

# **Index of Industrial Production**

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# LECTURE OUTLINE

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- ❖ Introduction
- ❖ Concepts and Uses of the IIP
- ❖ Statistical Units, Classifications and Business Register
- ❖ Sources and Methods
- ❖ Index Compilation
- ❖ Data Dissemination

\* This material was prepared based on the “International Recommendations for the Index of Industrial Production 2010” – United Nations Statistics Division (<http://unstats.un.org/unsd/EconStatKB/Attachment242.aspx>)

# INTRODUCTION

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- ❖ Comparison of economic performance over time is a key factor in economic analysis and a fundamental requirement for policy-making
- ❖ Short-term indicators play an important role in this context by providing such comparison indicators
- ❖ Among these short-term indicators, the index of industrial production has historically been one of the most well known and well-used indicators
- ❖ The index of industrial production also plays an important role in the System of National Accounts, since it reflects temporal changes in the value added for individual industries, as well as having a strong relationship with the performance of the economy as a whole



# INTRODUCTION

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- ❖ The Index of Industrial Production (IIP) *describes* the **change** of the **volume** of goods and/or services produced over time, and therefore provides a measurement that is free of influences of price changes
- ❖ Its main purpose is to provide a measure of the short-term changes in **value added** over a given reference period for selected activities

# INDUSTRIAL PRODUCTION

- ❖ The International Standard Industrial Classification of all Economic Activities (ISIC) Rev.4 is the classification (and version) that is used to define industrial production
- ❖ The International Recommendations for Industrial Statistics (IRIS) 2008 defines the scope of industrial production as ISIC Rev.4 sections
  - B (**Mining and quarrying**)
  - C (**Manufacturing**)
  - D (**Electricity, gas, steam and air conditioning supply**)
  - E (**Water supply, sewerage, waste management and remediation activities**)
- ❖ These activities are the more dynamic and fluctuating elements in the economy

# CONCEPTS AND USES OF THE IIP

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- ❖ The SNA describes production as “an activity, carried out under the responsibility, control and management of an institutional unit, that uses inputs of labor, capital, and goods and services to produce outputs of goods and services (...) that can be delivered or provided to other institutional units.”
- ❖ Of interest is the additional value created by the process of production, known as **value added**
- ❖ Value added is measured as the balance between the **outputs** produced (by the establishment, industry, etc.) and the **intermediate inputs** consumed



# MEASURING INDUSTRIAL PRODUCTION

- ❖ IC data are generally not available at the required detail and/or frequency, therefore the challenge is to obtain the most readily available data that provides the **best approximation** of short term movements in value added
- ❖ Approximations are generally achieved by either the measurement of output, or the measurement of use of inputs of the production process, specifically:
  - ❖ output approaches include measuring physical output quantities and/or values of output
  - ❖ input measures include measuring materials consumed and/or labor input used in the production process
- ❖ These approximate approaches assume a fixed relationship between the variable being measured and value added

# MEASURING INDUSTRIAL PRODUCTION

- ❖ The relationship between the variable being measured and value added is generally better in volume terms than in current prices
  - ❖ The **current price** value is made up of the **current period quantities** and the **current period prices**
  - ❖ The **volume measure** describes the **current period quantities** but in the **prices of another period**
- ❖ A volume estimate is obtained from a current price value via a process of price **deflation**, by the use of a price index. Change over time of the volume measure is referred to as volume change



# FORM AND FREQUENCY OF THE IIP

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- ❖ Volume measures of industrial production can be presented in either index numbers or monetary terms
- ❖ The **recommendation** for presenting industrial production volume measures is to use **index numbers** to aid analysis and international comparison
- ❖ One particular purpose of the IIP is to identify turning points in economic development at an early stage
- ❖ It is therefore necessary that the IIP be compiled at **high frequency**, either **monthly** (recommended) or **quarterly**

# USES OF THE IIP

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- ❖ The IIP is a key indicator of economic performance in most countries
- ❖ It combines many facts into a few simple figures
- ❖ An index number of production shown with an industrial grouping enables comparisons of industry performance to be made (analysis of relative changes in productivity, measured as output per hour worked)

# USES OF THE IIP

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- ❖ The production index serves to assess the significance of changes in the volume of industrial output on the economy as a whole
- ❖ It assists with evidence-based policy decisions (current situation)
- ❖ It also allows the analysis of relationship between its changes with changes in population, national income, foreign trade, prices and other aggregates



# USES OF THE IIP

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- ❖ The IIP may also play an important role in the compilation of the Quarterly National Accounts (QNA)
- ❖ The compilation of the production approach of GDP involves calculating **value added** at current prices as well as in volume terms by industry
- ❖ When observed data on IC is available IIP could be use as an output indicator on a quarterly basis
- ❖ Alternatively, if measures of IC are not available, an indirect method is used. Short-term movements of output indicator are assumed to evolve as the quarterly value added
- ❖ One of these short term indicators that can be used to compile the QNA is the IIP

# STATISTICAL UNITS, CLASSIFICATIONS AND *BUSINESS REGISTERS*

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Statistical units, classifications and business registers all play a **prominent** role in the collection and compilation of **high quality** statistics

# STATISTICAL UNITS

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- ❖ A statistical unit is an entity about which information is sought and for which statistics are ultimately compiled
- ❖ These statistical units vary from small entities engaged in one or very few activities undertaken at or from one geographical location to large and complex entities engaged in many different activities that may be undertaken at or from many geographical locations (Institutional Unit, Enterprise Group, Enterprise, Local Unit, Kind-of-Activity Unit, Establishment)
- ❖ The **establishment** is recommended as the statistical unit for the purposes of compiling an IIP because it is the most detailed unit for which the range of data required is normally available



# CLASSIFICATIONS

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- ❖ In the context of calculating IIPs, classifications of **activity** (industry) and **products** are required to categorize economic information about statistical units and their inputs and outputs
- ❖ There are various activity and product classifications, sometimes tailored to specific country needs
- ❖ However, most of these county-tailored classifications are either derived from or related to the International Standard Industrial Classification of All Economic Activities (**ISIC**), and to the Central Product Classification (**CPC**)
- ❖ The latest versions of these classifications are ISIC Rev.4 and CPC Ver.2 (recommended)

# THE BUSINESS REGISTER

- ❖ The statistical business register (BR) is an essential tool for data collection. A statistical BR is a inventory of **business units** engaged in production of goods and/or services. Business unit are usually enterprises with links to their establishments and classified by economic activity
- ❖ BR provides the basis from which a **sampling frame** is identified i.e. a list of all economic units in the industrial sector, which should include:
  - all accurate and up to date information on units that are required for stratification, sample selection, and contact purposes; e.g., industrial and geographical classifications, size variables (number employees, turnover, etc.), name, address, description of the unit, telephone number and a contact name; and
  - all the active units, without omission or duplication, that are in the survey target population

# THE BUSINESS REGISTER

- ❖ Where the IIP is compiled from statistical surveys, it is recommended that:
  - a business register provide the basis from which a sampling frame is identified;
  - the business register be maintained to ensure it remains as representative as possible and contains current information on its constituents;
  - a sample survey be used as a way of minimizing response burden and lowering operational cost;
  - the sample selection be updated each year to coincide with the update of index weights.
- ❖ It is also recommended that countries examine opportunities to utilize **administrative data** sources for the purposes of developing and maintaining a sampling frame and as a data source to reduce response burden



# SOURCES AND METHODS

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- ❖ There is not one single correct method to produce an accurate IP. The preferred variable and resulting method will depend on the industrial production activity as well as on data availability
- ❖ As mentioned before, approximate measures of value added are based on measuring the **output** of production or alternatively, the **inputs** used in the production process

# MEASURES OF OUTPUT

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- ❖ **Output** (2008 SNA) is defined as the set of goods and services (products) produced by an establishment, *excluding* the value of any goods and services used in an activity for which the establishment does not assume the risk of using the products in production, and excluding the value of goods and services consumed by the same establishment except for goods and services used for capital formation (fixed capital or changes in inventories) or own final consumption
- ❖ Output can be measured in **values** (monetary terms) or in **physical quantities**. In addition, a simplified definition of output known as 'value of **output sold** in the reference period' is also sometimes used to represent industrial production for an IIP

# VALUE OF OUTPUT

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- ❖ The 'value of output' includes products produced whether they are sold, otherwise used, or entered into inventories for sale or constitute "work-in-progress" inventories. Output should be recorded at the time it is produced and valued at the basic price prevailing at that time
- ❖ The most accurate output information on products is obtained via production surveys. The value of output may not always be easily available within a statistical unit's records. A statistical unit is in general able to easily provide the *value of output sold* in the reference period
- ❖ All output within the reference period should be included. It is often more difficult for units to provide data relating to output entering into inventories of finished goods, goods retained for further processing or work-in-progress



# VALUE OF OUTPUT

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- ❖ Volume measures are obtained through the use of an appropriate price deflator. The price deflation process will ensure that any quality changes of the products are reflected in the production volume
- ❖ Separate price deflators may be necessary to handle the two types of products (for domestic market versus for export market). If deflation takes place at the industry level, similar distinctions have to be made for instance between a conventional manufacturer of goods and a provider of manufacturing services (contractor)
- ❖ The availability of an appropriate deflator (or lack thereof) will often determine the suitability of the deflation method for a specific industry or part thereof

# PHYSICAL QUANTITY OF OUTPUT

- ❖ Physical quantity of output data are, in general, also obtained via the use of production surveys
- ❖ This approach measures product output in terms of the number of items, tonnes, liters, etc. in order to track the development of production. These data are often used when the products are homogeneous. **No** related **deflator** is required
- ❖ The physical quantity of output approach also aims to include goods and services produced whether they are sold, entered into inventories of finished goods or constitute “work-in-progress” inventories - The inclusion of work-in-progress can be more difficult to achieve with this method

# VALUE OF OUTPUT SOLD

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- ❖ The **value of output** sold is synonymous with such terms as turnover, sales, or **shipments** and refers to goods or services sold by the statistical unit during the reference period
  - ❖ value of output sold data are generally available in a more timely fashion than product level data; and
  - ❖ data collection is less costly due to the higher level of aggregation compared to product
- ❖ Methodological issues:
  - ❖ Value of output sold measures sales rather than output of the production process in the reference period
  - ❖ Work-in-progress is also excluded when the value of output sold is used; and
  - ❖ The 'value of output sold' data are traditionally collected at a higher level of aggregation – normally corresponds to the industry class (say ISIC class)
  - ❖ Appropriate deflators are required when using this approach



# MEASURES OF INPUT

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- ❖ Measures of input to approximate industrial production are generally used in circumstances where reliable or accurate measures of output cannot be obtained. In practice, the main input variables used to approximate industrial production are:
  - ❖ labor input; and
  - ❖ materials consumed.
- ❖ In practice it is also possible to use a combination of these two variables to approximate the value of output on a cost basis

# LABOR INPUT

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- ❖ **Labor input** can be measured in the form of number of hours worked, full-time equivalent jobs, or numbers of persons engaged and is used in a *volume extrapolation method*
- ❖ **Number of hours** worked is **preferable** to number of employees (or hours paid) as an indicator of labor input, since output is affected by changes in standard weekly working hours, the proportions of part-time employees, and hours of overtime
- ❖ These variables do not incorporate productivity changes and sometimes it is challenging to account for changes in the composition of the labor force into the index

# MATERIAL CONSUMED

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- ❖ Material consumption is only useful when there is a clear relationship between material use and production
  - ❖ collect the value of the material that is consumed in the production process, or
  - ❖ measure the quantity of material consumed
- ❖ Value of material consumed  $\Rightarrow$  volume is obtained by deflation
- ❖ Quantity of raw materials used  $\Rightarrow$  volume extrapolation
- ❖ The price deflator should reflect the mix of these materials, while the quantities have to be combined using appropriate weights



# METHODS TO OBTAIN INDUSTRIAL PRODUCTION *VOLUMES*

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- ❖ Measuring the change in the volume of value added over time implies that any change from price should be eliminated
- ❖ Volume measures are obtained through a process of **deflation** or volume **extrapolation**

# DEFLATION

- ❖ Deflation is defined as isolating the volume component (that is quantity and quality) from variables that have price and volume elements

	Period T0			Period T1		
	Volume value	Price index	Current measure	Current value	Price index	Volume measure
	(1)	(2)	(3)=(1)/(2)*100	(4)	(5)	(6)=(4)/(5)*100
Good A	110.0	100.0	110.0	120.0	107.2	111.9

	Period T0		Period T1		
	Volume measure	IIP	Volume measure	Volume relative	IIP
	(1)	T0=100	(6)	(7)=(6)/(3)	(8)=(7)*100
Good A	110.0	100.0	111.9	1.0176	101.8

# DEFLATION

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- ❖ Variables of the type “value of output”, “value of output sold”, and “value of material consumed” require the deflation method
- ❖ Four main price indices are compiled by countries in the area of economic statistics: Producer Price Indices (PPI), Consumer Price Indices (CPI), Export Price Indices (EPI), and Import Price Indices (MPI)
- ❖ The PPI is recommended as the price index to be used by countries when current price values are deflated to achieve volume measures of output for the IIP
- ❖ In circumstances where PPIs are unavailable, alternative deflators could include (CPI, EPI)



# VOLUME EXTRAPOLATION

- ❖ The volume extrapolation method utilizes the movements in volumes directly to calculate an IIP. The volume measure in the current period is compared to the volume measure in the base period and the resulting volume relative is used to calculate the IIP

	Period T0		Period T1	
	Volume	IIP (Tonnes of coal)	Volume	IIP (Tonnes of coal)
	(1)	(2) (T0=100)	(3)	(4)=(2)*(3)/(1)
Good A	100.0	20,000.0	22,000.0	110.0

# VOLUME EXTRAPOLATION

- ❖ The volume extrapolation method does not require the collection of value data or the use of price indices for deflation
- ❖ Variables of the type “physical quantity of output”, “labor input”, and “materials consumed” use the volume extrapolation method
- ❖ Mining and quarrying industries are good candidates for the extrapolation method because the products being measured are generally homogenous, the quality of the products tends to remain rather constant over time, and it is often possible to obtain almost a complete observation of all production volumes
- ❖ With regard to the manufacturing service industries (and also in those where there are large components of work-in-progress), volume extrapolation of hours worked is the preferred method due to the fact that there is no production of a good that can be measured

# SOURCES OF DATA

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- ❖ To produce statistics, basic data are collected and transformed from the institutional units – corporations, government units, households and non-profit institutions serving households – in their roles as producers, consumers and investors, income earners, etc.
- ❖ There are two primary data sources for collecting economic data:
  - ❖ **surveys** by the statistical office, and
  - ❖ **administrative data** sources
- ❖ In either case, however, the original providers of the data are the same, namely the production unit, and the original sources of the data are the same, namely the records kept by these units



# SURVEYS

- ❖ The information can be collected by the statistical office directly from the units concerned by either enumerating all the units in the population (**census**) or eliciting response only from representative units scientifically selected from the population (**sample survey** - less costly)
- ❖ Sample surveys approaches include, among others, surveying those businesses above a size threshold (e.g. employment or contribution to production); a simple sample drawn from the whole population; or a stratified sample (recommended)
- ❖ The survey approach presents some significant disadvantages:
  - ❖ resource intensive (both financial and manpower),
  - ❖ represent an additional respondent burden and,
  - ❖ present sampling errors and higher non-response rates than administrative data.

# ADMINISTRATIVE DATA SOURCES

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- ❖ Administrative processes in areas such as taxation, employment registration, building permits, etc. result in a register of the institutional units – enterprises, persons, etc. The register and data are referred to collectively as an administrative data source
- ❖ The administrative authorities keep records of the units in response to legislated administrative requirements or simply for internal purposes to assist the units in managing their operations
- ❖ The data emanating from the administrative source can often be used by the statistical offices. This approach presents lower response burden and higher cost efficiency when compared to statistical surveys
- ❖ Discrepancies between administrative concepts and statistical concepts often occur

# INDEX COMPILATION

- ❖ Index of industrial production => measure short-term volume changes in value added:
  1. Identifying variables (or indicators) and determining methods –within an agreed scope and classification system- to collect these data variables from the appropriate business population
  2. Techniques to obtain volume measures from the collected data
    - ❖ index formula types
    - ❖ aggregation of the IIP
    - ❖ managing of input data
    - ❖ weights
    - ❖ compilation topics



# INDEX TYPES

- ❖ A *volume index* is a **weighted average** of the **proportionate changes** in the quantities of a specified **set of goods or services** between **two periods of time** -say a reference period  $0$  and current period  $t$
- ❖ In this context “volume” is a more correct and appropriate term than “quantity” so as to emphasize that quantities must be adjusted to reflect changes in quality
- ❖ Numerous index number formulae have been proposed in the rather abundant literature on index number theory
- ❖ Differences mainly relate to the **weights** which they attach to the individual quantity relatives and the particular form of **average** used, whether it is arithmetic, geometric, harmonic, etc.

# INDEX FORMULA TYPES

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- ❖ While numerous types of indices exist, there are three main types that are used internationally when aggregating quantities over time
  - ❖ **Laspeyres** index, the weights of some fixed base period are used
  - ❖ **Paasche** index, the weights of the current period are used
  - ❖ **Fisher** index is defined as the geometric mean of the Laspeyres and Paasche indices

# THE RECOMMENDED INDEX TYPE

- ❖ Determining which index type to use to compile the IIP should be made on both theoretical and practical grounds:
  - ❖ the **purpose** of the index (to provide a short-term indicator of production and, where required, for use in the compilation of the QNA);
  - ❖ **theoretical considerations** (i.e. including an up-to-date weighting structure, time and factor reversal, etc.); and
  - ❖ **practical considerations** (i.e. what can be practically achieved due to resource constraints and data availability)
- ❖ The recommendation is to use a Laspeyres-type volume index for the compilation of the IIP



# AGGREGATION OF THE IIP

❖ The IIP is typically constructed at three fundamental stages:

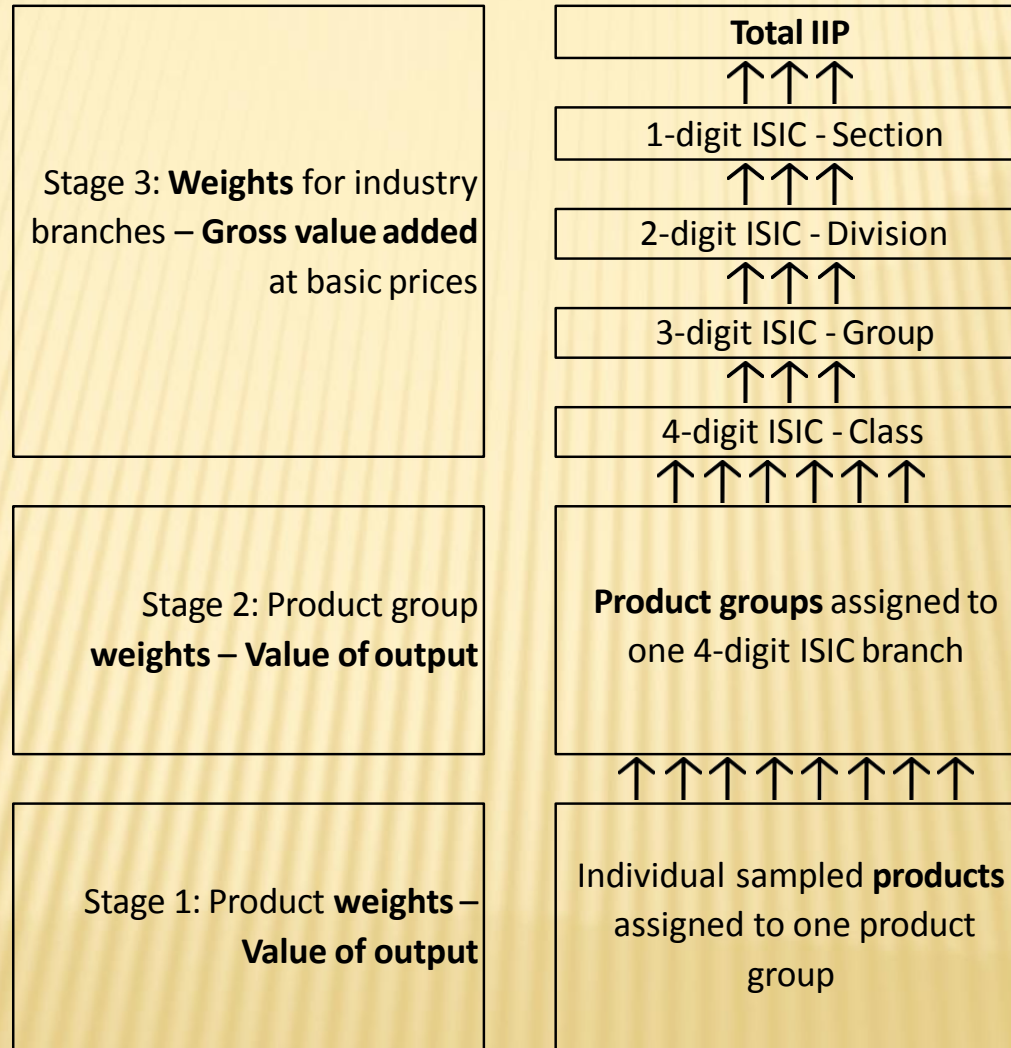
**product data** are collected and combined using weights to produce  
❖ data for the **product group**

**product groups** are then aggregated at the level of **industry classes**  
❖ using weights. Each product group is assigned to just one industry (e.g. ISIC Rev.4 class)

**industry classes** are used to derive **industry branches** in line with the  
❖ industry classification structure using weights

The next diagram shows the three stages of the IIP index structure

## Diagram: Index structure and weights



# AGGREGATION OF THE IIP

- ❖ Where values of production are collected deflation should occur at the most detailed level of the index structure but not higher than the 4-digit ISIC level (class)
- ❖ Deflation is undertaken by dividing the current period value of production/output by a price index, after aggregating the product and product group, if required
- ❖ Preferred price indexes are of the Paasche form (i.e. currently weighted):  $N_1/N_0 = V_L P_P$ 
  - ❖ PPIs, Export price indexes, CPIs usually are of the Laspeyres type
  - ❖ If possible, they need to be transformed into Paasche indexes
  - ❖ Supply-Use Tables play a key role in this



# NON-RESPONSE / MISSING DATA

- ❖ There are two general strategies to deal with item non-response:
  - ❖ Ignore all forms with missing values and confine analysis to the fully completed forms; or
  - ❖ Missing data are estimated so that the data matrix is complete. This is called **imputation**.
- ❖ Imputation is recommended because adopting the first strategy leads to discarding the valid data contained in the partially complete forms. There are a variety of imputation methods, ranging from simple and intuitive to rather complicated statistical procedures

# QUALITY ADJUSTMENT

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- ❖ Quantity and quality changes are considered changes in volumes and should be reflected in the IIP
- ❖ The term quality refers to all those characteristics of a good or service that are sufficiently different to make them distinguishable from each other from an economic point of view
- ❖ Accurately reflecting quality changes in the IIP calculation can be accounted for in a couple of ways:
  - ❖ via deflation when using a price index that is constructed to hold constant quality (preferred)
  - ❖ by adjusting the source data when the volume extrapolation method is employed (difficult)

# WEIGHTS

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- ❖ Weights allow the lower level indices to be 'put together' or combined to produce aggregate measures at higher levels once all the necessary input variables have been collected, imputed, and adjusted as required
- ❖ Weights are a key element in the construction of any index as they provide a measure of the relative importance of each index component
- ❖ In the case of the IIP, weights reflect the relative importance of a product, product group or industry within the overall scope of industrial production. To arrive at the aggregate index figure, data for products, product groups or industries are multiplied by these weights to derive a weighted average aggregate index



# WEIGHTS

- ❖ The weight attached to each product determines the impact the volume change of that product will have on the overall index

Panel (i)

	Base period			Current period t		
	Index	Quantity	Weight (%)	Index	Quantity	
Product A	0.7	150.0	100.0	170.0	113.3	= 170/150 * 100
Product B	0.3	100.0	100.0	120.0	120.0	= 120/100 * 100
Total	1.0		100.0		115.3	= (113.3 * 0.7) + (120.0 * 0.3)

Panel (ii)

Weight	Current period t		Base period				
	Index	Quantity	Index	Quantity	(%)		
(5)	(4)		(3)=(1)/(2)*100(2)		(1)		
Product A	0.5	150.0	100.0		170.0	113.3	= 170/150 * 100
Product B	0.5	100.0	100.0		120.0	120.0	= 120/100 * 100
Total	1.0		100.0			116.7	= (113.3 * 0.5) + (120.0 * 0.5)

# WEIGHTS

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- ❖ As shown before, weighting is required at three fundamental levels:
  - ❖ weights for **products**;
  - ❖ weights for **product groups**; and
  - ❖ weights for **industry branches**
- ❖ Weights at these three levels are generally obtained from different sources and use different data variables

# WEIGHTS

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- ❖ **Products**: Value of output should be used to establish the weight of each product selected in the product group – generally obtained via the conduct of product censuses or surveys
- ❖ **Product groups**: Share of value of output (or proxies thereof) by product group within its ISIC class – obtained via the conduct of product censuses, surveys, or from the national accounts (when sufficient product detail is available)
- ❖ **Industry branches**: Share of gross value added at basic prices by industry of all industries in-scope of industrial production – available from the annual national accounts, or other comprehensive data sources if needed



# UPDATING THE WEIGHTS

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- ❖ The weights of an index need to be periodically updated in order to reflect the changing structure of the economy - some products and industries become relatively more important than others, and products can disappear completely or new products can enter the market
- ❖ The two key issues to consider when updating index weights are
  - ❖ the **frequency** of weight updates; and
  - ❖ the **method** used to incorporate new weights into the index structure
- ❖ The **frequency** of weights updates can be linked to (i) the need to accurately reflect the current relative importance of product groups and industries; (ii) data availability; and (iii) the index type used to compile the index

# UPDATING THE WEIGHTS

- ❖ Industry level weights should be updated **annually** with the latest information available, as this will improve the accuracy of the indicator as a value added measure
- ❖ Product group weights should also be updated **frequently** (e.g. at least *every 5 years*) as this provides an opportunity to incorporate new products as well as reflect the changing relative importance of product groups within the industrial sector
- ❖ The index type chosen conditions the frequency at which weights are updated. Laspeyres-type index formula provides some flexibility in regard to the frequency of weight updates as the weights are not derived from the current period

# FIXED WEIGHTS VERSUS CHAINED INDEX

- ❖ Fixed weight indices have their weight structure fixed at a particular point in time
  - ❖ These weights represent the relative worth of different products/industries at that point in time and are used to compute indices over an extended period
- ❖ Chain linked indices refers to the updating of the weights and linking two index series together to produce a time series – non additivity
  - ❖ The chain approach does not re-calculate the entire historical series whenever the weights are updated, but rather links or splices together the two index series to produce a coherent time series



# FIXED WEIGHTS VERSUS CHAINED INDEX

❖ Algebraically, this can be expressed as:

$$=LQ \sum_i \left( w_{i,t-1} \frac{q_{i,t}}{q_{i,t-1}} \left[ \times \sum_i \right] w_{i,t-2} \frac{q_{i,t-1}}{q_{i,t-2}} \right) \times \dots \times \sum_i \left( w_{i,0} \frac{q_{i,1}}{q_{i,0}} \right)$$

where  $w_{i,t}$  is the relative share of value added of industry  $i$  at time  $t$ , and  $q_{i,t}$  is the volume measure for industry  $i$  at time  $t$

# COMPILATION ISSUES

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- ❖ The first step -pre-processing- is to obtain and organize the necessary data from which an IIP can be constructed: variables, deflators, and weights. Imputation of any missing data also occurs at this stage
- ❖ After obtaining the raw data from a set of observations – measurements of one product by one establishment – direct aggregation takes place to arrive at a unique values for each product
- ❖ Weights are then used to combine the product relatives data to produce the product groups indices
- ❖ Product group data are then combined to produce data for industry classes
- ❖ Deflation of the values should be carried out at the 4-digit level of the ISIC industry structure (class) if not at level of product groups or groups when possible

# COMPILATION ISSUES

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- ❖ Each time the weights and base year for the index are updated, data are only compiled with the new weights for periods close to the reference period and the series is then linked to the historical portion
- ❖ This is called a chain-linked index as it is compiled for a succession of different segments while keeping the original weights for each past segment fixed
- ❖ The QNA manual discusses three linking methods, the one-quarter overlap, the annual overlap technique, and the over-the-year technique
- ❖ While, in many cases, all three linking techniques give similar results, in situations with strong changes in relative quantities and relative prices, the over-the-year technique can result in distorted seasonal patterns in the linked series



# COMPILATION ISSUES: NEW PRODUCTS

- ❖ Weights updates provides the opportunity to incorporate new products. New product can be added to the basket of products in the (new) base period and quantity comparisons between the current period and the base period can now occur for this new product. Appropriate weighting data must be available for these products before they can be incorporated into the index
- ❖ The next slide illustrates the process of incorporating new products into an index at the time of re-weighting. Assume there is an index that is compiled from three components (A, B and C). The weights are initially from 2003:  $w_A=50%$ ,  $w_B=35%$ , and  $w_C=15%$
- ❖ Assume that new weights for these components are available in 2004:  $w_A=45%$ ,  $w_B=30%$ ,  $w_C=10%$ , and  $w_D=15%$

# COMPILATION ISSUES: NEW PRODUCT

Index	Weight 2003	Dec 042003 = 100	2004 Annual	Weight 2004	2004 = 100	Feb 05	Jan 05	Mar 05	
		2003 = 100				2004 = 100			
						<i>Panel (j) Product level indices</i>			
A	0.50	100.0	110.2	0.45	100.0	102.9	102.3	102.3	
B	0.35	100.0	112.4	0.30	100.0	100.4	100.9	101.5	
C	0.15	100.0	107.7	0.10	100.0	102.1	102.5	102.7	
D	...	...	...	0.15	100.0	103.0	103.1	104.0	
<i>Panel (ii) Aggregation to higher level indices</i>									
	<b>Total</b>	100.0	110.6	108.6	100.0	102.1	102.0	102.4	
<i>Panel (iii) Chaining of the higher level indices</i>									
	<b>Total</b>	100.0			110.6	108.6	110.9	110.8	111.2
<i>Panel (iv) Re-referencing the 4-digit ISIC index to period = 2004</i>									
	<b>Total</b>	92.1	101.8	100.0	100.0	102.1	102.0	102.4	

# COMPILATION ISSUES: SEASONAL ADJUSTMENT

- ❖ High frequency time series data on economic statistics are often characterized by seasonal fluctuations and other calendar related effects that mask relevant short- and long-term movements and impede a clear understanding of the underlying economic phenomena
- ❖ A proven and well-known solution is to identify and remove these effects, thus relying on seasonally adjusted data
- ❖ The main aim of seasonal adjustment is to filter out seasonal fluctuations and typical calendar effects in order to uncover the important features of the series in relation to its evolution
- ❖ In this way the seasonally adjusted results do not show “normal” and repeating events, rather they provide an estimate for what is new in the series: change in the trend, cycle, and the irregular component



# COMPILATION ISSUES: SEASONAL ADJUSTMENT

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## ❖ Advantages:

- ❖ It supplies users and analysts with the necessary inputs for business cycle analysis, trend-cycle decomposition and turning points detection
- ❖ It provides a more smooth and understandable series hence revealing the “news” contained in the time series of interest
- ❖ It facilitates the comparison of long-term and short-term movements among industries, sectors and countries
- ❖ It provides very useful tools for statistical quality control of time series

## ❖ Disadvantages:

- ❖ Subjectivity: time series components are non observable and can only be estimated. These estimates may vary from one software to another, and upon options chosen within the software
- ❖ Burden: seasonal adjustment is time consuming and resources intensive
- ❖ Risks: inappropriate or low-quality seasonal adjustment can generate misleading or false signals

# DATA DISSEMINATION

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- ❖ Data dissemination consists of the **distribution or transmission** of statistical **data** to policy makers, business community and other data users. It is one of the most important activities of data producers. Two of the most common are printed publications and electronic publications on the Internet
- ❖ **Publication** is the action of making statistical information public
- ❖ Dissemination of IIP statistics includes the presentation of information that meets predetermined **format** standards, as well as ensuring **data accessibility** via various dissemination mediums
- ❖ The presentation of data and method of dissemination should, to a large degree, be influenced by the target audience/users

# PUBLICATION

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- ❖ Publication involves the action of making statistical information public in printed form or on the Internet, but it may and also include CD-ROMs, magnetic tapes, audiocassettes, radio and TV broadcasts, as well as any other media that can meet the same objectives. Publication involves a series of steps:
  - ❖ selecting publication types and formats (Concise (key indicators) or Thematic (detailed) – Hard copies or electronic format)
  - ❖ selecting and presenting content for publication (key figures, tables, graphs)
  - ❖ reviewing of publications prior to being published (consistency checks)
  - ❖ promoting and monitoring the use of IIP statistics (presentations, technical seminars – Distributions of hard copies, number of downloads, media references)



# DATA REVISIONS

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- ❖ Revisions occur as a consequence of the trade-off between the need for timeliness of published data and their reliability, accuracy and comprehensiveness
- ❖ In general, there are two reasons for revisions:
  - ❖ due to “normal” statistical procedures (new information available, change in methodology, change in data sources, change of base year, change in classification)
  - ❖ due to the correction of errors that may occur in source data or in processing
- ❖ Countries should develop a revision policy for normal statistical data revisions. The development of a revision policy should aim to provide users with the necessary information to cope with revisions in a more systematic manner