

Training workshop for COSIT, Iraq
Compilation of Constant-price Estimates of National Accounts
- at National and Regional Levels
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Handout-3: Output at Constant Prices – Prescribed Methods

The output is measured directly from the amount of goods and services produced or indirectly from inputs that are used for their production.

The value of output, as defined in 1993 SNA, includes value of goods and services:

1. sold (at economically significant prices);
2. 'finished' and 'work-in-progress' entered (*minus* exited) into the producer's inventories;
3. supplied to other establishments belonging to the same enterprise for its use;
4. retained by their owners for own final consumption or own gross fixed capital formation;
5. supplied free, or sold at prices that are not economically significant to other institutional units;
6. provided to their employees as compensation in kind or used for other payments in kind; and
7. bartered in exchange for other goods, services or assets.

Categories 1, 2, 3, 6 and 7 constitute the 'Market output' (P.11);

Category 4 is 'Output for own final use' (P.12) and

Category 5 is 'Other non-market output' (P.13).

'Market Output' and 'Output for Own Final Use'

According to 1993 SNA, output for own final use is valued at the basic prices of similar products sold on the market. Thus 'market output' and 'output for own final use' are valued at same prices both for compiling estimates at current and constant prices. Thus these are dealt with together.

The EUROSTAT *Handbook on price and volume measures in national accounts*(2001) classifies methods of estimating output at constant prices into three categories: A, B and C. It recommends 'A' methods for each industry as conceptually the best method and considers the 'C' methods as undesirable. The *Handbook* classifies the methods for 'market output' as follows:

- "A method": Deflating the 'market output' at current prices, by an appropriate set of price indices
OR
volume measures, with detailed breakdown by type of commodity ensuring reasonable homogeneity, when there is very little change in quality.
- "B method": Turnover deflated by a less appropriate deflator
OR
volume measures, in general.
- "C method": Use of all other indicators, including 'Input' indicators.

The A/B/C methods, as designated by the *Handbook*, for estimating output by product for the goods producing industrial sectors (ISIC sections 'A' to 'F') are summarized in Table 3.1

Table 3.1 :A/B/C Methods for Output by Products (ISIC Sections – A to F)

ISIC code	‘A’ Method	‘B’ Method	‘C’ Method
A & B	Valuation at base-year prices, at the greatest level of detail to ensure entirely homogenous products.	Compilation at levels that only ensure approximate ‘quality’ homogeneity.	All other methods not taking quality into account or based entirely on inputs.
C	a. Quality-wise volume data of major products valued at base-year prices; <u>OR</u> b. Deflation by detailed and quality-adjusted PPI; <u>OR</u> c. Deflation by UVI for nearly homogenous products.	a. Quality-wise volume data not available; <u>OR</u> b. Deflation by quality un-adjusted PPI; <u>OR</u>	All other methods
D	a. Deflation by detailed and quality-adjusted PPI; OR b. Deflation by quantity index, where quality standards ensure homogeneity.	a. Deflation by detailed CPI adjusted to basic prices; OR b. Deflation by less appropriate PPI.	a. Any method based on input costs; OR b. Deflation by unrepresentative price index
Specific Manufactured Product:			
<u>Large Equipment Goods / Unique Products</u>			
	a. Based on “model pricing” – with updated & representative output-based models; OR b. Based on “specification pricing”.	Use of international prices (adjusted for exchange rate movements)	a. Any method based on input costs; OR b. Use of unadjusted quality indicators; OR c. Deflation by UVI.
<u>Computers</u>			
	a. Deflation by detailed and quality-adjusted PPI (using “Hedonic” method – most preferred, “re-sampling”, “option prices”); OR b. Deflation by PI based on list prices for home computers.	a. Deflation by less appropriate PPI; OR b. International price index (say that in US) if found sufficiently representative for domestic economy. It has to be adjusted for exchange rate changes.	Proxy methods, such as price indexes for electronic products.
<u>E: Production</u>			
	a. Deflation by detailed and quality-adjusted PPI; OR b. Deflation by quantity index, with product specifications ensuring homogeneity.	None specified	None specified
<u>E: Distribution – for which output is quantity * distribution margin (= sale price <i>minus</i> purchase price)</u>			
	Valuation at base-year prices, at the level of detail to ensure that ensures distinction between different qualities of distribution services.	Assuming a constant ratio between volume of distribution services and quantity of production.	Any other method like deflation of distribution margin at current price by PPI.
<u>E: Combination of Production and Distribution</u>			
	Deflation by suitable PPI for the output of combined activity.	Deflation by CPI, if that represents consumption of businesses as well.	Any other method like one based on input costs.

Table 3.1 :A/B/C Methods for Output by Products (ISIC Sections – A to F)

ISIC code	‘A’ Method	‘B’ Method	‘C’ Method
F: <u>Building Construction Work</u>	a. Deflation by PI using “actual prices” method; OR b. Deflation by PI using “model pricing” method.	Deflation by PI using “Hedonic” method, for which good data on “quality” are employed.	Any other method like use of volume measure – cubic meters / floor area of construction or number of building permits.
F: <u>Other Civil Engineering Construction Work – generally large and unique</u>	a. Methods based on “model pricing” – with updated & representative output-based models; OR b. Those based on “specification pricing”.	Using administrative data on public building contracts.	None specified
F: <u>Repair and Maintenance</u>	Based on hourly rates or quotes for ‘model’ jobs from contractors; and For small repair and maintenance works undertaken by households, CPI indices for the commonly used materials	None specified	None specified
F: <u>“Own account” Construction</u>	a. Deflation by PI using “actual prices” method; OR b. Deflation by PI using “model pricing” method.	a. Deflation by PI using “Hedonic” method, for which good data on “quality” are employed; OR b. Deflation by the closest market-based index available like index relating to residential dwellings.	Any other method like use of volume measures like floor area of ‘own account’ residential buildings construction or number of residential building permits.
<ol style="list-style-type: none"> 1. ‘Base-year prices’ refers to the previous year’s prices for annual chain-linked series of national accounts and to the prices of the base year (as conventionally used for national accounts) for fixed-base year series. 2. ‘Deflation’ stands for ‘deflation of current-price value of output’. 3. “Hedonic” method: Price is regressed on “quality” of the product, defined in terms of its characteristics. 4. “Model Pricing” method: This is based on price data collected (from standard price catalogues or statistical surveys) on a theoretical “model” product. 5. “Specification Pricing” method: Used mainly for unique products. The main or key components of the product is identified and priced in successive periods. 6. “Re-sampling” or “overlap pricing” method: In each period a new sample of items is priced. The prices of common items between two periods are use for working out price-relatives. 7. “Option Prices” method: When the difference lies in inclusion of an extra option, then the option is valued separately. 8. “Actual Prices” method: This method is based on price data from real projects or adjusted tender prices or quality-adjusted prices of directly comparable products. 			

Trade Margin – output of distributive trading activities

The output trading activities is the trade margin. Theoretically, this can be measured by taking the difference between deflated sales and deflated purchases. The EUROSTAT *Handbook* recommends this as the ‘A’ method, provided changes in quality of trade services is taken into account. The required data are most often not available. The OECD’s *Compilation Manual for an Index of Services Production* (2007), therefore, suggests methods based on the assumption that the margin-to-sales ratios are constant at constant prices. The suggested method of deflating the gross turnover by appropriate quality adjusted price indices rests on this assumption.

For all the activity-groups under ISIC ‘51’ & ‘52’, the *Manual*, in general suggests the following methods:

Preferred: Gross turnover (trade margin, commissions and brokerage) deflated by appropriate quality adjusted price index.

Alternative: Gross turnover (trade margin, commissions and brokerage) deflated by partially representative price index.

Other: Using volume indicator of ‘Employment’.

In addition, it also suggests a few more methods for specific activity groups. These are indicated in Table 3.2.

Table 3.2 : Specific Methods Prescribed for ISIC – ‘51’ & ‘52’ in the <i>Manual</i>			
ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
511	--	Lagged index of production for the manufactured goods	--
512	--	Lagged index of production for agriculture and manufacture of food, beverages and tobacco.	Tonnes of agricultural raw materials
513	--	Lagged index of production for manufacture of textile, clothing & footwear, and other household goods.	--
514	--	Lagged index of production for manufacture of solid, liquid and gaseous fuels, metals and metal ores, construction materials, hardware, plumbing and heating equipment supplies and intermediate products, such as industrial chemicals, waste and scrap.	Tonnes of intermediary products
515	--	Lagged index of production for manufacture of computers and computer peripherals, electronic and telecommunications equipment and office machinery and other machinery, equipment and supplies.	--
519	--	Lagged index of production for manufacture of miscellaneous goods.	--

For measuring output of services at constant prices, it is desirable to follow the the OECD's *Manual*. The *Manual* deals with compilation of Index of Services Production and specifies 'preferred', 'alternative' and 'other' methods separately for each ISIC category pertaining to services production.

In general, suggests two "preferred" methods for each services industry – ISIC group (3-digit) and class (4-digit). The first is based on deflation of gross turnover at current prices by appropriately weighted quality-adjusted price indices for the services provided by the respective industries. The second of the "preferred" methods, wherever specified, is volume indicators classified by type of service provider. The volume indicators for the "preferred" methods specified in the manual are given in *Table 3.3*.

For the "alternative" methods too, the *Manual*, in general, suggests two methods for each ISIC group / class – one, based on deflation of gross turnover at current prices by partially representative price index and the other based on use of less appropriate volume indicator, without distinguishing between different types of service providers. The "alternative" methods based on volume indicators are briefly described in *Table 3.3*.

As for the "other" methods, the *Manual*, in general, suggests a single method – based on a single input-related indicator, viz. 'employment', for all the ISIC groups / classes. The indicators, other than 'employment', specified in the *Manual* are included in *Table 3.3*.

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples			
ISIC code	'Preferred' Method	'Alternative' Method	'Other' Method
5510	Number of bed nights, classified by type of hotels and other short-stay accommodations	Number of bed nights – only total.	--
5520	--	Number of meals sold; Number of customers / admissions; Number of drinks sold.	--
6010	Passenger-kms. traveled by class of travel; Tonnes-kms. transported by transportation time.	Number of passengers; Number of tones of freight.	--
6021	Passenger-kms. traveled by class of travel.	Number of passengers by class of travel.	--
6022	--	Number of trips.	Number of vehicles licensed; Number of drivers licensed.
6023	Tonnes-kms. transported by kind of service.	Number of kilometers traveled. Number of tones of freight.	Number of vehicles licensed; Number of drivers licensed.
6030	Cubic-metres-kilometres transported.	Cubic-metres transported.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
6110 & 6120	<p>Passenger-kms. traveled by kind of travel;</p> <p>Tonnes-kms. transported by category of merchandise.</p>	<p>No. of passenger carried by kind of travel;</p> <p>Tonnes transported by category of merchandise.</p> <p>No. vehicles transported – cars & others;</p> <p>No. of containers transported – refrigerated and non-refrigerated</p>	--
6210 & 6220	<p>Passenger-kms. traveled by class of travel;</p> <p>Tonnes-kms. transported by kind of service.</p>	<p>Number of passengers by class of travel;</p> <p>No. of Tonnes transported by kind of service;</p> <p>No. of aircraft movements - arrivals & departure.</p>	--
6301 & 6302	--	Tonnes of goods handled	--
6303	--	--	--
6304	--	No. of bookings – domestic, trans-continental and inter-continental.	--
6309	--	Tonnes of goods carried.	--
6411	<p>No. of domestic and international letters by kind of service;</p> <p>No. of domestic and international parcels; and</p> <p>No. of pick-up points.</p>	<p>No. of domestic and international letters;</p> <p>No. of domestic and international letters.</p>	No. of items carried (without distinction of type of mail).
6412	<p>No. of domestic and international letters by kind of service;</p> <p>No. of domestic and international parcels by kind of service and size of parcels.</p>	No. of domestic and international letters and parcels.	No. of items carried (without distinction of type of mail).
6420	--	Number of calls made by fixed-mobile and national-international.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
6711	No. of Stock-broking transactions by type of financial instrument; No. of commodity transactions by kind of goods; No. of foreign exchange transactions by type of currency.	No. of Stock-broking transactions; No. of commodity transactions; No. of foreign exchange transactions.	--
6712	Number of transactions by type of financial instrument.	Number of transactions.	--
6719	Number of transactions by type of dealing.	Number of transactions; Number of clients served.	--
6720	Number of insurances by type of insurance.	Number of policies; Number of clients.	--
7010	Number of new dwellings sold by type of dwelling; Number of old dwellings sold by type of dwelling; Sq. metres of new dwellings sold by type of dwelling; Sq. metres of old dwellings sold by type of dwelling; Sq. metres of land sold; Number of residential rentals by type of dwelling; Number of non-residential rentals by type.	Number of property transactions by type of property; Number of residential rentals by ownership; Number of non-residential rentals – private & public sector.	Number of property transactions.
	<u>Owner occupied Housing</u>		
	Imputed rent of owner occupied housing stock by type of dwelling.	Number of owner occupied dwellings.	None.
7020	Number of dwellings sold or managed by type of dwelling; Sq. metres of non-residential sold or managed by type; Sq. metres of land sold.	Number of fees negotiated; Number of contracts managed; Number of property transactions.	Number of property transactions.

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
711	--	Number of items leased or rented out by type of equipment; Number of lease or rent agreement by type of equipment.	--
712	--	Number of items leased or rented out by type of equipment; Number of lease or rent agreement by type of equipment; Number of lease days by type of equipment.	--
713	--	Number of items leased out; Number of customers.	Number of items available for lease.
721	--	Number of hardware consultancy contracts; Number of billable hours.	
722	--	Number of software licenses sold; Number of programming hours; Number of billable hours.	--
723	--	Number of transactions processed; Number of forms processed; Number of keystrokes.	--
724	--	Number of data bases commissioned; Number of accesses to search enquiries; Number of programming hours.	--
725	--	Number of maintenance contracts; Number of items repaired.	--
729	--	Number of disaster recovery contracts.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	'Preferred' Method	'Alternative' Method	'Other' Method
7310: <u>Market services</u>	--	Number of publications; Number of research degrees completed; Number of patents granted.	--
<u>Non-market services</u>	Number of employees	--	--
7320: <u>Market services</u>	--	Number of publications; Number of research degrees completed; Number of patents granted.	--
<u>Non-market services</u>	Number of employees		
741	--	Number of contracts drawn; Number of tax returns filed; Number of campaigns run; Number of billable hours.	--
742	--	Number of designs commissioned; Number of surveys commissioned; Number of tests carried out; Number of billable hours.	--
743	--	Number of campaigns carried out; Sq. metres of billboards rented; Seconds of television time bought; Number of units of media space; Number of newspaper/magazine subscriptions; Number of newspaper/magazine single sales; Number of billable hours.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
749	--	No. of employees placed; No. of man-hours of surveillance; No. of man-hours of cleaning; No. of films processed; No. of litres packaged; No. of words typed or translated; No. of envelopes mailed.	--
8010, 8021, 8022 & 8030	Pupil-hours/ student-hours by level of education.	No. of pupils/ students by level of education.	--
8090	Student hours by type of course	No. of pupils/ students by level of course.	--
8511	Number of patients discharged by type of patient; Number of occupant-days - Psychiatric illnesses, Rehabilitation	No. of patients discharged; No. of beds; No. of admissions; No. of surgical operations; No. of births.	--
8512	Number of GP consultations by type of diseases; Number of first visits to specialists by type of disease; Number of courses of dental care treatment.	No. of consultations; No. of registered patients.	--
8519	Number of courses of treatment – Physiotherapy, Chiropody, Chiropractic.	No. of patients.	--
8520	Number of courses of treatment – farm animals, pet animals; No. of appointments / consultations - farm animals, pet animals.	No. of animals treated.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
8531	Number of occupant-days by type of residential care	No. of people in residential care; Number of beds.	--
8532	Number of persons receiving by category of recipient.	Number of day care places by category of recipient.	--
9000	Tonnes of rubbish collected by source; Tonnes of rubbish disposed – Incinerated, Land fill etc. Litres of waste water and sewage processed - surface water, sewage; Tonnes of contaminated waste treated by type of waste.	Tonnes of rubbish collected; Litres of sewage treated - Litres of decontamination reagents used.	--
91	Number of members by type; For religious organizations (9191): number of services or number of people attending services.	Number of members	--
921	Cinema tickets by category; Theatre tickets by category; Concert tickets by category.	Number of tickets sold – cinema, theatre & concert.	--
922	--	Number of words published; Number of photographs published.	--
923: <u>Non-market services</u>	Number of items lent by category of items; Number of visitors by service category.	Number of items lent; Number of visitors.	--
923: <u>Non-market services</u>	Number of tickets sold by category of ticket and visiting site.	Number of tickets sold by visiting site.	--
924: <u>Non-market services</u>	Number of tickets sold by category of ticket.	Number of tickets sold – participants, spectators.	--

Table 3.3: Volume Indicators specified in OECD Manual (ISIC Sections H to P, except Financial Intermediation, Insurance and Public Administration) - Examples

ISIC code	‘Preferred’ Method	‘Alternative’ Method	‘Other’ Method
924: <u>Non-market services</u>			
	Number of tickets sold by category of ticket.	Number of tickets sold – participants, spectators.	--
9301	Number of KGs cleaned – laundry, dry cleaning; Number of standard loads cleaned – laundry, dry cleaning.	Number of KGs cleaned; Number of standard loads.	--
9302	Number of appointments by kind of service.	Number of appointments.	--
9303	Number of deaths – burial, cremation. Number of coffins by category.	Number of deaths. Number of coffins	
9309	Number of visits to saunas, massage salons; Number of appointments: by kind of service; Number of operations: Coin-operated photo booths, Coin-operated weighing machines	Number of clients; Number of coin operated machines.	--
9500	Number of domestic employees by type of domestic service	Number of domestic employees – live-in, live-out, inside work, outside work.	--