

Session 3 Supply, Use and Input-Output Tables

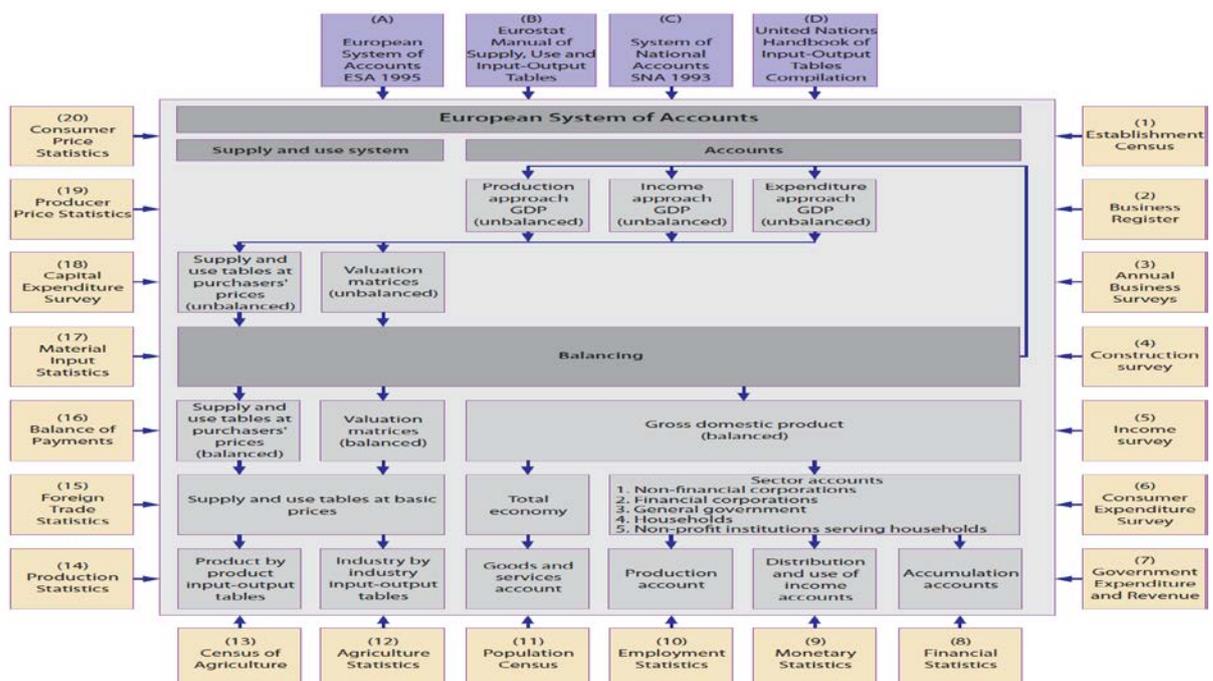
Supply and Use Tables as an Integral Part of the Compilation of National Accounts

The recommendations for compiling SUT as an integral part in the production of national accounts can be formulated in general terms as follows:

- Supply and use tables are the most efficient way to incorporate all basic data – aggregated or detailed – into the national accounts framework in a systematic way.
- Supply and use tables effectively ensure the consistency of results at a detailed level and thereby improve the overall quality of the national accounts.
- The SUTs framework provides the natural statistical framework to include the components of the production, income and expenditure approaches to measuring GDP, thereby enabling a coherent and balanced estimate of GDP both in current prices and constant prices to be achieved.
- The balanced SUTs provide consistency and coherency between the first three accounts of the National Accounts framework: Goods and Services Account; Production Accounts by industry and sector; and Generation of Income Accounts by industry and sector.

Compilation of National Accounts

Basic sources used to compile National Accounts:



There are several basic sources that are used to compile the national accounts.

- In general, a mixture of administrative records and statistical surveys is used as sources for the national accounts. The sample frame for the main surveys is determined by an Establishment Census or the Business Register.
- The Business Register is an important instrument of the statistical system. It comprises in principle all production units, listing names and addresses of all financial and non-financial corporations operating in the economy.

The approaches of calculating GDP

- The annual estimates of gross domestic product (GDP) are obtained from the production, income and expenditure approaches and reconciled using supply and use tables.
- **Production Approach:**
- The production approach is used to compute value added for all industries. This is done on an annual basis within the framework of detailed supply and use tables.
- The main classification schemes used are the activity classification based on NACE and the product classification based on CPA.
- In the production approach the following information on GDP is collected:

Total output at basic prices	Total output at basic prices
- Intermediate consumption at purchasers' prices	- Intermediate consumption at basic prices
= Gross value added at basic prices	= Gross domestic product
+ Taxes on products	- Taxes on products
- Subsidies on products	+ Subsidies on products
= Gross domestic product at market prices	= Gross value added at basic prices

- The major sources for the production approach are annual business surveys collecting data covering sales, purchases, inventories, gross fixed capital formation, employment costs etc.
- The survey data are supplemented by a number of other sources, notably agricultural data and general government non-market data.
- From the point of view of production, gross domestic product at market prices is at best estimated with reference to annually compiled supply and use tables both in current prices and in prices of the previous year. Tables are compiled in previous year's prices in order to achieve an accurate breakdown of value changes in subsequent years according to volume and price changes.
- The base-year table provides the specific weights for each industry and product, used in the index formulae by which the price data are aggregated.

- The great statistical benefit of a system based on prices of the previous year is the fact that the weights in the index formulae are always up-to-date, thus reflecting the structure of the recent past.
- The distinction between market and other non-market producers is important for the determinants of both output and value added.
- The output of market producers is determined from the revenue side. However, the output of nonmarket producers is calculated as the costs of all inputs including labour cost and capital consumption.
- In this case, the net operating surplus of non-market producers is by definition assumed to be zero.
- Consequently, the output value of non-market producers is equivalent to the sum of intermediate inputs, compensation of employees, other net taxes on production and consumption of fixed capital.
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Three ways of valuation are applied for domestically produced goods and services, namely basic prices, producers' prices and purchasers' prices.

- The basic price is the amount actually realised by the producer.
- This amount frequently differs from the price the producer must charge in form of a producers' price, since he has also to take into account taxes on products (such as non-deductible VAT, mineral oil tax, tobacco tax and other excise duties) and subsidies on products
- The purchasers' price, the price paid by the customer, equals the producers' prices (net of all VAT) plus non-deductible VAT and trade and transport margins in connection with the product in question.
- For imported goods two ways of valuation are of interest: namely the purchasers' price and the CIF price (cost, insurance and freight).
- The difference consists of taxes on products, including import duties less subsidies on products, transport margins on the domestic territory, trade margins and VAT.
- In national accounts, taxes on production and taxes on products are defined in the following way:
Taxes less subsidies on products

+ other net taxes on production

= Taxes on production and imports less subsidies.

- Taxes on products include in particular value added taxes, taxes and duties on imports, and taxes on products such as stamp taxes on the sale of petrol, diesel, alcoholic beverages and tobacco.
- Subsidies on products include import subsidies and other subsidies on products.
- Other taxes on production consist of all taxes that enterprises incur as a result of engaging in production, independently of the quantity or value of the goods and services produced or sold.
- In the use table, transactions are recorded at purchasers' prices. In the supply table, domestic production is recorded at
- basic prices and imports at CIF prices. Therefore, additional columns have to be included in the supply table in order to fill the valuation gap. The columns of the valuation matrices refer to trade margins, transport margins, taxes on products and subsidies on products.
- The additional columns in the supply table are derived from full size valuation matrices reflecting margins, taxes and subsidies by product for all industries and the categories of final demand. (ex: Box 3.1)

Income Approach

- The compilation of gross domestic product with reference to the income approach involves its estimation as the sum of the different components of value added, namely taxes and subsidies on products, compensation of employees, other net taxes on production and gross operating surplus.
- While the Production approach is by industry and by sector, the income approach is by industry, by sector and by type of income.
- The income approach adds up all income earned by resident individuals or corporations in the production of goods and services.
- Compensation of employees is estimated by industry and by sector, using business survey data, administrative data and labour accounts data, as appropriate.
- For the government sector and financial corporations, compensation of employees is initially estimated on the sector level and converted to the corresponding industries afterwards.
- For non-financial enterprises, households and NPISH, the estimates are based on the labour accounts data at industry level.
- Other taxes and subsidies on production are based on government information and then broken down to industries and institutional sectors.
- Gross operating surplus is estimated on an industry level as residual variable (output less intermediates).
- However the gross operating surplus of the government and NPISH sectors includes only consumption of fixed capital.

- Consumption of fixed capital has to be estimated from cumulative investment of the past by applying the perpetual-inventory-method (PIM) according to the actual use of capital goods.
- In the household sector, mixed income of self-employed and operating surplus have to be estimated by means of the production approach by identifying production levels and costs.
- Some countries give a breakdown of gross operating surplus, such as profits, rentals and other types of factor incomes.

Expenditure Approach

- The expenditure approach is used for computing government final consumption expenditure based on government accounts and for exports and imports of goods and services based on foreign trade statistics and balance of payments statistics.
- The expenditure approach is also used as a main method in computing household final consumption expenditure and gross fixed capital formation.
- The following information on GDP is collected in the expenditure approach:

Household final consumption expenditure

+ NPISH final consumption expenditure

+ Government final consumption expenditure

+ Gross fixed capital formation

+ Changes in inventories

+ Acquisitions less disposals of valuables

+ Exports of goods and services

- Imports of goods and services

= Gross domestic product at market prices

Compilation begins with the quarterly economic accounts and the production of first unbalanced estimates of GDP with its production income and expenditure components.

Final consumption expenditure by households:

- An important task of the expenditure approach is to estimate a matrix for final consumption expenditure by households reflecting the main consumption activities of private households.
- The result is a supplementary matrix with products (CPA) in the rows and the main categories of the Classification of individual consumption by purpose (COICOP) in the columns.
- The main data for this compilation are extracted from consumer expenditure surveys.

Final consumption expenditure by government

- A second task is the compilation of a matrix for expenditure of general government by products (CPA) and by main functions of the government (COFOG).

- The information for final consumption expenditure by government is extracted from the government accounts. It comprises the purchase of goods and services from industries, compensation of employees, consumption of fixed capital of government institutions less government sales and revenues.
- For compilation, balancing and publication of results government can be split into further categories, for example central government and local government.

Gross fixed capital formation

- The third task is the compilation of an investment matrix with a cross-classification of gross fixed capital formation by industry (NACE) and non-financial assets in form of buildings, machinery and transport equipment.
- The main source will be the Capital Expenditure Survey which is addressed to investors.

Exports and imports of goods and services

- Various sources are available for estimating exports and imports of goods and services.
- They include foreign trade statistics, production statistics, balance of payments statistics and other internal or external sources.
- Imports and exports of goods are mainly based on foreign trade statistics collecting the information on third-country trade from customs forms and intra-EU surveys on trade.

Data sources

- The following list of main sources for the implementation of the production, income and expenditure approaches is not exhaustive but comprehensive.
- It may cover monthly, quarterly and annual sources.

Classifications

- Statistical classification of economic activities in the European Community (NACE)
- Statistical classification of products by activity in the European Community (CPA)
- Classification of individual consumption by purpose (COICOP)
- Classification of the functions of the government (COFOG)
- Institutional sectors, e.g. non-financial corporations, general government, households, etc.

Registers

- Business Register

Data for production approach

- Agriculture statistics
- Annual business surveys (manufacturing industries)

- Annual business surveys covering all industries including service industries
- Construction survey
- Production statistics (PRODCOM)
- Government and financial institutions
- Annual purchases inquiry – collecting intermediate input detail as well as product margins
- Service sector statistics

Data for income approach

- Income statistics
- Employment statistics
- Government expenditure and revenues
- Tax statistics
- Profit surveys

Data for expenditure approach

- Household survey of consumer expenditure
- Budget survey
- Investment survey
- Foreign trade statistics
- Balance of payments
- Foreign trade statistics including Intrastat
- International Trade in Services surveys
- International Passenger Survey

Other data sources

- Consumer price statistics
- Producers' price statistics
- Import price statistics
- Export price statistics
- Company annual report and accounts
- Company financial web-sites
- VAT paid and VAT turnover detail

- Regulatory Accounts
- Trade Associations

Relationship between Supply and Use Tables and National Accounts Aggregates

- The main tool to balance the three independently produced GDP estimates are annual supply and use tables at current prices and at constant prices.
- The process of balancing these supply and use tables and GDP estimates involves a number of steps.
- These may start as independent steps or be linked with each other culminating in an iterative process with consistent estimates of GDP from all three perspectives.
- In general, most macroeconomic data of the national accounts are based on observed survey data and annual reports.
- When no such data are available, use is made of indirect estimations methods or extrapolated base-year estimates applying a combination of volume and price indicators.

Classification of products and industries in empirical tables:

No.	Reference CPA 2002	Description	Products (short term)
1	A + B	Products of agriculture, hunting and forestry; fish + other fishing products	Products of agriculture
2	C + D + E	Products from mining and quarrying, manufactured products; energy products, gas, water	Products of industry
3	F	Construction work	Construction work
4	G + H + I	Wholesale and retail trade, repair services, hotel and restaurant services, transport and communication services	Trade, hotel, transport services
5	J + K	Financial intermediation services, real estate, renting and business services	Financial, real estate, business services
6	L to P	Other services	Other services

Industries (A6)

No.	Reference NACE rev.1.1	Description	Industries (short term)
1	A + B	Agriculture, hunting and forestry; fishing	Agriculture
2	C + D + E	Mining and quarrying, manufacturing, energy, gas and water supply	Industry
3	F	Construction	Construction
4	G + H + I	Wholesale and retail trade; repair of motor vehicles and household goods, hotels and restaurants; transport and communication	Trade, hotel, transport
5	J + K	Financial intermediation, real estate, renting and business activities	Finance, real estate, business activities
6	L to P	Other service activities	Other service activities

- The first step in the balancing procedure is to balance supply and use of goods and services.
- The CPA comprises approximately 3,150 products.
- Ideally each product should be balanced in terms of supply and demand in the system of national accounts. Table in the next slide demonstrates which information is required to balance supply and use of goods and services at purchasers' prices.
- For each product total supply is estimated from total output at basic prices, imports CIF and the corresponding trade and transport margins and the net taxes on the specific product.
- On the use side, total use is allocated to the various categories of final demand.
- Remaining differences have to be allocated to supply and use or vice versa. (example 3.1)

Balancing Supply and Use of Products

CATEGORIES			SUPPLY								USE									
			Output at basic prices	Intra EU imports CIF	Extra EU imports CIF	Trade margins	Transport margins	Taxes on products	Subsidies on products	Supply at purchasers' prices	Intermediate consumption	Final consumption expenditure by households	Final consumption expenditure by non-profit institutions	Final consumption expenditure by government	Gross fixed capital formation	Changes in valuables	Changes in inventories	Exports intra EU FOB	Exports extra EU FOB	Total use at purchasers' prices
PRODUCTS (CPA)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	11111	Durum wheat																		
2	11112	Wheat, except durum wheat																		
3	11220	Maize																		
:	:	:																		
:	:	:																		
3150	981010	Undiff. goods produced by private households																		
3151	98210	Undiff. services produced by private households																		
3152	990010	Services provided by extra-territorial organisations																		
		Total																		

The final balancing of the supply and use system is an iterative procedure addressing row imbalances, then column imbalances, then row imbalances, and again column imbalances until the following goals are achieved:

- For each product total supply = total demand
- For each industry total inputs = total outputs
- For gross value added of each industry production approach = income approach

Methodological advantages of supply and use tables as an integral part of the compilation of national accounts

1. Supply and use tables offer an ideal framework for the integration of the various approaches to calculate GDP. In particular the equality between supply and use at the level of individual products ensures a strong integration of the system of accounts.
2. Sometimes it is almost impossible to know which macroeconomic aggregates can be adjusted if statistical discrepancies are observed between independently determined supply and use levels of goods and services. The study of the supply and use system on the detailed product level is a powerful means of identifying the areas for adjustments.
3. Supply and use tables enable an efficient confrontation of different primary sources. Inconsistencies between the different primary sources can be detected in many cases by incorporating detailed information from primary sources into a common framework. The approach provides a firm ground for making appropriate corrections of the information from primary sources.

4. In cases where statistical information is missing for certain transactions (for example for gross fixed capital formation or for private consumption), alternative estimates can be made in a transparent way using the framework of supply and use tables. This is not an ideal situation because it weakens the restrictions built into the framework, but it allows the national accounts to be compiled even in situations where the statistical sources are incomplete or contradicting.
5. Supply and use tables contain the full framework for establishing the connection between the various valuation concepts in national accounts. It involves the distribution of margins, taxes and subsidies on products for the transformation from basic prices to producers' prices and finally to purchasers' prices.
6. Detailed supply and use tables also offer the best framework for the calculation of GDP in constant prices. It is the ideal framework for deflating macroeconomic data. One of the central recommendations in the "Handbook on price and volume measures" is indeed to use the supply and use framework for constant price calculations.
7. Supply and use tables at basic prices are the basis for the construction of symmetric input-output tables. Input output tables and less often supply and use tables are often used in the database of macroeconomic models with sector disaggregation.