deflator) to avoid fluctuations from year to year.

8. Deflation of R&D, software, etc.

18. The cost of production approach is recommended for the measurement of some of the new assets categories, such as capitalization of the research and development, computer software and databases, etc. They should be also deflated by the cost approach.

9. Deflation of imports and exports

19. Imports and exports of goods and services – the workshop agrees that the use of unit value indexes (UVI) as deflators for the imports/exports of goods should be avoided, particularly

when products included in the calculation of UVI are not homogeneous. Instead, imports/exports price indices are recommended to be developed. The IMF's *Export and Import Price Index Manual: Theory and Practices* (2009)[2] should be consulted.

10. Deflation of government output and government final consumption

20. Government final consumption expenditure includes:

- Non-market output of general government after deducting the fees for services paid for by industries and households is treated as government final consumption expenditure;
- Government purchases of goods and services which are paid for by the government and distributed without transformation to households; and
- Household purchases of goods and services but reimbursed by government.

21. General government final consumption expenditure in constant prices should be calculated separately of each of its components listed in para 20. Purchases of goods and services for final uses are deflated by price indexes of the goods and services bought by government. The non-market output should be deflated by the cost approach, which means that goods and services used as intermediate consumption should be deflated by price indexes of the goods and services bought and the wage component should be deflated by the wage rates. To be more reliable and to capture changes in productivity, wages may be disaggregated by type of labor and deflated by its own wage rates. The use of CPI to deflate wages should be avoided, unless no other price indexes are available.

22. In this case, the deflation of output and final consumption expenditure of government is fully integrated and therefore no discrepancy between GDP by production approach and final demand approach is expected to result due to the treatment of general government.

11. Extra-budgetary funds of government

23. The workshop recommended that NSOs should have full information about the extra-budgetary funds and accounts operated by some of the government units. The application of the 50% and over criteria of government subsidy to the total operational costs of these units should be used to decide if they be included as part of the government sector. Services which might be subject to detailed scrutiny include postal services, broadcasting, urban transportation, etc.

Domestic workshop

24. Three comprehensive presentations by NBS experts were made during the domestic part of the workshop – Estimation of the China's Consumption Expenditure of Government and Change in Inventories; Analysis of inconsistency between GDP and GDE and Estimation of China's Net Export which were followed by discussions between Chinese experts and resource

[2] *www.imf.org/external/np/sta/xipim/pdf/xipim.pdf*

persons. The following conclusions drawn from the discussions could serve as useful reference for the future improvement of the NA compilation in China.

25. The issues which China faces with government consumption are mainly with the constant prices. So far, China uses CPI as deflators. As CPI grew at a much lower rate than the wage rates, the use of CPI to deflate government output may bring its growth rates higher than it should be. A recommendation is made to change CPI with the wage growth rate and use some employment indicators to account for difference in productivity. This deflator should be aligned with the deflator for the government services used in the production approach. This issue has already been discussed in more detail above.

26. The collection of data on inventories should be improved and they should be presented at least by type (raw materials, work in progress, finished products and goods bought for resale). At present, annually China has only total inventories by industry, which does not allow for proper deflation and estimation of the output and intermediate consumption. Quarterly data are even less satisfactory. The increase of inventories of 5 years in a row does not seem right as total inventory may increase but changes in inventory may not be positive for a long period of time. The problem should be carefully analyzed.

27. Current expenditures on defence are available as a lump sum and China uses ratios to split it. China is advised to pay special attention to the capitalization of weapons, which should be capitalized in the 2008 SNA, unlike the 1993 SNA which treats them as current expenditures of the general government sector.

28. The constant prices of imports and exports are derived by using the Unit Value Indices (produced by Customs). China is aware that there are problems with them. Cooperation with Customs, use of real price indices of imports and exports, establishment of register of exporting companies, use of indices of major import partners is recommended. See also discussion above.

29. To help balance better gross domestic expenditure (GDE) and GDP China needs to prepare SUT. China has a project with OECD. One of the potential reasons for the discrepancy could be the compilation of construction which is different for the production approach (relying on establishment data) and expenditure approach (relying on investment funds). The compilation of production and expenditure approach for construction should be harmonized to yield the same values. Review of the compilation is recommended.

30. It seems that there is a problem in treating consumer subsidies in China. The SNA does not have the concept of consumer subsidies. The treatment should be as follows:

- If government provides subsidies to households either fully or partially for households to buy goods and services that are specified in advance by the government for social security, social benefits or promotion of consumption, the amount paid for by the government should be treated as government individual consumption expenditure of goods and services to benefit households.

- If the government provides subsidies to industries to reduce prices of goods and services sold to households, then the payment is other subsidies on production (part of value added of industries).
- If the government provides cash for individuals and/or households to buy goods and services at their own choices then they should be treated as current transfers from government to households.

Part I

Measurement of GDP by final expenditures

1.1 Gross domestic product (GDP) is the sum of (i) final consumption expenditures, (ii) gross capital formation and (iii) exports less imports of goods and services and therefore GDP can be directly measured by implementing a regular surveying program to collect data on these final expenditures. This approach is called GDP by final demand.

1.2 This chapter will discuss the measurement of various components of final expenditures at current and constant prices which include final consumption expenditure, exports and imports and finally gross capital formation. Within the context of compiling gross capital formation, it also touches on the issue of how to capitalize expenditure.

A. Final consumption expenditure

Final consumption includes consumption of goods and services by residents (individuals, households and/or the community) to satisfy individual wants and social needs. They include goods and services bought from the market, produced for own use, obtained through bartering or received in kind for other individuals, government and non-profit institutions serving households (NPISHs).

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1.3 Thus final consumption is broken down into:

a) Final consumption expenditure of households;
b) Final consumption expenditure of general government;
c) Final consumption expenditure of non-profit institutions serving households.

1. Household final consumption expenditure

1.4 For households, all consumed goods - durable such as cars, refrigerators, air-conditioners, etc. and non-durable such as food, clothes - are part of final consumption, with the exception of purchases, own-construction or improvements of residential housing, which is treated as part of gross capital formation.

1.5 One should distinguish between households and individuals in the households as final consumers and households as producers of goods and services for the market. The latter are called unincorporated enterprises which do not incorporate themselves as legal entities that are separate from the owners. The purchases of goods and services by these unincorporated household enterprises for the purpose of production are treated as intermediate inputs or gross

capital formation depending on the characteristics of the goods. They are not household final consumption expenditure.

1.6 **Treatment of owner-occupied dwellings**. As mentioned in para. 1.4, dwellings are treated as assets and therefore the acquisition of dwellings by households is treated as gross capital formation. Households as owners of these dwellings act as unincorporated enterprises that produce services for own final use from these dwellings. **The output of services of these owner-occupied dwellings must be estimated and then included as household final consumption expenditure.** The output of services can be estimated as equivalent market rents. It is important to note that costs of regular maintenance and repair should be treated as intermediate consumption of this owner-occupied housing activity. Consumption of fixed capital is based on the depreciation of the dwellings. Given that equivalent market rent is available, the output can be measured by cost, which is the sum of the cost of regular maintenance and repair, consumption of fixed capital and a fair rate of return to capital.

1.7 Household final consumption expenditure expresses the expenditures that households actually made for their own final consumption. There are also expenditures that are financed by governments and NPISH to benefit households; these expenditures aim at increasing **household final consumption**, although they are not **household final consumption expenditure**. To obtain **actual household final consumption**, one may add household final consumption expenditures to final consumption expenditure to benefit households made by governments and NPISHs (which are called by the SNA individual final consumption expenditure of governments and NPISHs).

1.8 Included in final consumption expenditure of households are:

a) All goods and services bought for final consumption by households;
b) All goods produced for own final consumption by households, including those goods and services produced by household enterprises and retained for final consumption;
c) Domestic services produced for own final consumption by employing paid staff such as servants, cooks, gardeners, chauffeurs;
d) Services of owner-occupied dwellings (whose imputed values are equivalent market rentals);
e) All goods and services acquired by households in barter transactions for final consumption;
f) All goods and services received by households as payment in kind from producers;
g) Expenditures incurred in "do-it-yourself" decoration, maintenance and routine repairs of own dwellings and personal goods;
h) Payment to government units to obtain various kinds of licenses, permits, certificates, passports, etc.;
i) Explicit and imputed service charges on household uses of financial intermediation services provided by banks, insurance companies, pension funds, etc.

1.9 Data for final consumption expenditure of households can be regularly collected by surveys on household consumption expenditures. **These market expenditures must be supplemented by data on household production for own final consumption, which may be carried out separately in the collection of data on production or covered in the same household consumption survey**.[3] Products for final own consumption include farm products produced by farmers and non-farm products produced for own use by households such as water-carrying, household furniture, etc. Owner-occupied housing services must also be imputed for both farm and nonfarm households. Farm products for non-benchmark years may be extrapolated from the benchmark year by farm output. Non-farm products and owner-occupied housing services may be extrapolated from the benchmark year by number of households.

1.10 Regular data collection of household expenditure is expensive and therefore many countries implemented household expenditure surveys every few years and the use retail sale statistics to extrapolate benchmark household consumption expenditure. This issue will be discussed in depth in the next part.

Deflation of household final consumption expenditure

1.11 Household final consumption expenditure at constant prices is obtained by using consumer price indexes for deflation. In the case of owner-occupied housing services, if rental indexes are used to deflate output and thus final consumption expenditure if it is is measured by equivalent market rent, if it is measured by cost then output and final consumption expenditure are deflated by input cost Imputed own-account production should be deflated by price indexes for basic value (or indexes of production costs).

2. Government final consumption expenditure

1.12 Government final consumption expenditure includes all final expenditures on goods and services made by all levels of government that include federal/central, state/provincial and local governments.

1.13 Included in the final consumption expenditure of general government are:

a) Non-market output of general government less incidental sales to industries and households and less own-account capital formation (capitalization of own-account expenditures is discussed later in D). The output of general government is measured by production costs less incidental sales of government output (own-account capital formation is treated as government output and consumed as capital formation). A part of this expenditure which is aimed at benefiting households and/or individuals is called transfers of individual goods and services by SNA.

[3] For the ccollection of data on production for own consumption of unincorporated enterprises, readers may consult "Measurement households unincorporated enterprises with market production (HUEMs)", chapter 6 of Vu Quang Viet's *GDP by production approach: A general introduction with emphasis on an integrated economic data collection framework:* unstats.un.org/unsd/China.../GDP%20by%20production%20approach.pdf.

b) Government expenditures to reimburse household purchases of goods and services that are specified as part of social security and/or social benefits.

c) Government expenditure on market goods and services that are supplied without transformation and free of charge to households. This is called by the SNA as social assistance in kind.

1.14 The sum of (b) and (c) is called **social benefits in kind**.

Table 1.1. Allocation of government expenditure to government final consumption expenditure

Expenditures on current goods and services	⇨	**Government final expenditure**
1. As non-market output of government less (sales and capitalized expenditures)		
Expenditures to produce non-market individual goods and services less sales for delivery free of charge or at insignificant prices to households such as education, health services, sports and recreation, culture, provision of housing services, collection of household refuse, operation of public transport, etc.	⇨	Government individual final consumption expenditure
Expenditure to produce non-market collective goods and services for general administration, national defense, security and other common benefits to the community as a whole.	⇨	Government collective final consumption expenditure
2. As social benefit in kind		
Reimbursements from government's social security funds to households on specified goods and services bought by households on the market; Other social security benefits in kind except reimbursements: This includes goods and services which are *not produced* by the government sector but bought and distributed free or almost free to households under the social security funds (any payment by household must be deducted); Social assistance benefits in kind: This includes goods and services similar to *other social security benefits* but not under social security schemes.	⇨	Part of government final consumption expenditure
3. Expenditures on of capital goods	⇨	**Government capital formation**

4. Other expenditures		Uses in income and capital accounts
• Payment for social security, foreign assistance for current expenditures, etc. • Interest payments on debts • Re-payment of principle on debts		• Current transfers • Property income • Financial transactions

1.15 Practically, as shown in table 1.1, the compilation of government final consumption expenditure is based on the classification of data from actual consolidated annual budgets of all levels of the government (i.e. central, state and local governments) to appropriate national accounts concepts. Data on actual government expenditures are however not normally available at the end of the year, thus government expenditures must be estimated on the basis of budgeted expenditures using some relationships (simple ratios for example) between actual and budgeted expenditures in the past. Estimates of government output and final consumption expenditure will have to be revised when actual data is available.

Distinguishing fees and taxes in order to identify incidental sales of government goods and services

1.16 Licences and fees - payments of households to government units to obtain various kinds of licences, permits, certificates, passports etc. are not always clear, i.e. whether these are payment for services (i.e. incidental sales by government) or de facto taxes.

1.17 It was recommended that following the SNA 2008, payments by households for licences to own or use vehicles, boats or aircrafts and those for recreational hunting, shooting or fishing are treated as taxes as no actual services are provided by government. Payments for licences to undertake a specific activity such as a taxi licence are treated as a tax on production.

1.18 Payments by households for all other kinds of licences, permits, certificates, passports, etc. that require government services such as inspection, should treated as purchases of government services, excluded from government final consumption expenditure and included in household consumption expenditure.

An example in compiling government output and final consumption expenditure

1.19 Table 1.2 shows a simple example of government budget in which expenditures and incomes have been already reclassified into SNA categories. Data from table 1.2 is then used to compile government output and final consumption expenditure, which are shown in table 1.3. The output of government services is equal to current expenditures for non-market activities. In this example, the output of non-market activities of general government is 100 which may contain both non-market output such as education, health, defense, etc., and market output produced by secondary activities such as sales of documents, museum reproductions, etc. Out of 100, 80 are collective non-market services which are treated as collective final consumption expenditures of general government, and 20 are individual non-market goods and services which are treated as individual final consumption expenditures of general government after deducting a sale of 5 paid by households. Sales of outputs produced by government activities to be used as the intermediate consumption of industries do exist, but are assumed to be zero in the example

for the sake of simplicity. In addition to the above expenditures, government partly or fully finances through reimbursement final expenditures of the household sector for market goods and services, which are 10 in the example. These values, which are commonly called in economic literature *consumption subsidies,*[4] must be treated in the 1993 SNA as part of individual final consumption expenditures of general government.

1.20 Government final consumption expenditure can also be calculated as follows:

Government output less sales and less capitalized expenditures		107
Less	Own-account capital formation	-7
Less	Sales to households and industries	-5
Less	Social benefits in kind	+10
Equal	Government final consumption expenditure	= 98.

Table 1.2. An example of government revenues and expenditures

Government expenditures		**183**
Government capital expenditures		30
Purchases of capital goods	23	
Own-account construction	7	
Current expenditures for non-market activities		100
Collective	80	
Individual	20	
Social benefits in kind (reimbursements included)		10
Social benefits in cash		43
Others*		0
Government revenues		**183**
Sales to households and industries		5
Taxes		150
Others*		0
Deficit financing		28

*"Others" denote property income, capital and current transfers and transactions in financial assets and/or liabilities. They normally take values other than zero assumed here for simplicity's sake.

[4] In the SNA, only producers get subsidies from government, not consumers.

Table 1.3. Output, final consumption and capital formation of government sector

Output produced by government activities		107
Output of government services	Equal to current expenditures for non-market activities	100
Secondary output	Own-account construction	7
Government final consumption		105
Individual final consumption of government	Or *social transfers in kind* equal to current expenditures for non-market activities for individuals (20), less sales (5), plus social benefits in kind (10)	25
Collective final consumption of government	Equal to current expenditures for non-market activities for collective needs	80
Government capital formation		30

Deflation of government final consumption expenditure

1.21 General government final consumption expenditure in constant prices is calculated as separately of each of its components listed in para 1.13. Purchases of goods and services are deflated by price indexes of the goods and services bought by government. The non-market output should be deflated by the cost approach, which means that goods and services used as intermediate consumption should be deflated by price indexes of the goods and services bought and the wage component should be deflated by the wage rates. To be more reliable and in order to capture changes in productivity, wages may be disaggregated by type of labor and deflated by its own wage rates. The use of consumer price index (CPI) should be avoided, unless no other price indexes are available.

1.22 As the deflation of output and final consumption expenditure of government is fully integrated, no discrepancy between GDP by production approach and final demand approach is expected to result due to the treatment of general government.

3. Final consumption expenditure of non-profit institutions serving households (NPISHs)

1.23 Non-profit institutions are of three types:

(a) Those that are financed and set up to support enterprises: they are treated as enterprises

(b) Those that are mainly financed by government ("mainly" criterion means that 50% and over is financed by general government): they are treated as part of general government
(c) Those that are mainly financed households: they are treated as non-profit institutions serving households (NPISHs).

1.24 NPISHs covered institutions like libraries, museums, churches, charities, labor and professional associations, etc. Similar to the government sector, the output of this sector is measured by costs and its output less (incidental sales and capitalized expenditures) is treated as final consumption expenditure.

1.25 The compilation of output and final consumption expenditure of NPISHs is similar to that of general government.

1.26 Included in the final consumption expenditure of NPISHs are:

d) Non-market output of NPISHs less incidental sales to industries and households and less own-account capital formation. The output of NPISHs is measured by production costs less incidental sales of government output (own-account capital formation is treated as government output and consumed as capital formation). A part of this expenditure which is aimed at benefiting households and/or individuals is called transfers of individual goods and services by SNA;

e) NPISHs' expenditures to reimburse household purchases of goods and services that are specified as part of social benefits.

f) NPISHs' expenditure on market goods and services that are supplied without transformation and free of charge to households. This is called by the SNA as social assistance in kind.

1.27 The deflation of NPISHs is similar to that of general government.

4. Transaction in second hand goods

1.28 For second-hand goods that already exist in the economy, a purchase by one institutional sector, say unincorporated enterprises of the household sector, must be netted out by a sale of the same value by another institutional sector, say the non-financial sector. The treatment in national accounting depends on the nature of the goods and the nature of the transactions.

Nature of the transaction

1.29 The following nature of transaction should be taken into account:

(a) If the transaction is a direct one between a resident seller and a resident buyer, no additional production is generated in the economy. If the transaction is through a third party serving as a trader, the difference between the price of the buyer pays to the

trader and the price the trader pays to obtain the goods is treated as trade margins. These trade margins are treated as output of trade. How this output is treated, whether it is final consumption or capital goods/service depends on the nature of the goods that is transacted.

(b) If the transaction is between a nonresident to a resident, the transaction may be recorded as either exports or imports.

Nature of the goods

1.30 The following nature of goods should be taken into account:

(a) If the goods are fixed assets bought and sold among enterprises and government, only trade margins need to be recorded, as part of increase in cost of capital transfer which is a part of gross capital formation.

(b) If the goods are fixed assets are sold by enterprises and government to households then it is treated as household final consumption expenditure and the same value less trade margins must be entered as negative gross fixed capital formation so that no addition goods is produced except for the trade margins. Second-hand automobiles make up a major part of this second-hand goods.

(c) If the goods are fixed assets sold by households to enterprises (which are rare) to be used as fixed assets, the goods are entered as gross fixed capital formation but a negative value equal to the value of the goods less trade margins must be entered as negative household final consumption.

(d) If the goods are old scraps, such as recycled papers, transactions between households will cancel each other out, but for transactions between households and enterprises, the value received by household should be entered as negative household consumption and as intermediate consumption by recycling industries.

1.31 In general, for better treatment second-hand goods, national accountants should focus only on second-hand automobiles which is an important market in most countries and on the value of recycling materials.

B. Gross capital formation

1.32 Gross capital formation in the SNA is the same as the concept of ***investment in capital goods*** used by economists. It includes only produced capital goods (machinery, buildings, roads, artistic originals, etc.) and improvements to non-produced assets. Gross capital formation measures the additions to the capital stock of buildings, equipment and inventories, i.e. the additions to the capacity to produce more goods and income in the future.

1.33 Non-produced assets such as land, natural resources, patented entities may also be used as capital in an establishment or enterprise or the whole economy but they are not part of the gross capital formation in the SNA.

1.34 In business accounting, investment in capital goods may include acquisitions less disposals of non-produced assets (such as land, mineral resources, etc.). At the national level, the inclusion or exclusion of non-produced assets would not affect the value of investment in capital goods, as the sale of a non-produced asset by one economic entity will be offset by a purchase of the same asset by another economic entity.

Common usage of the term "investment"

1.35 In common usage (business and households) the concept of investment is very broad. It includes:

a) Investment in produced and non-produced assets (i.e. patents, goodwill, natural resources);
b) Investment in financial assets.

1.36 Gross capital formation which is a major factor in changing the values of non-financial assets in the economy includes (see table 2.3 for the classification of assets and the effects of gross capital formation on assets):

a) Gross fixed capital formation;
b) Changes in inventories;
c) Acquisition less disposals of valuables (like jewellery and works of art).

1. Gross fixed capital formation

1.37 Practically for the compilation of gross fixed capital formation, the worksheet that includes assets by types should be used (see table 1.2). This will be discussed later. Conceptually, gross fixed capital formation includes all goods and related services that can be used repeatedly for more than one year to produce other goods and services. It reflects the following types of transactions:

a) Acquisitions less disposals of new or existing produced assets such as dwellings, other building structures, machinery and equipment, cultivated assets (e.g. trees and livestock), mineral exploration, computer software, entertainment, literary or artistic originals and other intangible fixed assets, capitalized research and development;
b) Costs of ownership transfers on non-produced, non-financial assets like land and patented assets;
c) Major improvements to produced and non-produced, non-financial assets that extend the lives of assets (e.g. reclamation of land from sea, clearance of forests,

rock, etc., draining of marches or irrigation of forests, and prevention of flooding or erosion);

d) Acquisitions can be in terms of purchase, own-account production, barter, capital transfer in kind, financial leasing, natural growth of cultivated assets and major repairs of produced assets;
e) Disposals can be in terms of sale, barter, capital transfer in kind, financial lease. Exceptional losses, such as those due to natural disasters (fire, drought, etc.) are not recorded as disposal.

1.38 It is important to realize that assets in business accounting are measured at book values and are adjusted for depreciation, therefore the difference between the values of assets of the two periods would not provide the value of gross fixed capital formation (see table 1.3 for the factors that change values of assets during an accounting period). These factors include acquisitions less disposals of assets and inventories (adding to the value of assets as gross capital formation), consumption of fixed capital (reducing the value of assets) and other changes in assets that may be volume changes and/or price changes). Thus, to get a proper value of gross fixed capital formation, assets must be revalued. However, it is much better to ask for information on new investment in fixed capital directly from businesses.

Deflation of fixed capital formation

1.39 Most of fixed assets such as machinery and equipment such as personal computers, automobiles, ships, airplanes, etc. should be deflated by basic price indexes (which are normally called producer price indexes; and can be replaced by wholesale price indexes). In case that machinery and equipment are imported from abroad, import price indexes should be used for deflation purposes. Deflation of construction should be based on cost approach. This means that indexes of different types of construction should be developed for deflation purposes. Cost of capital transfer may be deflated by consumer price indexes. Assets such as R&D, mineral exploration, computer software and database calculated by capitalizing expenses should be deflated by costs (item 4 of this section B). Costs of ownership transfer are deflated by consumer price index of equivalent activity.

Table 1.3. Classification and formation of non-financial assets

Types of non-financial assets	Opening balance sheet	Changes in the balance sheet			Closing balance sheet
		Gross capital formation	Consumption of fixed capital	Other changes in balance sheet	
	(1)	(2)	(3)	(4)	(5) = (1)+(2)-(3)+(4)
Produced assets					
Produced fixed assets					
Dwellings					
Other buildings and structures					
Non-residential buildings					
Other structures					
Land improvements					
Machinery and equipment					
Transport equipment					
ICT equipment					
Other machinery and equipment					
Weapons systems					
Cultivated assets					
Livestock for breeding, dairy, etc.					
Vineyards, orchards and other plantations					
Intellectual property products					
Research and development					
Mineral exploration and evaluation					
Computer software and databases					
Entertainment, literary or artistic originals					
Other intellectual property products					
Inventories					
Materials and supplies					
Work in progress					
Finished goods					
Military goods					
Goods for resale					
Acquisitions less disposals of valuables					
Acquisitions less disposal sof non-produced assets		Not applicable			
Natural resources					
Land					
Subsoil assets					
Mineral and energy reserves					
Non-cultivated biological resources					
Water resources					
Other natural resources					
Acquisitions less disposals of contracts, leases and licenses					
Contracts, leases and licenses					
Purchase, sale of goodwill and marketing assets					

2. Changes in inventories

1.40 Inventories include:

a) Materials and supplies;
b) Work-in-progress (growing crops, maturing trees and livestock, uncompleted structures, uncompleted other fixed assets, partially completed film productions and software);
c) Finished goods;
d) Goods for resale.

1.41 Particularly important is the independent measurement of changes in inventories. Ratios of inventories of finished goods over outputs provide important information on the short-term development of the economy. When the ratios exceed normal values, production is expected to slow down to reduce the inventory build-up that is expensive to maintain. When the ratios are below normal values[5] due to faster sales, the economy is expected to grow to meet additional demand. Some countries that participated in this workshop, unfortunately, still treat changes in inventories as residuals, which include statistical errors and therefore has no analytical values to economic analysis.

1.42 It is also important that inventories be prepared separately for materials and supplies, work-in-progress and finished goods. Changes in inventories of materials and supplies are used to estimate intermediate consumption and changes in inventories of work-in-progress and finished goods are used to calculate output. In the SNA, work-in-progress and finished goods produced during an accounting period is treated as output.

1.43 In the SNA, as shown in the formula below, the price, $p_{t,}$, used in evaluating quantity of inventories (q) must be the market prices at the time of the accounting period.

$$\text{Change in inventories} = (q_t - q_{t-1})\, p_t$$

Changes in prices would affect the value of inventories in the balance sheet from one accounting period to another accounting period, which is measured by the SNA as nominal holding gains as follows:

$$\text{Nominal holding gains} = (p_t - p_{t-1})q_{t-1}$$

1.44 The proper revaluation of inventories at market prices to replace book values as practiced in business accounting is important in correctly measuring inventories and output.

1.45 In business accounting, assets, including the addition to inventory, in business accounting, are recorded at book values, i.e. at the prices at the time they are added into inventory. However, the withdrawals (sales or consumption) are valued differently depending on the methods of reporting inventories. The common methods of reporting inventories are:

[5] Average inventory ratios do reduce over time, when the economy is functioning more efficiently.

(a) Specific item cost - the actual cost of each item is ascertained separately;

(b) FIFO (first in- first out) - the cost of items sold or consumed during a period is computed at prices as though they were sold or consumed in the order of their acquisition;
(c) Average cost - the cost of an item is determined by applying a weighted average of the cost of all similar items – which are book value - available for sale over a period of time;

(d) LIFO (last in- first out) - the cost of items sold or consumed during a period is deemed to be the cost of the most recent acquisitions or production.

In Canada, like other countries, businesses adopt various methods of accounting. An extensive survey of manufacturers in Canada in 1975 showed 35% using the FIFO method and 31% using the average cost method. A small 1990 survey of wholesalers and retailers showed 68% using the specific item cost method which was consistent with increased use of computerized inventory control. An annual survey (Financial Reporting in Canada) by the Canadian Institute of Chartered Accountants showed in 1994 that 44% of companies used FIFO, 36% average cost and fewer than 4% LIFO.

1.46 Unlike many homogeneous farm products that can be recorded in quantity, inventories of manufacturing products are normally recorded in aggregate value in the opening and closing balance sheets of the business accounts. In such a situation, volume must first be estimated using price indices; only then a calculation of change in inventories and nominal holding gains can be made. The approach to calculate non-farm inventories (on which data on quantity of inventories are not available) as practiced in Canada is a simple way to approximate the SNA recommendation.[6] Table 1.4 below shows an example of revaluing inventories. The upper shows the method recommended by the SNA where quantity and unit price are available so that they can always be valued at market prices at the time of the accounting period. It also shows SNA changes in inventories and holding gains that are necessary for purposes other than the calculation of GDP. The Canadian approximation method is shown in the lower part. It requires the conversion of inventories in book value into the base year prices (or constant prices). From there, it derives changes in inventories in constant prices and then reconverts them back into current prices.

1.47 Another example is shown in table 1.5 that calculate changes in inventories to be used for the calculation of output. What is shown in table 1.5 is that if inventories are not valued properly according to the SNA, output, intermediate consumption and thus GDP may be incorrectly calculated.

1.48 The Canadian method provides changes in inventories at both current and constant prices.

[6] The treatment of Inventories in Canada was extracted from Kishori Lal (Statistics Canada), "Recording of changes in inventories in the SNA and in the business accounts: the case of Canada, Chapter III in *Links between Business Accounting and National Accounting*, edited by Vu Quang Viet, United National Statistics Division, ST/ESA/STAT/SER.F/76, 2000. *unstats.un.org/unsd/publication/SeriesF/SeriesF_76E.pdf*

Table 1.4 SNA recommendation and the Canadian method of measuring change in inventories

Quarters →		0	1	2	3	4	Year =sum of 4 quarters
1993 SNA method							
1.Prices		0.4	0.5	0.8	1.25	2.5	
2.Quantities of inventories		100	60	20	60	100	
3. Book values of inventories		40	30	16	75	250	
4.Change of book value in balance sheet			-10	-14	59	175	210
5. Change in quantity of inventories			-40	-40	40	40	0
6. SNA change in inventory = $(q_t - q_{t-1})p_t$			-20	-32	50	100	98
7. SNA nominal holding gain =(pt- pt-1)qt-1			10	18	9	75	112
Change in balance sheet <u>minus</u> holding gains = SNA change in inventories = 210-112 =98							
Canadian method							
8. Book value of inventories	=(2)	40	30	16	75	250	
9. Price deflators	=(1)	100	125	200	312.5	625	
10. Constant value of book values	=(8)/(9)*100	40	24	8	24	40	
11. Constant value of change in inventories	=Change in (10)		-16	-16	16	16	0
12. Current value of change in inventory (VPC)	=(11)*(9)/100		-20	-32	50	100	98
13 Change in balance sheet	=(4)		-10	-14	59	175	210
14. Inventory valuation adjustment (IVA)	=(13)-(12)		10	18	9	75	112

Table 1.5 Estimation of output from sales – an example

		Accounting periods			
	Calculating operations	T_0	T_1	T_2	T_3
Information given					
1. Sales net of taxes and plus subsidies			80	120	272
2. Price index			100	125	200
3. Value of inventory at end of period (book value)		0	40	30	16
4. Change in inventory (book value)	= $(T_i - T_{i-1})$ applied to line (3)		40	-10	-14
Derived data					
5. Value of inventory at constant prices	= Line (3)*100/ line (2)	0	40	24	8
6. Change in inventory at constant prices	= $(T_i - T_{i-1})$ from line (5)		40	-16	-16
7. Change in inventory at current prices (VPC)	= Line (6) * line (2)/100		40	-20	-32
8. Output at basic price	= Line (1) + line (7)		120	100	240

3. Acquisitions less disposals of valuables

1.49 Acquisitions less disposals of valuables are part of the SNA assets boundary, however it is advisable that not all items that may be described as precious metals and stones, antiques and other art objects should necessarily be included as valuables in the balance sheet of the owner, which could be a household as well. Only those items regarded **as alternative form of investment in fixed assets should be captured**, the remaining part, if owned by households should be recorded as final consumption expenditures of households.

1.50 Transactions in monetary gold are not treated as final consumption. The SNA2008 defines physical gold bullions as monetary gold when held as reserves by monetary authority. Non-monetary gold should be in principle treated as valuables and can also be used as intermediate consumption (in the production of other goods), added in inventory, and entered into supply through as imports or demanded as exports. However, in the case that physical gold held by households as stores of value and transacted with non-residents through country borders, countries may choose to treat it similarly to monetary gold and not recorded as exports and imports when they have not been previously recorded in inventories or valuables. In such a case, the recording of transactions of gold in exports and imports (which are not produced and not used for the purpose of production in the accounting period) may distort their analytical meaning.

4. Capitalization of own-account capital formation: an example

1.51 Many activities from own-account construction of dwellings, own-account research and development and software development are capitalized by the SNA. This means they are used as fixed assets over a time period longer a year to produce other goods and services. Without being capitalized, the goods and services used to produce them are treated as intermediate consumption and the wages and salaries paid as well as consumption of fixed capital in producing them make up gross value added. The example below will be used to show the necessary imputations in the accounts.

1.52 After enumerating the costs incurred in generating research and development (R&D), which is shown in the red box within table 1.6, the output of R&D is imputed as the sum of costs (which is 11 in the example). Thus now the company produces two products: (1) its own principal product which is still valued at 120 (calculated on the basis of sales), and (2) its secondary product which is value at cost at 11. Thus when own-account production is capitalized instead of being treated as merely current cost of production, the output and value added generated by the company and thus the whole economy increase by the same amount of output capitalized, which is 11 in the example (see table 1.7). Essentially, this means that the imputed income retained by the company (or saving in the national accounts concepts) is utilized to purchase its own output as gross capital formation. So in terms of balancing supply and uses of goods and services in the economy, out of the output of 131, sales to others is 120 and 11 is sales to itself as gross capital formation.

Table 1.6. Account without imputation of own-account capital goods: an example

Output at basic prices	**120**
Goods and services used in production	**40**
Gross value added at basic prices	**80**
Other taxes on production	0
Compensation of employees (COE)	60
Consumption of fixed capital (CFC)	10
Net operating surplus	10

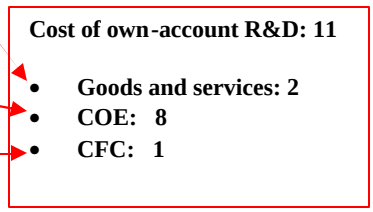


Table 1.7. Account with imputation of own-account capital goods: an example

	Original output before capitalization	Output after capitalization	
		Primary output	Secondary output
Output at basic prices	**120**	**120**	**11**
Goods and services used in production	**40**	**38**	**2**
Gross value added at basic prices	**80**	**82**	**9**
Other taxes on production	0	0	0
Compensation of employees (COE)	60	52	8
Consumption of fixed capital (CFC)	10	9	1
Net operating surplus	**10**	**21**	**0**

1.53 **The consequence of imputed capitalization is higher gross value added and thus higher GDP by the same imputed amount**. With this imputation, it is expected by economists specializing in productivity analysis and the 2008 SNA that the imputed intellectual property assets can explain productivity effect on economic growth. Other economists are still uneasy of imputations that go beyond actual transactions, particularly in case of research and development where they may not yield any concrete results. In addition the depreciation of these assets can only be based on some convention.

1.54 **The treatment of military weapons systems as gross fixed capital formation** is in fact not an imputation since they have useful lives of more than one year and can be used repeatedly. It is doubtful that the increase in the accumulation of these assets explains economic growth. This is the reason that for analysis of economic growth only non-military assets should be used.

5. Relationship in supply, uses of assets and of gross capital formation

1.55 A worksheet shown in table 1.8 will help facilitate the compilation of gross fixed capital formation (GCF) and inventories by kind of assets, which must be in purchasers' prices. The main focus is on obtaining data for columns (1), (2) and (3). GCF for each kind of asset is derived from domestic production, imports which are then reduced by exports. In addition to utilizing these sources to estimate investment in fixed assets, surveys on investment of enterprises would provide the total value of investment to be used as total controls. Surveys are normally designed to find indicators that allow for the extrapolation of benchmark data on fixed assets.

1.56 Construction statistics provide a major source of information to construct gross capital formation in dwellings, other buildings and structures. From construction statistics, only activities that result in fixed assets or that prolong the assets' life will be counted as assets (i.e. major repairs).

1.57 Machinery and equipment are obtained from domestic production, which after deducting exports is an important source of data on GCF. Merchandise imports of machinery and equipment would normally identify another important source of supply.

1.58 Weapons system must be based on government sources.

1.59 Cultivated assets are derived from agricultural statistics and the work of national accountants on agriculture.

1.60 Intellectual property relies on industrial surveys and imputation of data by national accountants particularly with data on employment to be used for estimation or extrapolation.

1.61 Data on inventories must rely on industrial and distributive trade surveys. Most countries focus mainly on inventories kept by major industrial producers and enterprises involved in distributive trade, and national strategic inventories of important commodities such as petroleum, rice, and wheat that are kept by government.

Table 1.8. Worksheet for compiling gross fixed capital formation

Types of non-financial assets	Domestic production	Imports	Exports	Gross capital formation
	(1)	(2)	(3)	(4) = (1) + (2) – (3)
Produced assets				
Produced fixed assets				
Dwellings				
Other buildings and structures				
Non-residential buildings				
Other structures				
Land improvements				
Machinery and equipment				
Transport equipment				
ICT equipment				
Other machinery and equipment				
Weapons systems				
Cultivated assets				
Livestock for breeding, dairy, etc.				
Vineyards, orchards and other plantations				
Intellectual property products				
Research and development				
Mineral exploration and evaluation				
Computer software and databases				
Entertainment, literary or artistic originals				
Other intellectual property products				
Inventories				
Materials and supplies				
Work in progress				
Finished goods				
Military goods				
Goods for resale				
Acquisitions less disposal of valuables				
Acquisitions less disposal of non-produced assets		Not applicable		
Natural resources				
Land				
Subsoil assets				
Mineral and energy reserves				
Non-cultivated biological resources				
Water resources				
Other natural resources				
Acquisitions less disposals of contracts, leases and licenses				
Contracts, leases and licenses				
Purchase, sale of goodwill and marketing assets				

C. Estimation of consumption of fixed capital and net capital stock

1.42 Consumption of fixed capital (CFC) is needed to derive net capital formation (NCF=GCF-CFC) and net domestic product (NDP=GCF-CFC) and net capital stock. Special characteristics of consumption of fixed capital include:

a) Consumption of fixed capital is a cost of production. It measures the decline in the current values of the stock of fixed assets owned and used by producers as a result of physical deterioration, normal obsolescence and normal accidental damages during the accounting period;

b) Thus, consumption of fixed capital can be measured directly or indirectly. The direct method is through surveys of produced fixed assets at market at two consecutive periods and then calculating the decline in the market values of the stock of fixed assets. The indirect method recommended by the SNA is the perpetual inventory method, which is an approximation of market valuation and less costly to implement. Depreciation in business accounting is not acceptable in national accounting since it is based on historical book values;

c) The example below shows the difference between depreciation used in business accounting and consumption of fixed capital, which is the economic concept adopted by the SNA.

Table 1.9. Depreciation and consumption of fixed capital

1. Depreciation in business accounting at book value (straight line over 4 years)								
		Calculating method	T_{-4}	T_{-3}	T_{-2}	T_{-1}	T	T_{+1}
1	Gross capital formation at book value (GCF)			800				
2	Depreciation at book value (D)	D= Line (1)/4		200	200	200	200	0
3	Net capital stock at book value, end of period*	NCS=NCS+GCF-D	0	600	400	200	0	0

2. Consumption of fixed capital in national accounting by the perpetual inventory method								
		Calculating method	T_{-4}	T_{-3}	T_{-2}	T_{-1}	T	T_{+1}
4	Price index of fixed asset			100	105	106	115	
	At base year price of T_{-2}							
5	Gross capital formation (GCF)			840				
6	Consumption of fixed capital (CFC)	= Line (5)/4		210	210	210	210	0
7	Net capital stock, end of period	=NCS+ GCF-CFC	0	630	420	210	0	0
	At current market price							
8	Consumption of fixed capital at current market prices	=Line (6) price-adjusted by line (4)		200	210	212	230	0
9	Net capital stock at current market prices, end of period*	= Line (7) price-adjusted by line (4)		600	420	212	0	0

*By convention, depreciation and CFC start in the year in which GCF takes place.

Notes to table 1.9:

- The very simple example below shows how depreciation in business accounts and consumption of fixed capital is calculated. It is assumed that the fixed asset was bought at time T-3 for 800 and entered in the business account at this price (e.g. book value, or historical value), has a lifetime of 4 years and will be scrapped after that. The value of the fixed asset is assumed to decline proportionally over 4 years (straight line depreciation).

- Table 1.9.(1) shows the calculation of depreciation in business or government accounting. Gross capital formation is recorded at book value. As the asset survives 4 years, depreciation is simply calculated by dividing the book value by 4.

- Table 1.9.(2) shows the calculation of consumption of fixed capital by using the perpetual inventory method. The method requires first the calculation of gross capital stock and consumption of fixed capital at the base year price and then the inflating of these values into current prices by using price indices. Thus the following steps are required:

    - The gross capital stock at book value is converted to the price of a base year. In this example, the base year is set at T-2.
    - The consumption of fixed capital at the base year price is calculated by using the same straight -line depreciation assumption. Net capital stock at the base year price is the difference between gross capital stock and consumption of fixed capital.

- The next step is to derive consumption of fixed capital and net capital stock at current market values by using the price indices.

- As can be seen in table 1.9.(2), the calculation of the consumption of fixed capital of one fixed asset with a 4-year lifetime at time T requires data on gross capital formation of that kind of asset from year T-3 on. The consumption of fixed capital of buildings with 30-year lifetime at the present time will require data on annual gross capital formation of buildings of the same kind for 30 years before that. Thus, the calculation of consumption of fixed capital requires long time-series of data on gross capital formation, their average service life and their probability of retirement. In practice, the compilation of net capital stock and the calculation of consumption of fixed capital require a combination of obtaining an initial benchmark estimate of capital stock (by survey) and series of gross capital formation statistics.

- The simple method shown in table 1.9 omits the effects of asset mortality, i.e. how assets are retired around the average service life especially when there is more than one fixed asset of the same kind. The assumption of a straight-line depreciation may need to be replaced by a more realistic assumption that is appropriate for each kind of assets as some depreciate quickly at the beginning and slowly at the end of its service life, while the opposite is true for others.

- For more detailed information on the perpetual inventory method, readers are advised to read chapter 8 of the handbook, *Links Between National Accounting and Business Accounting* (United Nations, ST/ESA/STAT/SER.F/F76) or *Measuring of Capital: A Manual on the Measurement of Capital Stocks, Consumption of Fixed Capital and Capital Services* (OECD).

D. Exports and imports of goods and services

1. Definition

1.62 Exports and imports between the domestic economy and the rest of the world are transactions between residents and non-residents of an economic territory (see figure 2.4).

1.63 A transaction of goods and services (sales, barter, gifts) from residents to non-residents is an export and from non-residents to residents is an import. From this definition, purchases of goods and services by non-resident tourists in the country are treated as exports and purchases of goods and services by resident tourists outside of the country are treated as imports. Gifts and barter in kind from abroad should also be imputed as imports and the same kind of transactions to abroad should be imputed as exports.[7]

[7] In the income account, the same values should be imputed as current transfers from abroad to pay for the imputed imports or as current transfers to abroad so that non-residents can pay for the imputed exports.

1.64 Exports and imports exclude all transactions in land, buildings and non-movable non-produced assets, and in financial assets (stocks, bonds, money, monetary gold, etc.) The SNA takes an exception rule on land, buildings and non-movable non-produced assets since they are still used for production purposes in the domestic economy. Financial assets are neither goods nor services.

1.65 Exports and imports occur when there are changes of ownership between residents and non-residents regardless of whether there are corresponding physical movements of goods across borders). However there are three exceptions that require imputation of changes of ownership:

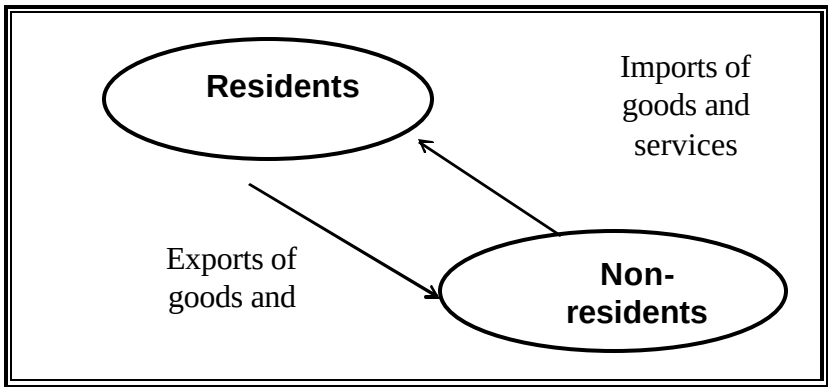
(a) Goods transferred as part of financial leasing (which are long-term leasing of assets where the lessee is fully responsible for maintaining the assets);
(b) Deliveries between affiliated enterprises; and
(c) Goods sent for significant processing to order or repairs. Goods bought from non-residents and sold to non-residents by commodity dealers within the same accounting period are not recorded as exports or imports.

2. Residents and non-residents

1.66 Exports and imports between the domestic economy and the rest of the world are transactions between residents and non-residents of an economic territory (see figure 1.1).

1.67 An institutional unit, for example a household, an enterprise, a non-profit unit, etc. is a resident unit when it has a center of economic interest in the economic territory in question. Center of economic interest is understood as ownership of land, ownership of structures or engaging in production in the territory for a long period of time (at least a year).

Figure 1.1. Exports and imports as transactions between residents and non-residents



1.68 Military personnel, civil servants including diplomats employed abroad by an economic territory are residents of the territory that employs them.

1.69 Students are residents of their country of origin however long they study abroad.

1.70 International organizations are not considered residents of any national economy, but their workers are residents of the economy in which they are expected to have their abode for at least a year.

1.71 Owners of buildings and non-produced assets like land, subsoil assets, legal constructs like leases, etc. even though are not residents; they are treated as residents of the economy since these assets remain in the economy and serve the production activities of the economy. Transactions of them are not part of exports and imports.

3. Valuation of exports and imports

1.72 Exports are valued f.o.b. (free on board), i.e. at the prices at the domestic customs frontier before being shipped out. They should be, by definition, equivalent to purchasers' prices since they include domestic transport, and trade costs to bring the good to the ports, and also include taxes less subsidies on products paid by the purchasers or received by the producers.

1.73 Imports must also be valued f.o.b. (free on board), but in this case they are valued at the prices at the foreign custom frontier.

1.74 Imports are normally valued c.i.f. (i.e. including insurance and freight costs) at the domestic custom frontier by customs. To derive imports f.o.b., cost of freight and insurance services between the two borders must be estimated and deducted from imports c.i.f. Freight and insurance services on imports may be provided by either residents or non-residents. Those provided by non-residents are imports but those provided by residents are domestic output. Imports f.o.b. avoid counting domestic output as imports and avoid double counting imported freight and insurance services, as they are already included in data on imports of services.

4. Conversion of imports c.i.f. to imports f.o.b.

1.75 In national accounting, exports and imports are measured f.o.b., even though trade statistics and supply and use tables normally record imports by commodities c.i.f. as imports c.i.f. are equivalent to valuation in basic values. Thus even though product by product, each value of imported product is valued c.i.f, it is necessary to adjust the total value of imports from c.i.f. to f.o.b.

1.76 Table 1.10 shows import data collected by customs which are regularly reported c.i.f. The full value c.i.f. cannot be treated as imports since the services provided to bring the goods to the importing countries may be produced by the importing countries. Thus these import values c.i.f. must be broken down into separate components which include:

(a) The value of imports at foreign ports (imports f.o.b);
(b) Transport services to carry the goods to the importing countries;
(c) Insurance premiums on the imported goods.

(d)

Table 1.10. An example of imports broken down by components

Foreign port value (imports f.o.b.)		**220**
Transoceanic margins		**20**
Transport		16
by resident carriers	6	
by non-resident carriers	10	
Insurance premiums		4
by resident carriers	1	
by non-resident carriers	3	
Imports c.i.f.		**240**

1.77 Thus the data from table 1.10 can be compiled according to the SNA as shown in table 1.11. Table 1.11 has not recorded properly yet insurance services. In fact, insurance premiums paid on the imported goods have to be broken into two components: insurance service charges and net premiums (=premiums less insurance service charges). Thus values of insurance services are lower than the values with (*).

Table 1.11. An example of imports broken down by components

Domestic production of services		7*
Transport services	6	
Insurance services	1*	
Imports of goods f.o.b.		220
Imports of services		13*
Transport services	10	
Insurance services	3*	
Imports c.i.f.		**240**

5. Estimation

1.78 Instructions on preparing balance of payments published by the IMF provide details on methods to prepare exports and imports.[8] Foreign trade statistics that reflects official merchandise trade across borders recorded by customs is the main source of data for exports and imports. However, in general, it does not cover:

[8] IMF, Balance of Payments Manual. Free electronic document: http://www.imf.org/external/pubs/ft/bopman/bopman.pdf.

a) Imports and exports through smuggling particularly for countries with land borders with other countries;
b) Exports of fish and purchases of oil on the high seas;
c) Imports and exports of military goods by government that are often not recorded;
d) Imports and exports of services paid through the banking system, from postal, telephone, electricity, transport, hotels, consultancy services, electronic trade in services, financial and insurance services, etc.

1.79 Items (a) to (b) may be based on certain benchmark studies and in the absence of any additional information may be assumed to change over time in the same way exports and imports of merchandise change for years between benchmark years.

1.80 Items (c) may be obtainable only from government, even though some time they may be obtained from trade statistics of the country trade counterpart. Items in (d) can be obtainable from the Central Bank which collects data from banks under its supervision, from postal, telephone, electric, airlines, transport and shipping, insurance and financial companies that do business across borders.

6. Deflation of exports and imports

1.81 Deflation of imports and exports of goods and services should not be based on the use of unit value indexes (UVI) particularly when products included in the calculation of UVI are not homogeneous. Instead imports/exports price indices were recommended to be developed. These price indexes should be developed for groups of homogeneous products. For preparing deflators of imports and exports the IMF's *Export and Import Price Index Manual: Theory and Practices* (2009)[9] should be consulted.

[9] *www.**imf**.org/external/np/sta/xipim/pdf/xipim.pdf*

Part II

An operational guide for using commodity flow approach to compile GDP

Introduction

2.1. Commodity flow method provides a systematic and consistent frame for the estimation of GDP by final expenditures. Essentially, it is a simple form of the supply and use tables but requires much less up-to-date information. This is in contrast with the supply and use tables which require full information on the supply of products which come from both domestic production and imports and on the uses of products for their own production (i.e. intermediate consumption), final consumption, gross capital formation and exports.

2.2. The supply and use tables are an integrated framework and therefore allow for the full use of information in national accounts compilation. Data from various sources on the supply and uses of every product in the economy for each accounting period can be entered, evaluated, and adjusted until its total supply is equal to its uses. Unfortunately, very few countries can afford to construct the supply and use tables every time production accounts are prepared, even annually. This document will hopefully provide a short-cut commodity flow method to be used when the supply and use tables are not available. Even in the case that the benchmark supply and use tables are available; countries still have to resort to the commodity flow method, particularly for annual and quarterly accounts.

2.3. Part A will discuss the valuation system in the SNA, which is the foundation for the commodity flow approach in particular and in national accounting in general.

2.4. Part B will discuss the supply and use tables in the form that reflect the actual prices at which transactions take place, where outputs are at basic prices (the prices received by the producers) but consumption is at the purchasers' prices that the consumers actually pay for. The commodity flow approach based on the supply and use tables requires a bridge between basic prices and purchasers' prices. This bridge is made up of trade, transport margins and taxes on products. After building this bridge, the method to compile GDP by final expenditures is

basically to bring and reconcile actual data collected by surveys, estimates of components of final expenditures by using growth indicators for extrapolation or benchmark coefficients, and allocation of domestic products and imports to the appropriate consumption categories. Readers should consult Chapter IV in the document *GDP by Production Approach: A General Introduction with Emphasis on an Integrated Economic Data Collection Framework*[10] for the concepts and definitional boundary of activities and products used in GDP by final demand approach. Part D will also discuss the use of commodity flow method to compile GDP by final expenditure at annual and quarterly frequency when limited data is available.

2.5. Part C will focus on how to estimate trade and transport margins and also taxes on products, which are required to bridge basic values and purchasers' values.

2.6. Finally, Part D will provide a summary on the technique to estimate GDP by final expenditure approach.

[10] Vu Quang Viet, *GDP by Production Approach: A General Introduction with Emphasis on an Integrated Economic Data Collection Framework,* written as training materials for the China-funded United Nations project: *Statistical Capacity Development in China and other Developing Countries in Asia.*

A. Valuation in national accounting

2.7. The UN System of National Accounts in principle records transactions of goods and services at the actual prices at which that they are transacted. A good after production normally goes through either wholesalers, retailers or both before reaching another producer or a final consumer. The price received by the producer differs from the price paid by the middleman buyer, and that again differs from the price the final consumer paid. Thus in order to spell out clearly their relationships in the system, the SNA has adopted three distinct types of prices or values of products: basic price, producer's price and purchaser's price.

1. Basic definitions

2.8. The UN's System of National Accounts defines three types of prices for valuing goods and services as follows:

2.9. **BASIC PRICES:** *The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, by the producer as a consequence of its production or sale.* ***It excludes any transport charges invoiced separately by the producer.*** (SNA2008, para. 6.51)

2.10. **PRODUCER'S PRICE:** *The producer's price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any VAT, or similar deductible tax, invoiced to the purchaser.* ***It excludes any transport charges invoiced separately by the producer.*** (SNA2008, para. 6.51)

2.11. Neither the producer's nor the basic price includes any amounts receivable in respect of VAT, or similar deductible tax, invoiced on the output sold.

2.12. **PURCHASER'S PRICE:** *The purchaser's price is the amount paid by the purchaser, excluding any VAT or similar tax deductible by the purchaser, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser's price of a good* ***includes any transport charges paid separately by the purchaser*** *to take delivery at the required time and place*. (SNA2008, para. 6.64).

2.13. Important to the valuation methods are the concepts of trade margin and transport margins.

2.14. **TRADE MARGIN:** Trade margin is defined as the difference between the selling price of the good and the price that would have to be paid by the distribution to replace the good at the time it is sold. Thus trade margin is the output of the distributor (either the wholesaler or the retailer or both). Trade margin applies only when there is a distribution service provided by the trader through buying and selling of a product.

2.15. **TRANSPORT MARGIN:** Transport margins only occur when transport services are separately invoiced. (2800 SNA 14.130). If it is not invoiced separately by the producer to the

trader then it is part of the basic price. If it is invoiced inclusively in the price of the goods sold by trader then it is part of the trade margins. It is called margin because it is the service that is provided to deliver goods to the users.

2.16. The links between the different valuation methods in the SNA are shown below:

Table 1. Relationship between basic prices, producer's prices and purchaser's prices

Basic prices	
+	Taxes on products excluding invoiced VAT
-	Subsidies on products
= Producer's prices	
+	VAT not deductible by the purchaser
+	**Transport charges (margins) separately invoiced**
+	**Wholesale and retail trade margins** (these margins do not include transport costs that are paid separately by the purchaser, either from purchasing from the trader or from other transporters)
= Purchaser's prices	

2. Example to illustrate valuation methods in the circulation of goods and services

2.17. The following examples showed the circulation of goods from the producer to the final consumer:

(a) Table 2.A covers the case when the retailer is not separately invoiced for the cost of transporting the goods from the producer.

(b) Table 2.B shows the case when the retailer has to pay separately for the cost of delivery.

In both cases, as one can see that, the trade margin is the same as long as the cost to replace the goods sold to the final consumer (replacement cost) remains the same to the retailer. Trade margin can be simply calculated as the difference between the price charged to the consumer and the replacement cost. In both cases 2.A and 2.B. it is 110-102=8. Trade margins can be either in producer's prices or basic prices depending whether sale tax on products is included or not.

2.18. In the example given in tables 2.A and 2.B, the purchaser's value paid by the consumer is 115.1 for his purchase of rice. In national accounting, the consumer is treated as though he consumed a bundle of products: rice, trade and transport margins, and taxes on products. The reason for doing this is that for the purpose of comparison over time and across consumers, eliminating the influence of government tax policy and distribution costs (consisting of both trade and transport margins), goods and services must be measured in such a way that the value reflects the quantity of goods produced and consumed.

2.19. The commodity flow tables for the examples 2.A and 2.B are respectively shown in tables 3.A and 3.B.

Table 2.A. Example: Circulation from a producer of rice to a consumer (transport not separately invoiced)

Producer		Retailer		Consumer
Sold to the retailer (transport is included but **not separately invoiced**): 100 Sale tax: 2	⇨	Purchaser price/replacement cost: 102 Sold to the consumer: 110 Sale tax: 2 Transport charge extra: 3 [11] Sale tax on transport: 0.1	⇨	Purchaser price : 115.1 Rice: 110 Sale tax: 2.0 Transport: 3.0 Sale tax on transport : 0.1
Output: Goods: 100		Output: Trade margin: 8 = 110-102 Transport: 3		Purchaser price:115.1

Table 2.B . Example: Circulation from a producer of rice to a consumer (transport separately invoiced)

Producer		Retailer		Consumer
Sold to the retailer (transport is **separately invoiced**): Basic prices 97 Transport 3 Sale tax: 2	⇨	Purchaser price/replacement cost 102 Sold to the consumer: 110 Sale tax: 2 Transport charge extra: 3 [12] Sale tax on transport: 0.1	⇨	Purchaser price : 115.1 Rice: 110 Sale tax: 2.0 Transport: 3.0 Sale tax on transport : 0.1
Output: Goods: 97 Transport: 3		Output: Trade margin: 8 = 110-102 Transport: 3		Purchaser price:115.1

2.20. In the first example, reflected in table 2.A and table 3.A, the contract between the producer and the retailer is the delivery of rice at the retailer's gate, with a higher basic value of the delivered rice of 100. The transport output is needed to move the goods only from the retailer to the consumer. Thus, only trade margin 3 is produced (see table 3.A). Here it is assumed the producer has to increase its intermediate inputs to bring the goods to the gate of the retailer.

[11] If the transport is implicit to the price, i.e. the trader delivers the goods without additional charge. For example, the sale price (not including taxes) is 113 instead of 110. The trade margin will be 113-102=11. This trade margin now includes the implicit cost of generating transport service.

[12] See previous footnote.

2.21. In the second example, reflected in table 2.B and table 3.B, the contract is for the retailer to pay separately for the rice and the transport margin (the rice being 97, and a transport margin of 3). In the second case, transport margins are required to deliver the goods to both the retailer and the final consumer. Thus, transport output to move goods (i.e. trade margins) generated is 6. In general, a good may circulate through more than one layer of trade (wholesaling and retailing), more than one transport service providers and subject to more than one round of taxes on products. In the commodity flow method and the use and supply tables, taxes on products are summed up as one item. The same treatment is for transport margins (see table 3.A and 3.B) which is delivered at different stages of a good circulation, although trade margins at most can be divided into wholesaling and retailing. This is also the basis for estimating trade, transport and tax margins by using the ratios of these margins over the value of a given kind of the consumed goods calculated for the base year, discussed in Parts C and D.

2.22. Thus the consumer expenditure of 115.1 on rice can be factored into: (i) consumption of rice at basic price; (ii) the consumption of transport margins; (iii) consumption of trade margins and (iv) in addition, taxes on products must also be paid at various stages of the circulation process.

Table 3.A. The example presented as commodity flow in supply and use of commodity (transport not separately invoiced)

	Basic price	Taxes on products	Trade margins	Transport margins	Supply in purchaser's prices		Uses in purchasers' prices
	(1)	(2)	(3a)	(3b)	(4)=(1)+…(3)		(4)
Rice	100	2+2+0.1	8	3	115.1	=	115.1
Transport margins	3	0.1			3	=	3.1

Table 3.B . The example presented as commodity flow in supply and use of commodity (transport separately invoiced)

	Basic price	Taxes on products	Trade margins	Transport margins	Supply in purchaser' prices		Uses in purchasers' prices
	(1)	(2)	(3a)	(3b)	(4)=(1)+…(3)		(4)
Rice	97	2+2+0.1	8	6	115.1	=	115.1
Transport margins	6	0.1			6	=	6.1

2.23. The information above allows us to create partially the production account of the producer of rice, the transport agent and the retailer in terms of proving the rice and delivering it to the final consumer.

2.24. Case B is more complicated as the treatment in table 4.B considers the transport margin as though it is produced by an independent transport agent paid directly by the final consumer. In this case, the retailer is purely transmitting that cost to the final consumer. However if additional

information showed that the producer of rice also produces the transport margin as secondary product, then it is treated as part of the industry output of the rice producer.

Table 4. A. The use table in case A

	Intermediate consumption					Household final consumption
	…	…	Rice producer	Transport agent	Trade agent	
…						
Rice (and delivery)						100
Transport margin						3
Trade margin						8
Value added at basic prices						
Taxes on products						4.1
Output at basic prices			100	3	8	

Table 4. B. The use table in case B

	Intermediate consumption					Household final consumption
	…	…	Rice producer	Transport agent	Trade agent	
…						
Rice						97
Transport margin						6
Trade margin						8
Value added at basic prices						
Taxes on products						4.1
Output at basic prices			97	6	8	

2.25. Value added of the producer of rice, the retailer and the transport agent of rice can be calculated if data on intermediate consumption (IC) is given.

2.26. In this example, use goes directly into final household consumption. In general, the consumption of rice can go to intermediate consumption, gross capital formation in the form of changes in inventories or exports. It certainly cannot be treated as gross fixed capital formation because it cannot be used repeatedly over time to produce other products.

2.27. To see fully the relationships in the supply and uses of goods and services including the income generated by production, we need the supply and use tables.

B. Supply and use tables

2.28. This part will first describe the supply and use tables and then explain how the supply and use tables can be used to estimate national accounts aggregates.

1. Description of supply and use tables (SUT)

2.29. The supply table and similarly the use table are shown in a much aggregated manner as an example in table 5. In the activity columns, all economic activities are aggregated broadly into 3 groups: non-financial activities, financial activities, and non-market services. In actual compilation, each column here may contain numerous columns, each of which is identified by an industry classification code, which should be based on ISIC[13]. The reason for so doing is to immediately show the value added generated by every activity in the economy. Economic activities can also be grouped in types of institutional sectors (unincorporated households, corporations, government, nonprofit institutions). The latter distinction is for both the purpose of compiling institutional sector accounts and for balancing purposes. For example rice produced by subsistence farmers will mostly be consumed by households.

2.30. The rows are also highly aggregated, which may be much more numerous and identified by the commodity classification codes, which should be based on CPC[14].

2.31. In an economy, as much as in a SUT, the number of products need not be the same as the number of activities. In some counties, some activities are for the purpose of generating product that is totally different in nature from the activity. For example, a television corporation may broadcast its program for free but sells its time for advertising. Thus its activity is television but its product is advertising. Newspaper may operate in a similar manner.

2.32. In SUT, the total supply of each product must equal its total use, both being measured in purchaser's prices. It is easy to check on column 12 that the row sums from row 1 to 4 in the supply table are equal to the corresponding row sums in the use table.

- Total supply at purchaser's prices = domestic production in basic prices + imports c.i.f. + trade and transport margins+ taxes on products.
- Total use in purchaser's prices = intermediate consumption by industries + exports f.o.b + final consumption + gross capital formation.

2.33. **In SUT, it is important to distinguish the concept of industry output and product output (or commodity output). Industry output is the value of all types of products produced by that industry. Product output (of a given product) is the total value of that**

[13] *International Standard Industrial Classification of All Economic Activities,* ST/ESA/STAT/SER.M/4/rev.4), United Nations, 2008. http://unstats.un.org/unsd/cr/registry/isic-4.asp

[14] *Central Product Classification (CPC), version 2*, United Nations, 2008. http://unstats.un.org/unsd/cr/registry/cpc-2.asp

kind of product produced by all industries in the economy. Thus the total value of industry outputs is equal to the total value of product outputs.

2.34. The outputs of industries in the supply table are at basic prices, but the uses in the use table are at purchasers' prices. Because of that, in the supply table, the supply of every product at purchasers' prices (column 12) is obtained by adding to the supply of product at basic prices (column 9) trade and transport margins (column 10) and taxes less subsidies on products (column 11).

2.35. The elements of imports in the supply table (column 7) must be measured c.i.f. (including cost, insurance and freight) to make them equivalent to basic prices, but the total value of imports must be valued f.o.b. (free on board) so as to arrive at the correct balance of trade (imports less exports). Thus the column and row of c.i.f./f.o.b. adjustment are necessary. In order to avoid double counting, the adjustment row and column (row 5 and column 8) deduct insurance and freight services on imported goods since they are included in both the values of imported goods and the supply of services.

2.36. Similarly to other product outputs, the output of transport services is shown in row 2 and column 6 of the supply table. However, row 2 of the use table shows only the trade and transport services at purchasers' prices, which are directly purchased by users because trade and transport margins on the goods consumed are already included as a part of the purchasers' prices of goods that are used. Thus to balance the totals of row 2 of the supply and use tables, the total value of trade and transport margins is entered in row 2 and column 10 of the supply table as a negative value.

2.37. Reading through column 1 and row 1 of both the supply and use tables helps explain how data are presented. The total supply at purchasers' prices of non-financial products in row 1 is 380. 283 are produced domestically and 22 are imported, so the total supply at basic prices is 305. Adding in trade and transport margins (for circulation inside the economy), 60, and taxes less subsidies on products, 15, one obtains the total supply of the first product at purchasers' prices, 380. Column 1 in the supply table shows the outputs at basic prices produced by agricultural activities. They produce non-financial goods and services (except trade margins) and some trade margins. Column 1 in the use table shows the uses of goods and services in production of the financial outputs of corporations. 8 (=7 + 1 shown in row 5) is called intermediate consumption. The gross value added (25) is calculated as the difference between the industry output of industry 1 (33) and its intermediate consumption (8). The value added should be broken down into compensation of employees, other taxes on production, consumption of fixed capital and operating surplus. Gross operating surplus together with mixed income is calculated as a residual. In case of unincorporated enterprises, which mix up expenditures of the enterprise and final consumption expenditure of their owners such that compensation of employees is not paid explicitly to the owner/worker, the residual will be called **mixed income**. In addition, an important part of goods produced by households is for own final consumption, which does not require trade margins or is not even subject to taxes on products, but products produced by corporations would be subject to both. The distinction would help providing better benchmark indicators for estimation in the following accounting periods when complete data is not available.

2.38. Economic activities can be classified by types of producers, such as households' unincorporated enterprises and corporations as each type of producer may use different technology and more importantly it is easier to reroute the income that is generated. For example mixed income goes to the households while gross operating surplus goes to corporations.

2.39. GDP is equal to the total of value added at basic prices plus taxes less subsidies on production and imports. GDP = 196 + 20 = (25 + 69 + 33 + 14 + 55) + 20 = 216 (see the use table, column 6, rows 9-11. Taxes less subsidies on products are obtained as the sum of column 11 in the supply table and shown also in the use table in column 6 row 11. Taxes and subsidies are not shown elsewhere in row 11 since producers pay for them only as part of their intermediate consumption.

2.40. GDP also must equal the sum of exports less imports, household final expenditure, government and non-profit institutions serving households (NPISHs) final expenditures, gross capital formation. GDP = 41-28 + 152 + 8 +3 + 40 = 216.

2. Use of the supply and use tables to estimate national accounts aggregates

2.41. Firstly, SUT of the benchmark year can be used to estimate GDP by three methods either annually or quarterly. In this case, the size of SUT may have to be aggregated into a manageable size, with important industries and commodities singled out and other less important ones aggregated together. A benchmark SUT, frequently compiled every five years, may have a few thousands products and hundreds of activities. A large number of countries in Southeast Asia, which includes Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam, has regularly compiled input-output table every five years of the size which is larger than 100 industries.

2.42. In general, detailed information on inputs which are used by industries is collected only every five years for the purpose of preparing the benchmark SUT. Annually, only surveys on output and total cost of materials and services are collected to estimate value added. For quarterly accounts, data must be collected monthly and therefore only data for output are collected. This data collection practice is based on the strategy for cost saving and timeliness in the publication of important indicators on the performance of the economy.

2.43. Annually new value added ratios should be used to replace benchmark value added ratios to estimate value added but in general benchmark ratios are used instead. In many countries, due to budget and even time constraint, only benchmark ratios are available.

TABLE 5 SUPPLY AND USE TABLES BY INSTITUTIONAL SECTORS

	A. SUPPLY TABLE	Agriculture	Manufacturing	Trade, transport, communication	Finance and business services	Education, health and other services	Product output of total economy	Imports c.i.f. (Total f.o.b.)	c.i.f./f.o.b. adjustment	Total product supply at basic prices	Trade & transport margins	Taxes less subsidies on products	Total supply of products at purchasers' prices
		(1)	(2)	(3)	(4)	(5)	(6)=(1)+.(5)	(7)	(8)	(9)=(1)+..(7)	(10)	(11)	(12)=(9)+.+(11)
1	Non-financial goods & services except margins*	31	177	5		70	283	22		305	60	15	**380**
2	Trade and transport services	2	2	59			63	3	-1	65	-60	3	**8**
3	Financial services				20		20	2	-1	21		2	**23**
4	Other non-market services					10	10	0		10			**10**
5	c.i.f./f.o.b. adjustment							-2	2	0			0
6	Direct purchases abroad by residents							3		3			3
7	**Industry output at basic prices/total**	**33**	**179**	**64**	**20**	**80**	**376**	**28**	**0**	**404**	**0**	**20**	**424**

	B. USE TABLE	Agriculture	Manufacturing	Trade, transport, communication	Finance and business services	Education, health and other services	Intermediate consumption by product of total economy	Exports f.o.b.	Household final expenditures NPISHs	Government		Gross capital formation	Total use of products at purchasers' prices
										Individual final consumption	Collective final consumption		
		(1)	(2)	(3)	(4)	(5)	(6)=(1)+.(5)	(7)	(8)	(9)=(1)+..(7)	(10)	(11)	(12)=(9)+.+(11)
1	Non-financial goods & services except margins	7	93	30	5	23	158	37	142	3		40	**380**
2	Trade and transport services	-	4	0	-	-	4	2	2				**8**
3	Financial services	1	12	1	1	2	17	1	5				**23**
4	Other nonmarket services		1				1		1	5	3		**10**
5	**Intermediate consumption by industries**	8	110	31	6	25							
6	Direct purchases abroad by residents								3				3
7	Direct purchases at home by nonresidents							1	-1				0
8	Total uses at purchasers' prices	8	110	31	6	25	180	**41**	**152**	**8**	**3**	**40**	**424**
9	Total gross value added/GDP						216						
10	Gross value added at basic prices	**25**	**69**	**33**	**14**	**55**	196						
11	Taxes less subsidies on products						20						
12	**Industry output at basic prices/total**	**33**	**179**	**64**	**20**	**80**	**376**						

2.44. **<u>Guideline principle</u>: Given industry outputs are available, benchmark ratios are used to estimate value added by industry, product outputs, and the values of products used as intermediate inputs. Actual data and estimates of components of final expenditures from various sources are confronted with the total value of products that is available for use in the economy and estimated as a residual in order to arrive at consistent sets of numbers.** The following procedure may be used to estimate national accounts, either quarterly or annually.

2.45. **Step 1:** Deflate industry outputs and other statistics collected for the year or period under accounting into the prices of the benchmark year of the supply and use tables. Estimation in constant prices should be obtained first because not only that many of the available indexes are on the basis of real growth but also it is easy to evaluate the data on this basis, later the results are inflated back to current prices. One may decide to operate in an opposite way; in that case, tables derived should be inflated to current prices especially in the case that changes in relative prices are significant to such an extent that shares and input coefficients are changed significantly.

2.46. **Step 2**: Calculate benchmark ratios using the make matrix and the use matrix. The make coefficient matrix is derived by assuming that each industry produces the same shares of products. From the supply table, shares of products produced by a given industry are calculated. For example, product 1 produced by industry 1 is 31/33=0.93939. Table 6.1 and table 6.2 are derived from the supply and use tables given in table 5.

Table 6.1 Make coefficient table: shares of products by industries

		Industries				
		1	2	3	4	5
Products	1	0.93939394	0.98882682	0.078125		0.875
	2	0.06060606	0.01117318	0.921875		
	3	0	0		1	
	4					0.125

Table 6.2 Input coefficient matrix: input coefficients by industries

		Industries				
		1	2	3	4	5
Products	1	0.21212121	0.51955307	0.46875	0.25	0.2875
	2	0	0.02234637	0	0	0
	3	0.03030303	0.06703911	0.015625	0.05	0.025
	4	0	0.00558659	0	0	0
	Value added	0.75757576	0.38547486	0.515625	0.7	0.6875

2.47. **Step 3**: Derive the supply of domestic products using make coefficient table (similar to table 6.1) and the new industry outputs in the prices of the benchmark year, i.e. in constant prices). This would require price indexes for industry outputs. **Since there is no price index for an industry output, its price index must be constructed as the weighted**

sum of the price indexes of the products the industry produce, where the shares of products produced by that industry serve as weights. The price indexes used for this purpose are the basic price indexes which are commonly called producer price indexes. The coefficient use matrix is similarly derived by simply dividing inputs used by the industry output. (See tables 6.2 and 6.3 for the estimated industry outputs in current and constant prices assuming that industry outputs in current prices are respectively 40, 200, 70, 22 and 12).

Table 7.1 Make table (based on table 6) in current prices

		Industries					Product outputs	Price indexes
Products		1	2	3	4	5		
	1	37.6	197.8	5.5		10.5	251.3	105
	2	2.4	2.2	64.5			69.2	102
	3				22		22.0	102
	4					1.5	1.5	100
Industry output in current prices		40.0	200.0	70.0	22.0	12.0	344.0	

Table 7.2 Make table (based on table 6) in constant prices

		Industries					Product outputs
Products		1	2	3	4	5	
	1	35.8	188.3	5.2		10.0	239.3
	2	2.4	2.2	63.3			67.8
	3				21.6		21.6
	4					2	1.5
Industry output in constant prices		38.2	190.5	68.5	21.6	11.5	330.2

2.48. **Step 4**: Derive the new intermediate consumption using table 6.2 and the industry outputs at constant prices derived previously (as in table 7.2). The results will be similar to column 6 of the use table in table 5. Thus, if industry outputs in constant prices are respectively 38.2, 190.5, 68.6, 21.6, 12 then it is possible to estimate products in constant prices used for intermediate consumption (IC) by industries (see table 7.3 below).

Table 7.3 Use table in constant prices (based on table 6.2)

		Industries					Products used for intermediate consumption
Products		1	2	3	4	5	
	1	8.1	99.0	32.1	5.4	3.3	147.9
	2	0.0	4.3	0.0	0.0	0.0	4.3
	3	1.2	12.8	1.1	1.1	0.3	16.4
	4	0.0	1.1	0.0	0.0	0.0	1.1
	VA	28.9	73.4	35.3	15.1	7.9	160.7
	Industry output	38.2	190.5	68.5	21.6	11.5	330.2

2.49. **Step 5**: Estimate for the supply table new product taxes and new trade margins in order to finally obtain the total supply of products in purchaser's prices similar to column 12 in the supply table of table 5. Part C will discuss in detail how to estimate trade and transport margin ratios.

2.50. **Step 6**: Estimate components of final expenditures, namely household final consumption, government final consumption, gross capital formation, exports. These estimates must satisfy the condition that the sum of a given product used (column 12 of the use table in table 5) must equal the sum of the supply of products in the supply table (column 12).

2.51. **Step 7:** Using the use table, it is also possible to estimate value added at basic prices given industry outputs in basic prices by multiplying the value added coefficients of each industry with the industry outputs in deflated prices of the benchmark year (see table 7.3) .

2.52. **Step 8:** Check for consistency in GDP estimates by different methods. The GDP estimated by the production approach (using value added ratios) in principle should be equal to the GDP derived by the final expenditure approach. The difference is treated as statistical discrepancy. If discrepancy is large, all the basic data should be re-examined. When discrepancy is less than 1%, it is better, like the case of Canada, to distribute the statistical discrepancy proportionally to the two alternatives to obtain one value of GDP as users generally find it difficult to deal with two estimates of GDP. Otherwise, countries should decide on the value of GDP on the basis of its own evaluation of the reliability of each approach.

3. Final expenditure approach to GDP

2.53. In the final expenditure approach to GDP, one needs to fill in the components of final expenditures, either individually by main components or group of products. Table 8 provides a glimpse on the relative importance of each component in final expenditures in a number of

countries in the world. Final consumption expenditure of households is always the most important component, making up from 37 percent in China to over 70% in the Philippines and the United States. The size of the share of household final consumption in a country is influenced mainly by the relative share of gross fixed capital formation and final consumption expenditure of general government. The People's Republic of China has an exceptionally low share of final consumption expenditure of households. This is due to the fact that it has an exceptionally high share of gross fixed capital formation.

Table 8. Components of final expenditures in GDP in 2009

Country	Final consumption expenditure	Household consumption expenditure	Government final consumption expenditure	Gross capital formation	Gross fixed capital formation	Changes in inventories	Exports of goods and services	Imports of goods and services	GDP
China, People's Republic of	0.504	0.368	0.136	0.456	0.438	0.017	0.392	0.306	1.00
India	0.696	0.573	0.123	0.350	0.337	0.013	0.206	0.253	1.00
Indonesia	0.682	0.586	0.096	0.310	0.311	-0.001	0.241	0.213	1.00
Malaysia	0.645	0.502	0.143	0.140	0.204	-0.064	0.969	0.754	1.00
Philippines	0.844	0.739	0.105	0.146	0.146	0.000	0.317	0.308	1.00
Thailand	0.683	0.550	0.133	0.219	0.244	-0.026	0.685	0.579	1.00
Viet Nam	0.733	0.670	0.064	0.384	0.348	0.036	0.762	0.886	1.00
Australia	0.737	0.557	0.180	0.283	0.283	0.000	0.195	0.200	1.00
Canada	0.807	0.588	0.219	0.210	0.215	-0.005	0.287	0.304	1.00
United States	0.883	0.710	0.173	0.136	0.146	-0.010	0.111	0.138	1.00

Source: United Nations Statistics Division. [15]

3.1. Data sources

2.54. **Exports and imports** of goods through customs are regularly collected by every country. These data are supplemented by other data on transactions in services from tourism; postal, telecommunication, transport services; banking, insurance and other financial services. The latter data are collected through administrative channels or sampling surveys (for tourist expenditures).

2.55. **Household final consumption expenditure**: Household final consumption makes up the most important part of GDP by final expenditure as shown in table 8 and therefore it is important for countries to carry out regular survey to capture it. Household final consumption expenditure is important for other works as shares of household final consumption are necessary as weights for the calculation of consumer price indexes and shares of final expenditures by kind of expenditures and by detailed products are needed for the calculation of purchasing power

[15] http://unstats.un.org/unsd/snaama/selbasicFast.asp

parity. Generally, benchmark data rely on household expenditure survey which is carried out every 3 to 5 years. Annual and quarterly data are estimated on the basis of benchmark data and monthly retail sale surveys. In many countries that are financially capable, household expenditure survey is carried out annually (see Appendix 1 or the program in the United States).

2.56. **Government final consumption expenditure:** The data are from benchmark government final expenditure. Annual and quarterly data are estimated by extrapolation on the basis of the benchmark data and the budget plans.

Table 9. Shares of household consumption in USA and Vietnam, 2008 based on household survey[16]

	USA	Vietnam
Average annual expenditures	100	100
Food	12.8	45
Food at home	7.4	38
Food away from home	5.3	6
Alcoholic beverages	0.9	2
Tobacco products and smoking supplies	0.6	*
Housing**	33.9	11
Apparel and services	3.6	4
Transportation.	17	12
Vehicles.	5.5	
Gasoline and motor oil	5.4	
Other transportation	6.2	
Healthcare	5.9	6
Entertainment	5.6	1
Personal care products and services	1.2	0
Reading	0.2	
Education	2.1	5
Miscellaneous	1.7	2
Others, non-consumption	14.5	11
Cash contributions	3.4	
Personal insurance and pensions	11.1	

Note: *Tobacco is included in alcoholic beverages.
**Housing includes rents, utility, furniture, etc. to maintain residential housing.

[16] US Bureau of Labor Statistics, http://www.bls.gov/cex/ and Vietnam Household Living Standards 2008, http://www.gso.gov.vn/default.aspx?tabid=512&idmid=5&ItemID=9646.

2.57. **Gross fixed capital formation:** Data for the government is from the budget. Data for the corporations may come from enterprise production surveys. Data from households come from either relevant production data or arrive as residuals.

(a) Machinery either domestically produced or imported go to gross fixed capital formation (GFCF) if one can clearly identify them to avoid including with them small tools that can be used as intermediate consumption. By classifying machinery properly in terms of Central Product Classification (CPC), it is possible to identify those that are clearly fixed assets and those that can be used for both or only for household uses. For example, domestic appliances (CPC 448) are mostly used for household final consumption while weapons and ammunition and parts thereof (CPC449) may either go to GFCF or change in inventories (ammunitions for instance).

(b) Automobiles and other durable goods (computers, refrigerators, etc.): a share goes to enterprises' gross capital formation, and the rest goes to household final consumption. The share purchased by enterprises may be estimated by using data on new motor registration.

(c) Motorcycles and bicycles mostly go to household final consumption.

(d) Other large values of purchases or construction of transport equipments such as airplanes, ships, boats, pipelines, railroad and rail cars should be treated the same way as automobiles, but for the most part they go to gross fixed capital formation.

(e) Construction: Except a part of output/expenditure for maintenance of either enterprises or owner-occupied housing services that should be treated as gross fixed capital formation, new construction and major repair go to gross fixed capital formation. A real estate services supporting the transactions of both new and old constructions should be estimated and treated as gross fixed capital formation.

2.58. **Changes in inventories**: Data on changes in inventories of businesses must be based on enterprise production surveys. Many countries may not able to have data on inventories by industries, then at least national commodity reserves, normally oil and gas and cereals, should be included. Some countries may also add statistical discrepancy to this item. This should be definitely avoided as changes in inventories would provide indicators to gauge the future trend of the economy. Growth that is higher than normal indicates that the economy may soon slow down as unsold goods are piling up.

3.2. Balancing commodity supply and use at detail levels

3.2.1 Methods

2.59. Except when data are fully available for the compilation of the supply and use tables, balancing technique requires ratios that are based on a previous benchmark surveys or expert knowledge of those who are familiar with the industry either as producers or business association that promote the interest of the industry. These ratios are then used to extrapolate data for the more current accounting periods.

2.60. The principal steps that can be applied in balancing are as follows:

(a) Calculate for each product the total amount that is used as intermediate consumption , which is equal to: supply of products at purchasers' prices less exports of products (see similar result of the calculation as in the last column of table 7.3 or in the worksheet in table 17);

(b) Identify and allocate products to gross fixed capital formation;

(c) Identify and estimate changes in inventories, using data on national commodity reserves and estimates of changes in inventories based on benchmark ratios (inventories required for a given level of output) but, much better, more recent surveys;

(d) Estimate products that are used for intermediate consumption on the basis of the coefficients in the use table of the benchmark year (the procedure has been explained in part B.II). It is important to realize that purchases of intermediate goods and services used by general government and non-profit institutions serving households (NPISHs) are treated as intermediate consumption. The outputs of these sectors, after some adjustments for fees and sales, are than treated as final consumption of government or NPISHs. There are two adjustments that need to be identified and deducted from outputs: [17]

(i) Fees for services paid by enterprises and households must be deducted from output of government and NPISHs;
(ii) The goods and services purchased by the government and NPISHs on the market and delivered for free to the households (which are called by the SNA as social benefits in kind): These expenditures must be identified from government expenditure budget and entered directly to the final consumption of government and NPISHs.

[17] See Vu Quang Viet, *GDP by Production Approach: A General Introduction with Emphasis on an Integrated Economic Data Collection Framework,* Table 3.7 and Table 4.1.

(e) The residual, after allocating to gross capital formation and intermediate consumption, will be allocated to household final consumption.

3.2.2 Examples

2.61. A few examples are listed for illustration (see table 10 and 11 below).

2.62. In order to estimate household consumption of rice, one may have to estimate the part that is used to produce flour and other related food (similar to column 1 of table 11) as well as to increase national reserve; the rest of the volume that goes for domestic uses should go to household final consumption. The government may purchase rice to transfer to households; in that case purchase of rice should also enter as final consumption of government. Food products are similarly treated. Retail sale survey may be used to extrapolate household consumption. The rest will go to intermediate consumption after balancing with exports and imports.

Table 10. Example on the supply of a few products

		Domestic production in basic prices	Imports f.o.b.	Trade and transport margins	Taxes less subsidies on products subsidies on products	Total supply of domestic products in purchaser's prices
		(1)	(2)	(3)	(4)	(5)
1	Rice	x	x			x
2	Construction	x			x	x
3	Automobile		x	x	x	x
4	Machinery	x	x	x	x	x

Table 11 . Example on the use of a few products

		Intermediate consumption	Exports f.o.b.	Household final expenditures NPISHs	Government Government final consumption	Gross capital formation		Total use of products purchasers' prices
						Gross fixed capital formation	Change in inventories	
		All in purchasers' prices						
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Rice	?		x			x	x
2	Construction	x		x		x		
3	Automobile							
4	Machinery					x		

2.63. It is important to identify household durable goods such as furniture, kitchen equipment and utensils as a group which are treated as household final consumption. Most of other transportable products, not for gross capital formation, are used as intermediate consumption of enterprises. Except for a small share that is used for maintenance of household durable goods for recreation, transport, gardening, sporting, the rest is used as intermediate consumption.

2.64. One key product that is an important part of gross fixed capital formation is transport equipments, except for vehicles for personal uses. To help allocating vehicles to gross fixed capital formation for enterprises, government or household final consumption, new registration of vehicles by type of owner is needed. Most motorcycles and bicycles can be treated as household final consumption. Other transport equipments from airplanes, to boats, rail box cars are mostly for gross capital formation in developing countries.

2.65. Data on electricity, gas are normally available from administrative data. Data on the split of use of gasoline to households and enterprises can be estimated by number of registered cars and extrapolated by retail surveys.

3.2.3. Problems in linking COICOP and CPC classifications

2.66. The United Nations' *Classification of Individual Consumption According to Purpose (COICOP)*[18] is the classification standard that is used to classify household final consumption expenditures. This is the basis to guide regular data collection for household surveys. However, it differs from the United Nations' *Central Product Classification Version 2* (CPC, Ver.2)[19] which is used to itemize products imported, produced, and used as inputs in the economy for the supply and use tables in some important respects:

(a) The principles used for the two classification systems are different. Consumption by purposes (COICOP) classifies both goods and services together if they are consumed for the same purpose. For example, goods of different materials and services consumed for education purpose are grouped together. In the classification by purposes, goods made of different materials (woods, metal, plastics, etc.) are classified together. This contrasts to CPC that classifies products by the materials and technology that are used to produce them.

(b) In general, aligning items in COICOP to those of CPC is possible if the items at lower levels in both systems are harmonized. However, because COICOP was developed more or less independently of CPC, and because there is no need to know consumption at a very detailed level, as well as it is difficult for households to recollect and answer questions in such a detail, as a consequence, in some cases it is not possible to reclassify COICOP into the same classes of products in CPC even though COICOP has tried to align its classification at the more detailed level.

2.67. The differences between COICOP and CPC for a number of consumer goods shown in table 12 are not aimed to be comprehensive but only for illustration purpose. One can see that

[18] United Nations, http://unstats.un.org/unsd/cr/registry/regdnld.asp?Lg=1
[19] United Nations, *Central Product Classification Version 2* (CPC, Ver.2). http://unstats.un.org/unsd/cr/registry/cpc-2.asp

for every class of consumption purpose, COICOP, although grouping them together, has tried to distinguish different classes of products and services but they are not detailed enough to enable a proper link between COICOP and CPC. For example, COICOP group 5.4 (glassware, tableware and household utensils) includes utensils which can be made either of glass, metal, wood or plastics and also include expenditure for repair and maintenance. These items are however classified into different CPC depending mainly on the materials that they are made of. The same problems can be observed for household appliances (05.3), tools and equipment for house and garden (05.5) and to a lesser extent, clothing (03.1), and household textiles (05.1).

2.68. Thus the links between COICOP and CPC are not possible unless COICOP is broken down into more detailed classes. It is advisable that countries develop their own COICOP with an objective to make as much as possible full correspondences between classes of final consumption by purposes and classes of products in their national classification systems. This alignment is important in the construction of the use and the supply tables.

Table 12. Some analyses of the differences between COICOP and CPC ver 2

COICOP	CPC, ver 2
Classification of Individual Consumption According to Purpose	Central Product Classification, Ver.2
01-12 - Individual consumption expenditure of households	
01 - Food and non-alcoholic beverages	
01.1 - Food	21-23
01.2 - Non-alcoholic beverages	244
02 - Alcoholic beverages, tobacco and narcotics	
02.1 - Alcoholic beverages	241-243
02.2 - Tobacco	25
02.3 - Narcotics	2509?
03 - Clothing and footwear	
03.1 - Clothing	282-283, + repair services 8723
03.2 - Footwear	293-296, + repair services 871
04 - Housing, water, electricity, gas and other fuels	
04.1 - Actual rentals for housing	
04.2 - Imputed rentals for housing	
04.3 - Maintenance and repair of the dwelling	
04.4 - Water supply and miscellaneous services relating to the dwelling	
04.5 - Electricity, gas and other fuels	
05 - Furnishings, household equipment and routine household maintenance	
05.1 - Furniture and furnishings, carpets and other floor coverings	381 (furniture), 272 (carpets, floor coverings), 3691 (plastic floor coverings) + repair services 8724

COICOP	CPC, ver 2
Classification of Individual Consumption According to Purpose	Central Product Classification, Ver.2
05.2 - Household textiles	281 (knitted or crocheted fabrics), 271 (textile articles), 279 (other textile) + repair services 8724
05.3 - Household appliances	448 (domestic appliances), 269 + repair services 8715
05.4 – Glassware, tableware and household utensils	3693 (table ware), 37 (glass ware), 4291 (domestic metal products), 4299 (chain, locks, safes, trays, photo frames, needles, etc.)
05.5 - Tools and equipment for house and garden	4292 (hand tools), 4293 (boxes, containers), 4294 (things made of metal wire)
05.6 - Goods and services for routine household maintenance	346 (fertilizers and pesticides), 351 (paints), 353 (soap and cleaning preparations)
06 - Health	
06.1 - Medical products, appliances and equipment	352 (pharmaceutical products), 481 (Medical and surgical equipment and orthopaedic appliances)
06.2 - Outpatient services	
06.3 - Hospital services	
07 - Transport	
07.1 - Purchase of vehicles	
07.2 - Operation of personal transport equipment	
07.3 - Transport services	
08 - Communication	
08.1 - Postal services	
08.2 - Telephone and telefax equipment	
08.3 - Telephone and telefax services	
09 - Recreation and culture	
09.1 - Audio-visual, photographic and information processing equipment	
09.2 - Other major durables for recreation and culture	
09.3 - Other recreational items and equipment, gardens and pets	
09.4 - Recreational and cultural services	
09.5 - Newspapers, books and stationery	
09.6 - Package holidays	
10 - Education	
10.1 - Pre-primary and primary education	
10.2 - Secondary education	
10.3 - Post-secondary non-tertiary education	
10.4 - Tertiary education	
10.5 - Education not definable by level	
11 - Restaurants and hotels	
11.1 - Catering services	
11.2 - Accommodation services	
12 - Miscellaneous goods and services	
12.1 - Personal care	

COICOP	CPC, ver 2
Classification of Individual Consumption According to Purpose	Central Product Classification, Ver.2
12.2 - Prostitution	
12.3 - Personal effects n.e.c.	
12.4 - Social protection	
12.5 - Insurance	
12.6 - Financial services n.e.c.	
12.7 - Other services n.e.c.	
13 - Individual consumption expenditure of non-profit institutions serving households (NPISHs)	
13.1 - Housing	
13.2 - Health	
13.3 - Recreation and culture	
13.4 - Education	
13.5 - Social protection	
13.6 - Other services	
14 - Individual consumption expenditure of general government	
14.1 - Housing	
14.2 - Health	
14.3 - Recreation and culture	
14.4 - Education	
14.5 - Social protection	

Notes: Titles 13 and 14 are transferred from the accounts of NPISH and general government in order to arrive at household final consumption which also includes the final expenditures of NPISHs and general government that benefit the households.

3.3 Balancing commodity supply and use as a short-cut method

3.3.1. Methods

2.69. The difficulty faced by national accountants in estimating annual and quarterly GDP is insufficient data, for example by the end of a quarter and for a number of activities only data of the previous two months are available. As a consequence, extrapolation technique is needed to estimate a number of data on the basis of their likely trends. This is unavoidable for obtaining preliminary estimates in order to meet the urgent needs of analysts and policy makers. These preliminary estimates will be revised when additional data come in. Statistical offices should provide the reasons and the procedure of estimation so that users are aware of the preliminary nature of the estimates.

2.70. Again, there is no one set of data that can be used to estimate all components of final expenditures, but a number of them and therefore there is a need to combine different methods for estimating them:

(a) For short-cut methods, the estimates may be by more aggregated groups of products rather than by individual product at detailed levels (see table 12 for more aggregated groups of products).

(b) The methods can be either extrapolation from a previous year or a benchmark year using indicators collected through surveys (such as retail sales) or using the traditional methods by first extrapolating output and then allocating a part of that output to household final expenditure. The same allocation method using at the detailed level can be used at the aggregated level by aggregating the supply and the use table to the same level of aggregation and then estimating intermediate consumption based on the use matrix and the rest of domestic use of the consumption goods and services is allocated to final consumption.

(c) Data on exports and imports are always needed.

(d) Gross capital formation, similarly to the more detailed approach, must rely on output growth indicators of the assets that can be used for gross capital formation, and the data of imports of machinery, equipment for similar purpose or surveys on expenditure on capital equipments. Estimates of construction of registered large construction enterprises must be based on surveys but estimate of construction output of household enterprises can rely on sales of construction materials collected by retail sale surveys.

(e) Final consumption of general government must rely on government budget.

(f) Final consumption expenditure of households must be estimated separately for goods and services which are covered by retail sales and those that are not.
- Goods and commercial services covered by retail sales must be supplemented by production for own consumption of agricultural products.
- Other services which are not covered by retail sales. Output must be estimated first and then part of it is allocated to household final consumption using the ratios in the bench mark use table or experts' knowledge as discussed previously.

2.71. The important indicators that are used to extrapolate a significant amount of household final consumption are indexes of real retail sales (see table 13). Indexes of retail sales are discussed below.

3.3.2. Retail trade turnover indexes[20]

2.72. Retail indexes are indicators of the monthly activities of the distributive trade industry in nominal and real terms. In real terms, the indexes are calculated by deflating the current values of turnover (which are gross sales that exclude sale taxes and other deductible taxes or shipment when they reflect delivery between establishments in the same enterpirse) with the appropriate price indices. The deflators of retail trade turnover can be the corresponding consumer price indices (CPI). For quarterly accounts, it is preferable to have the data on turnover adjusted for calendar and seasonal variations by applying the appropriate seasonal adjustments methods. The rate of change (or growth) is determined as the percentage change of turnover with respect to the corresponding month of the preceding year (if chain- linked) or a base year. Alternatively, in lieu of the retail trade/wholesale trade turnover index, the volume of turnover, which is based on quantity, may be used.

2.73. In most of the national statistical offices, the retail trade sample surveys are rarely restricted to one standard form, but tend to comprise a combination of forms differentiated by periodicity and major characteristics, namely:

(a) Activity, size, legal form, type of operation and the types of variables covered (turnover, expenditures, employment, other specialized variables);

(b) An occasional extra characteristic, such as the geographical location of the unit, which may influence the contents of a survey.

2.74. The statistical units used in sampling survey are based on ISIC, but the data on goods and services collected should be specified in CPC-based commodities for the estimation of household final consumption.

[20] This part is based on The United Nations *International Recommendations for Distributive Trade Statistics 2008* (IRDTS 2008). http://unstats.un.org/unsd/trade/M89%20EnglishForWeb.pdf.

Table 13 Sources of data and indicators for preliminary estimates of components of household final expenditure when full data are not yet available

Components of household final expenditure	Sources of data or indicators
Food, beverage and tobacco	Retail sales Estimated output of agriculture
Clothing and footwear	Retail sales
Household appliances, articles and equipment	Retail sales. Household appliances, article and equipment can also be estimated from output and allocated to household consumption.
Machinery, equipment and supplies	Retail sales. Transport equipments purchased can be estimated from output and imports and allocated to household consumption.
Personal and other goods	Retail sales
Electricity, gas and water	Administrative records of companies
Telecommunication	Administrative records of companies
Transportation services	Administrative records of large companies, supported by labor in transport in unincorporated enterprises
Trade	Add wholesale and retail trade margins on goods consumed if they are in basic prices, except for production for own use.
Insurance	Administrative records of insurance companies. Output may be estimated by growth in premiums, allocated to households by shares of premiums paid.
Banking	Administrative records of banks or its output extrapolated by loans and deposits, output allocated to households by shares in the sum of loans and deposits.
Other financial services	Survey of financial services or their outputs are extrapolated by employment and other appropriate indicators, allocated to households by employment.
Education and health services	Administrative records or output is extrapolated by quantity indicators such as number of students, patients or revenues deflated by CPI. Allocated to households by benchmark shares.
Personal services	May have to be estimated as a percentage share of all other financial expenditures.
Residential rental /owner-occupied housing	Output - Based on data on benchmark housing stock and survey on rents. Monthly rent can be collected through CPI.

Table 14 ISIC for retail trade survey

"47","Retail trade, except of motor vehicles and motorcycles"

"471","Retail sale in non-specialized stores"

"4711","Retail sale in non-specialized stores with food, beverages or tobacco predominating"

"4719","Other retail sale in non-specialized stores"

"472","Retail sale of food, beverages and tobacco in specialized stores"

"4721","Retail sale of food in specialized stores"

"4722","Retail sale of beverages in specialized stores"

"4723","Retail sale of tobacco products in specialized stores"

"473","Retail sale of automotive fuel in specialized stores"

"4730","Retail sale of automotive fuel in specialized stores"

"474","Retail sale of information and communications equipment in specialized stores"

"4741","Retail sale of computers, peripheral units, software and telecommunications equipment in specialized stores"

"4742","Retail sale of audio and video equipment in specialized stores"

"475","Retail sale of other household equipment in specialized stores"

"4751","Retail sale of textiles in specialized stores"

"4752","Retail sale of hardware, paints and glass in specialized stores"

"4753","Retail sale of carpets, rugs, wall and floor coverings in specialized stores"

"4759","Retail sale of electrical household appliances, furniture, lighting equipment and other household articles in specialized stores"

"476","Retail sale of cultural and recreation goods in specialized stores"

"4761","Retail sale of books, newspapers and stationary in specialized stores"

"4762","Retail sale of music and video recordings in specialized stores"

"4763","Retail sale of sporting equipment in specialized stores"

"4764","Retail sale of games and toys in specialized stores"

"477","Retail sale of other goods in specialized stores"

"4771","Retail sale of clothing, footwear and leather articles in specialized stores"

"4772","Retail sale of pharmaceutical and medical goods, cosmetic and toilet articles in specialized stores"

"4773","Other retail sale of new goods in specialized stores"

"4774","Retail sale of second-hand goods"

"478","Retail sale via stalls and markets"

"4781","Retail sale via stalls and markets of food, beverages and tobacco products"

"4782","Retail sale via stalls and markets of textiles, clothing and footwear"

"4789","Retail sale via stalls and markets of other goods"

"479","Retail trade not in stores, stalls or markets"

"4791","Retail sale via mail order houses or via Internet"

"4799","Other retail sale not in stores, stalls or markets"

——retail sale of any kind of product in any way that is not included in previous classes:

- by direct sales or door-to-door sales persons
- through vending machines etc.

——direct selling of fuel (heating oil, fire wood etc.), delivered directly to the customers
premises

——activities of non-store auctions (retail)

——retail sale by (non-store) commission agents

2.75. In principle, products consumed should be classified using CPC but for the purpose of annual and quarterly GDP compilation, the following aggregated breakdown of the turnover by groups of products could be used instead, as they are readily available in household expenditure surveys or retail sales:

- Food, beverages and tobacco
- Clothing and footwear
- Household appliances, articles and equipment
  - Of which: Furniture
- Machinery, equipment and supplies
  - Of which: Information-processing equipment
  - Of which: Motor vehicles and associated goods
- Personal and other goods
- Construction materials
- Other

C. Estimation of trade and transport margins

2.76. Trade margin as defined in the System of National Accounts is the difference between the price (in basic prices) charged to the consumer and the cost of acquisition in order to replace the goods at the time the goods were sold. Thus, the cost of goods sold recorded in business accounts reflects the book value of the goods, not the replacement value. That cost of goods sold must be adjusted for inflation.

2.77. There are two ways of estimating trade margins. The first one is to measure directly the trade margins which are the output of trading services provided by wholesalers and retailers. One should be reminded that wholesalers and retailers may provide other product outputs, such as transport margins (if they are invoiced separately to the consumers), repair and installation services and also financial services (lending and insurance), etc. These secondary products are not part of trade margins. Thus in the use and supply tables, the wholesaling and retailing activities may be recorded as producing more than trade products.

1. Through measurement of output of wholesaling, retailing and freight transport

2.78. This would require an economic census and regular sampling survey to measure the output of wholesalers and retailers.

2.79. The resulting trade margins will be allocated to the products that are channeled through the distributive trading network. Questionnaire should be designed in such a way to capture the turnover of each commodity and the cost for its replacement. This may not be possible; in general the margin is calculated for each group of commodities of similar nature. It is then allocated proportionally to all consumers. **Wholesaling is allocated to intermediate consumers**

(i.e. enterprises or businesses) and gross capital formation as generally producers buy in large quantity and therefore they can buy directly from wholesalers in order to get discounts. Retailing is allocated to final consumers. It is true that some final consumers may buy from wholesalers, and vice versa enterprises may buy from retailers; thus adjustment may be necessary if data is available.

2.80. Production for own use should not be allocated with any trade and transport margins.

2.81. Transport margins which are used to move commodities by different modes such as rail, truck, water, air, and pipeline are mostly provided by enterprises specializing in a certain type of transport means. These services together with the transport services provided by wholesalers and retailers and invoiced separately to consumers make up trade margins.

2.82. These margin ratios calculated from the benchmark data will be used to estimate margins when data is not available. For annual compilation of GDP, new trade margins based on annual survey should replace the benchmark ones. Estimation will be discussed further in Part D.

2. Through indirect direct measurement of composite margins

2.83. Another method of measuring trade margins is to calculate the percentage difference between the average unit retail price of a given type of product against the unit basic price of the same product. Unit retail prices of products are collected regularly to calculate the consumer price indexes and similarly unit basic prices (at the establishment gate) are also collected regularly by many countries. These prices should exclude all types of sale taxes. These margins may be used to supplement data collected from retailers and wholesalers in order to determine their outputs as discussed in C.III.3.2, in order to obtain trade margins at the detailed level. The difference between the two unit prices consist of all three types of margins: wholesaling, retailing and transport margins. The composite margins calculated this way must be adjusted to guarantee that the total margins are equal to the value of output of wholesaling, retailing services and freight transports. The outputs of these activities should not include other secondary products such repair, installation, passenger transport and financial services).

2.84. For illustration, some trade and transport margins of the US economy and the full but aggregated set of Vietnam trade and transport margins are shown in tables 15 and 16. The US adopts the producers' price system while Vietnam uses the basic price system. Services do not have trade margins.

2.85. In the US, trade and transport margins in 2002 were very high varying from 45% to 158% over the producers' prices. The margins of fresh vegetables and fruits (over 100%) tended to be higher than processed food (about 60%) as the latter can be preserved for longer time. It is also interesting to observe that over 95% of wholesale trade services were provided by wholesale

trade establishments and only 5% were provided by manufacturing industries; and that 96% of retail trade services were provided by retail trade establishments, the rest were provided by other service industries.[21] Thus surveying of trade establishments would provide good indicators for capturing trade margins and the growth of the wholesale and retail trade industries. On average, the ratio of trade margins over the total value of goods was 31% and over all products output was 9.3%. The wholesale and retail industry made up 11.8% of US GDP in 2002.

Table 15. Some US trade and transport margins, 2002[22]

As percentage of producers' prices

	Producers' prices	Trade and transport margins	Transportation costs	Wholesale and retail trade	Purchasers prices
Auto	100%	45%	3%	42%	145%
Tires	100%	158%	2%	156%	258%
Accessories	100%	136%	3%	133%	236%
Furniture	100%	101%	12%	89%	201%
Cereals	100%	63%	3%	60%	163%
Bakeries	100%	61%	2%	59%	161%
Beef & veal	100%	57%	3%	54%	157%
Sea food	100%	62%	3%	59%	161%
Fruits	100%	101%	13%	88%	200%
Vegetables	100%	114%	21%	93%	214%
Processed fruits and vegetables	100%	62%	4%	58%	162%

2.86. In Vietnam, a developing country, trade and transport margins tend to be much lower than in a developed country like the USA. Based on the input-output table for 1996 of Vietnam,[23] most commodities have quite low trade and transport margins. The average trade and transport ratio for Vietnam for goods only was 10%, and for all goods and services 7%. The ones that have higher trade and transport margins like paddy (14%), coffee beans, coal mining (22%), crude oil (20%), etc. are heavy and expensive to transport. On average, the ratio of trade margins over the total value of goods was 9% and over all products output (including both goods and services) was 7.0%. The reason for the overall ratios in USA to be close to those of Vietnam when their trade margin ratios were much larger was due to the fact that the USA has a much larger share of the service industry in the economy which does not require trade and transport margins.

[21] U.S. Bureau for Economic Analysis, 2002 Standard Make and Use Tables at the summary level. http://bea.gov/industry/io_benchmark.htm#2002data

[22] "US Benchmark Input-Output Accounts 2002", *Survey of Current Business*, October 2007, Appendix C. http://www.bea.gov/scb/pdf/2007/10%20October/1007_benchmark_io.pdf

[23] General Statistical Office, Input-Output of Vietnam 1996, Hanoi, Vietnam, 1999.

3. Measurement of transport margins and tax on products

2.87. The measurement of transport margins is different from the measurement of trade margins. They should be the output of transport industry that provides services only for the transportation of goods. They should be assessed by products. The ratios of transport services over the basic value of a commodity are calculated for the benchmark year and used for quarterly or annual estimation of transport service at constant prices.

2.88. Similarly, ratios of taxes on products at the benchmark period are used to calculate taxes on products, except when there are changes in tax rates. In that case, the benchmark tax ratios should be adjusted.

D. Summary on commodity flow method

2.89. The commodity flow table shown in table 16 should be a guide to prepare GDP by final expenditure approach in the benchmark prices (constant prices). The approach follows the following principles:

(1) Build up the supply of products towards domestic uses in purchasers' prices from the domestic production, imports less exports.

- Trade margins, transport margins and taxes on products are estimated using the trade margin ratios, transport margin ratios and taxes ratios on products of the benchmark year. If benchmark ratios are not available, use other estimates which may be based on ratios based on the difference between consumer prices and basic prices collected for price statistics.
- The total values of trade margins, transport margins should be compared and adjusted to the output values of trade services, value of freight transport services output of the accounting year collected through surveys (after being deflated).
- Estimate of product taxes less subsidies should be compared to taxes less subsidies collected by government (after being deflated by CPI).
- Some components may be directly extrapolated by retail trade indexes and or by other surveys or administrative sources.

(2) Allocate the supply of products to various components of final expenditures.

- For every product or group of products, the use of it as intermediate consumption (column 7) is estimated using the use table. Otherwise, expert assessment is needed.
- The rest should be allocated to other uses.

- Table 16 groups similar products together. Most of group 1 (except for fishery) if not going into inventory would go to intermediate consumption of manufacturing industries.
- Food, after deducting its use in intermediate consumption, will mostly go to inventory or household final consumption
- Other non-asset processed goods can go either to intermediate consumption, inventory or household final consumption. Part of the furniture consumed by business must be treated as gross fixed capital formation.
- Machinery and equipment (except for low value small tools) should go to gross fixed capital formation. Here, for transport and other equipments such as personal computers and other durable goods, those that are purchased by households should be treated as household final consumption.
- Construction, except small repairs, should go to gross fixed capital formation.
- Output of general government services should go to final consumption of government, except for very small amount of fees paid by business and households.
- Output of NIPSIH is treated similarly to output of general government.
- Research and development should go to gross fixed capital formation.
- Other services after deducting those consumed as intermediate consumption by industries (including general government and NPISH) should go to household final consumption.

(3) For GDP at current prices, components of household final expenditures may be inflated back by appropriate consumer price indexes, gross capital formation and inventories are inflated by basic price indexes (i.e. producer prices indexes). Exports and imports in current prices are their original prices.

Table 16. I-O 1996 Vietnam[24]

	Output in purchasers' prices	Output in producer prices	Output in basic prices	Imports	Output in basic prices + imports	TTM	Taxes	TTM ratios	Tax rates
Crops	81,720,528	72,997,974	70,203,836	10,620,218	80,824,054	8,722,554	2,794,138	11%	3%
Animal husbandry	21,575,982	20,751,664	20,700,927	6,272	20,707,199	824,318	50,737	4%	0%
Forestry	6,358,471	5,886,811	5,146,064	597,151	5,743,215	471,660	740,747	8%	13%
Fishery	18,067,758	16,623,520	15,990,483	14,404	16,004,887	1,444,238	633,037	9%	4%
Coal mining	4,799,625	3,941,313	3,781,956	178,279	3,960,235	858,312	159,357	22%	4%
Crude oil, natural gas	17,275,519	15,002,428	11,431,849	220,756	11,652,605	2,273,091	3,570,579	20%	31%
Other mining	8,225,248	7,720,049	7,415,992	125,747	7,541,739	505,199	304,057	7%	4%
Processed food	89,169,988	82,594,511	78,226,029	7,292,797	85,518,826	6,575,477	4,368,482	8%	5%
Glass, glass products and ceramics	1,632,903	1,492,544	1,390,259	1,277,797	2,668,056	140,359	102,285	5%	4%
Wood and construction materials	38,008,113	31,597,430	30,081,220	6,631,949	36,713,169	6,410,683	1,516,210	17%	4%
Chemicals, fertilizers and medicinal	16,836,660	12,914,168	12,292,204	25,762,279	38,054,483	3,922,492	621,964	10%	2%
Processed rubber and by products	1,378,286	1,051,464	962,219	1,488,110	2,450,329	326,822	89,245	13%	4%
Machinery, tools and metal products	35,499,840	29,076,749	27,942,483	57,417,353	85,359,836	6,423,091	1,134,266	8%	1%
Textiles and leather products	33,679,114	29,409,232	28,446,342	11,140,919	39,587,261	4,269,882	962,890	11%	2%
Printed materials except products of publishing	1,882,121	1,821,187	1,713,644	76,060	1,789,704	60,934	107,543	3%	6%
Products of publishing houses (newspapers, periodicals and books)	1,338,942	1,225,605	1,097,193	8,026	1,105,219	113,337	128,412	10%	12%
Gasoline and lubricants	516,080	213,470	210,624	13,448,001	13,658,625	656,787	2,846	5%	0%
Services	218,137,609	218,136,446	205,244,766	15,419,058	220,663,824	1,163	12,891,680	0%	6%
ALL COMMODITIES	**596,102,787**	**552,456,565**	**522,278,090**	**151,725,176**	**674,003,266**	**44,000,399**	**30,178,475**	**7%**	**4%**
GOODS ONLY	**377,965,178**	**334,320,119**	**317,033,324**	**136,306,118**	**453,339,442**	**43,999,236**	**17,286,795**	**10%**	**4%**

[24] General Statistical Office, *Input-Output of Vietnam* 1996, Hanoi, Vietnam, 1999.

Table 17. Commodity flow table

	Output in basic prices	Plus Imports	Less Exports	Trade margins	Product taxes	Supply to domestic uses in purchasers' prices	IC	GFCF	INV	HHFC	GFC	NPISH FC	Domestic uses in purchasers' prices
							In purchasers' prices						
	(1)	(2)	(3)	(4)	(5)	(6) =1+..+5	(7)	(8)	(9)	(10)	(11)	(12)	(13)=7+..+12
Group 1: raw materials													
Crop and animal products													
Forestry and logging products													
Fishery products													
Ores and minerals													
Group 2: processed non-asset goods													
Electricity, gas and water													
Food products													
Beverages													
Tobacco products													
Yarn, thread and textile materials													
Textile articles and apparels													
Leather products and footwear													
Product of woods and straw													
Paper products, printed materials													
Refined petroleum													
Basic chemicals and other chemicals													
Rubber and plastic products													
Glass products													
Furniture													
Basic metals and metallic products, except machine													
Group 3: Asset products													

	Output in basic prices	Plus Imports	Less Exports	Trade margins	Product taxes	Supply to domestic uses in purchasers ' prices	IC	GFCF	INV	HHFC	GFC	NPISH FC	Domestic uses in purchasers' prices
							In purchasers' prices						
	(1)	(2)	(3)	(4)	(5)	(6) =1+..+5	(7)	(8)	(9)	(10)	(11)	(12)	(13)=7+..+12
Machinery and equipment													
Construction													
Group 4: Services													
Wholesale, retail trade													
Transportation													
Postal and telecommunication													
Research and development													
Financial, real estate, rental and leasing													
Business services and production services													
Community ,social and personal services													

Notes:

IC: intermediate consumption
GFCF: Gross fixed capital formation
INV: Changes in inventories
HHFC: Household final consumption
GFC: Government final consumption
NPISH FC: NPISH final consumption.

Appendix 1

Consumer expenditure survey in the United States of America

The consumer expenditure survey in the United States of America is carried out annually by the Bureau of Labor Statistics on behalf of the Bureau of Census. This extraction of relevant information from the section Frequently Asked Questions *would provide some basic understanding of the consumer or household survey.* [25]

What is the Consumer Expenditure Survey?

The Consumer Expenditure Survey collects information from the Nation's households and families on their buying habits (expenditures), income, and household characteristics. The strength of the survey is that it allows data users to relate the expenditures and income of consumers to the characteristics of those consumers. The survey consists of two components, a quarterly Interview Survey and a weekly Diary Survey, each with its own questionnaire and sample.

How is the Consumer Expenditure Survey used?

Data from the Consumer Expenditure Survey are used in a number of different ways by a variety of users. One important use of the survey is for the periodic revision of the Bureau of Labor Statistics Consumer Price Index (CPI). The Bureau uses survey results to select new market baskets of goods and services for the CPI, to determine the relative importance of CPI components, and to derive new cost weights for the market baskets. Market researchers find the data useful in analyzing the demand for groups of goods and services. The data allow them to track spending trends of different types of consumer units (See the response to question 3 for the definition of a consumer unit). Government and private agencies use the data to study the welfare of particular segments of the population, such as those consumer units with a reference person aged 65 and older or under age 25, or for low-income consumer units (See the response to question 4 for the definition of a reference person). Economic policymakers use the data to study the impact of policy changes on the welfare of different socioeconomic groups. Researchers use the data in a variety of studies, including those that focus on the spending behavior of different family types, trends in expenditures on various expenditure components including new types of goods and services, gift-giving behavior, consumption studies, and historical spending trends.

What is a consumer unit?

A consumer unit consists of any of the following: (1) All members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their incomes to make joint expenditure decisions. Financial independence is determined by spending behavior with regard to the three major expense categories: Housing, food, and other living expenses. To be considered financially

[25] http://www.bls.gov/cex/faq.htm#q2

independent, the respondent must provide at least two of the three major expenditure categories, either entirely or in part.

The terms consumer unit, family, and household are often used interchangeably for convenience. However, the proper technical term for purposes of the Consumer Expenditure Survey is consumer unit.

Who is the reference person?

The reference person of the consumer unit is the first member mentioned by the respondent when asked to "Start with the name of the person or one of the persons who owns or rents the home." It is with respect to this person that the relationship of the other consumer unit members is determined.

What types of data are available and in what form?

A number of types of data, in several different formats, are available from the Consumer Expenditure Survey. The standard data releases include the following:

NEWS RELEASE. This annual release consists of a brief discussion of the latest survey results. The information generally is available on the Consumer Expenditure Survey Web site on the day on which the annual data are released. The annual data usually are released late in the year following the reference year (for example, 2002 data will be available late in 2003).

ANNUAL REPORT. The report includes integrated data from the Diary and Interview portions of the Consumer Expenditure Survey in ten standard tables. The tables show average expenditures, income, and characteristics for consumer units classified by 13 standard characteristics—quintiles of income, before-tax income class, age, size of the consumer unit, composition of the consumer unit, number of earners, housing tenure, race, type of area (urban or rural), Hispanic origin of reference person, region, occupation, and education.

TWO-YEAR REPORTS. Two separate reports are published in alternating years.

Biennial Report – This report includes integrated survey data and is published at 2-year intervals. The tables included in the biennial report cover the same characteristics that are shown in the annual report, but with additional detail. Also included are tables showing average annual data over a 2-year period for the following characteristics: Income before taxes cross-tabulated by either age, consumer unit size, or region; single consumers by gender cross-tabulated by either income or age; and selected Metropolitan Statistical Areas. The biennial report also compares survey data with other data sources.

Anthology – This report includes both methodological and analytical articles. The methodological articles are intended to provide data users with greater insight into ongoing improvements in the survey as well as issues that are faced in collecting, processing, and publishing information from such a complex survey. The analytical articles provide information on topics of interest using Consumer Expenditure Survey data.

MONTHLY LABOR REVIEW AND OTHER JOURNAL ARTICLES. Analyses of Consumer Expenditure Survey data appear frequently in articles in the Bureau's Monthly Labor Review and occasionally in other economic journals.

Does the Consumer Expenditure Survey include information on assets and liabilities?

Information on assets and liabilities is collected from respondents to the survey; however, like the income data, the assets and liabilities data are not as reliable as the expenditure data. Respondents may be unable or unwilling to provide accurate information on their assets and liabilities. Net changes in assets and liabilities are published in the Consumer Expenditure Survey biennial reports. The public-use CD-ROMs also include information on assets and liabilities. An alternative source of data on assets, liabilities, and other financial information of consumers is the Survey of Consumer Finances, conducted by the Federal Reserve Board. For information, visit the Web site at www.federalreserve.gov/pubs/oss/oss2/scfindex.html.

Are historical data from the Consumer Expenditure Survey available?

Yes. Prior to 1980, the Consumer Expenditure Survey was conducted about every 10 years. Since that time, it has been an ongoing survey. Data are available from both the pre-1980 and later surveys. For information about the availability of any Consumer Expenditure Survey data, including historical data.

Caution should be used in comparing data from the current survey with those gathered during pre-1980 surveys, or even during the first few years of the current survey, due to changes in concepts and definitions. For example, integrated data from the Diary and Interview Surveys have been published from 1984 onward; prior to 1984, data from each survey were published separately. Also prior to 1984, published data covered only the urban portion of the population. Beginning in 1984, the published data are for the total population, urban and rural.

How are the Consumer Expenditure Survey data collected?

Data collection is carried out by the U.S. Census Bureau under contract with Bureau of Labor Statistics. In the Interview Survey, each consumer unit is interviewed every 3 months over five calendar quarters. In the initial interview, information is collected on demographic and family characteristics and on the consumer unit’s inventory of major durable goods. Expenditure information also is collected in this interview, but is used only to prevent duplicate reporting in subsequent interviews. Expenditure information is collected in the second through the fifth interviews using uniform questionnaires. Income and employment information is collected in the second and fifth interviews. In the fifth interview, a supplemental section is administered in order to account for changes in assets and liabilities over a one-year period.

In the Diary Survey, respondents are asked to keep track of all their purchases made each day for two consecutive 1-week periods. Participants receive each weekly diary during a separate visit by a Census Bureau interviewer.

How do the Census Bureau and BLS handle respondent confidentiality?

The information that respondents provide is used solely for statistical purposes. All Census Bureau data collectors take an oath of confidentiality and are subject to fines or imprisonment for improperly disclosing information provided by respondents. Names and addresses are removed from all forms, and are not included in any statistical release. As a further precaution, the Bureau of Labor Statistics applies certain restrictions to the microdata shown on the public-use CD-ROMs. These include geographical and value restrictions that prevent the identification of respondents.

Why are there two survey components?

The two survey components—the Interview Survey and the Diary Survey—are designed to collect different types of expenditures. The Interview Survey is designed to obtain data on the types of expenditures respondents can recall for a period of 3 months or longer. These include relatively large expenditures, such as those for property, automobiles, and major durable goods, and those that occur on a regular basis, such as rent or utilities. Each consumer unit is interviewed once per quarter for five consecutive quarters. The Diary Survey is designed to obtain data on frequently purchased smaller items, including food and beverages, both at home and in food establishments, housekeeping supplies, tobacco, nonprescription drugs, and personal care products and services. Each consumer unit records its expenditures in a diary for two consecutive 1-week periods. Respondents are less likely to recall such purchases over longer periods. Although the diary was designed to collect information on expenditures that could not be easily recalled over time, respondents are asked to report *all* expenses (except overnight travel) that the consumer unit incurs during the survey week.

What are some of the limitations of the data?

The Interview and Diary Surveys are sample surveys and are subject to two types of errors, nonsampling and sampling. Nonsampling errors can be attributed to many sources, such as differences in the interpretation of questions, inability or unwillingness of the respondent to provide correct information, mistakes in recording or coding the data obtained, and other errors of collection, response, processing, coverage, and estimation for missing data. The full extent of nonsampling error is unknown. Sampling errors occur because the survey data are collected from a sample and not from the entire population. Tables with standard errors and other reliability statistics are available on request. Standard error tables are available on the Consumer Expenditure Survey Web site; these tables are classified by the same demographic characteristics found in the 10 "standard" tables published for the survey, except for the classification by region.

Caution should be used in interpreting the expenditure data, especially when relating averages to individual circumstances. The data shown in the published tables are averages for demographic groups of consumer units. Expenditures by individual consumer units may differ from the average even if the characteristics of the group are similar to those of the individual consumer unit. Income, family size, age of family members, geographic location, and individual tastes and preferences all influence expenditures.

Do the data that are published come from both surveys?

Yes. Since 1984, the Bureau of Labor Statistics has published data integrated from the Interview and Diary components of the survey. Because the two components are designed to capture different types of expenditures, integrating data from them combines the important features of both. The integrated data provide a complete accounting of consumer expenditures and income, which neither survey component alone is designed to do.

How are the data integrated?

Detailed expenditure data for some items, such as food items, are unique to the Diary Survey. Data for other items, such as third-party reimbursements for medical care expenses or the cost of auto repairs, are collected only in the Interview Survey. However, there is considerable overlap in coverage between the surveys. Because of this overlap, integrating the data presents the problem of determining the appropriate survey component from which to select the expenditure items. When data are available from both survey sources, the more reliable of the two, as determined by statistical methods, is selected. As a result, some estimates are selected from the Interview Survey and others, from the Diary Survey.

What are the standard errors as reported in the Consumer Expenditure Survey standard error tables?

Sampling error is the difference between the survey estimate and the true population value. The most common measure of the magnitude of sampling error is the standard error. The primary purpose of standard errors is to provide users with a measure of the variability associated with the mean estimates. This variability measures how close different estimates would be to each other if it were possible to repeat the Consumer Expenditure Survey over and over using different samples of consumer units. A small standard error indicates that multiple samples would produce values that are consistently very close to each other, whereas a large standard error would indicate that multiple samples would produce values that are not close to each other.

Beginning with year 2000 data, the Consumer Expenditure Survey program has made available standard error tables using integrated data from both surveys. These standard error tables correspond to the program's standard tables, except for the classification by region, population size of area of residence, and selected age, and are available on the Consumer Expenditure Survey Web site.

Do the data show cost-of-living differences among areas?

No. The Consumer Expenditure Survey data in published tables show average expenditures and incomes of consumer units. The expenditure levels may vary across areas for a number of reasons. These include demographic and economic differences in age levels, income levels, size of consumer units, tastes, and personal preferences. A commonly used method of comparing the cost of living among areas involves developing an estimate of the cost of a similar bundle of goods and services for each area. The Consumer Expenditure Survey makes no attempt to

measure the cost of a standard bundle of goods and services, but instead provides actual expenditure levels of consumer units.

Why do some expenditure levels, such as those for vehicle purchases, appear to be so low?

The data shown in the published tables are averages for all consumer units, or for all the consumer units in a particular demographic group. For example, the expenditures, income, and characteristics for the group with a reference person under age 25 are averaged across all consumer units with that characteristic. Because not all consumer units purchase each item during the survey period, the average expenditure for an item is generally considerably lower than the expenditure by those consumer units that purchased that item. The less frequently an item is purchased, the greater the difference between the average for all consumer units and the average for those purchasing the item.

Are reimbursed expenditures, such as those for medical expenses or car repairs, included in the published totals?

No. Expenditures shown in the published tables are direct out-of-pocket expenditures. The amounts are net of reimbursements.

Why do average annual expenditures exceed income for some of the demographic groups? How can consumer units spend more than they earn?

Data users may notice that average annual expenditures presented in the income tables sometimes exceed income before taxes for the lower income groups. For data prior to 2004, the primary reason for that is believed to be nonresponse to questions about income, a common problem in household surveys. The average incomes shown in the published tables for 2003 and earlier are derived from information provided by complete income reporters (consumer units that provide information for at least one of the major sources of their income, such as wages and salaries, self-employment income, or retirement income). However, even complete income reporters may not have provided a full accounting of all income from all sources. Research has shown that some complete reporter consumer units classified in the lower income classes have expenditure levels that are more typical of upper income consumer units. Their expenditures raise the average expenditure levels of the income class in which they are classified.

Beginning in 2001 for the Interview Survey and 2004 for the Diary Survey, the income data include information collected from respondents using income ranges or brackets—for example $2,000-$2,499—in addition to discrete income amounts, as provided in the past. Respondents who are unable or unwilling to provide a specific dollar amount may be able or willing to estimate a range for their incomes. The use of bracketing in data collection provides more reliable income estimates to the extent that it increases the percentage of households providing income data.

In addition, starting in 2004, the Consumer Expenditure Survey uses imputation to fill in missing values for income data. The published tables now include income data from all consumer units—

not just complete reporters. Income imputation has reduced the gap between income and expenditures when negative, and increased it when positive. For example, in 2003 (the last year prior to imputation), expenditures exceed income on average for all complete reporters who report less than $40,000 in income. In 2004, expenditures exceed income on average for all consumer units for whom less than $30,000 is reported or imputed. Similarly, in 2003, income exceeds expenditures for total complete reporters by less than $8,400; in 2004, income exceeds expenditures for all consumer units by more than $11,000.

However, there are reasons why expenditures exceed income for the lower income groups despite the use of imputed income data. Consumer units whose members experience a spell of unemployment may draw on their savings to maintain their expenditures. Self-employed consumers may experience business losses that result in low or even negative incomes, but are able to maintain their expenditures by borrowing or relying on savings. Students may get by on loans while they are in school, and retirees may rely on savings and investments.