

Session 1
Supply, Use and Input-Output Tables
Introduction

- **Outline of the session**

1. Introduction
2. Input – Output framework of the European System of Accounts (ESA 1995)
3. Outline of the supply and use system
4. Outline of the symmetric input – output tables
5. Requirements of the ESA 1995 for the input- output framework data

Introduction

- Input-output (I/O) analysis as a theoretical framework and an applied economic tool in a market economy was developed by Wassily Leontief with the construction of the first input-output tables for the United States for the years 1919 and 1929 which were published in 1936. Since then, tables describing the interrelationships among various producers of an economy have been constructed for over 90 countries.
- For the development of input-output methodology and its application to important economic issues, Leontief was honoured with a Nobel Prize in Economic Science in 1973.
- The integration of an input-output framework into the system of national accounts was developed and published in 1968 by the United Nations as a *System of National Accounts, Studies in Methods*.
- *The integrated work earned Professor Richard Stone, a Nobel prize winner in Economic Science in 1984 "for having made fundamental contributions to the development of the systems of national accounts and hence greatly improved the basis for empirical economic analysis".*

Introduction

- The 1993 System of National Accounts (SNA) requires countries to compile annual supply and use tables (SU-tables) as it forms an integrated part of the 1993 SNA. According to the 1993 SNA, the annual estimates of gross value added and its components, as well as output, intermediate consumption expenditure, final consumption expenditure and gross domestic product (GDP) estimates should all have their origin in the annual SU-tables.
- In the UK, the first official Input-Output Tables were published in 1961 for the year 1954, and have been produced roughly every five years as needed for the National Accounts rebasing of constant price estimates.

- However, since 1991/2, the production of Input-Output Supply and Use Tables have been a central part of the UK's National Accounts and have been used to set the annual level of current price Gross Domestic Product.
- The main aim of the United Kingdom Office for National Statistics Input-Output work is to provide a framework for the detailed reconciliation of the components of the three measures of Gross Domestic Product (GDP), thus agreeing a single annual estimate of current market price GDP.
- In order to achieve this, Input-Output (I-O) Supply and Use Tables are produced annually.
- This Input-Output approach brings together all the available information on inputs, outputs, gross value added, incomes and expenditures.
- The first UK I-O Annual Supply and Use Tables were compiled during 1991/92 covering the year 1989, and published in the 1992 ONS *National Accounts Blue Book (Chapter 18)*.
- *For the 2006 Blue Book exercise, the first I-O Annual Supply and Use Tables for 2004 were produced together with revised tables for the period 1992-2003, which include revisions as described later in this article.*
- The tables are based on the *European System of Accounts 1995 (ESA 95)*.

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Input – Output framework of the European System of Accounts (ESA 1995)

The Input – Output framework of the European System of Accounts (ESA 1995) consists of three types of tables.

1. Supply tables
 2. Use tables
 3. Symmetric Input – Output tables
- Supply Table: Provides a detailed picture of the supply of the goods and services by domestic production and imports.
 - Use Tables: Shows the use of goods and services for intermediate consumption and final use. (Consumption, gross capital formation, exports). This also shows how the components of value added (compensation of employees, other net taxes on production, consumption of fixed capital, net operating surplus) are generated by industries in the domestic economy.

Benefits of Supply and Use tables

- Give detailed information on the production processes, the interdependencies in production, the use of goods and services and income generated in the production.
- A balanced supply and use table provide coherent data linking industries, products and sectors.

- Enables detailed analysis of industries and products through a breakdown of the production account, the goods and services account and the generation of income account.

Benefits of Supply and Use tables, contd.

- These tables show,
 - The structure of the costs of production and income generated in the production process.
 - The flow of goods and services produced within national economy.
 - Flows of goods services with the rest of the world.
- Supply and use tables show where goods and services are produced and where they are used in intermediate consumption

Classification of Industries and Products

The supply and use tables and input-output tables of the ESA 1995 relate products and industries.

- The classification used for industries is the 'General Industrial Classification of Economic activities within the European Communities' (NACE)
- The classification of products is based on the 'Classification of Products by Activity' (CPA)

Input – Output Tables;

- By transforming supply and use tables, symmetric input – output tables are generated.
- Hence, supply and use table forms the basis for input-output tables.
- This transformation occurs by applying certain assumptions to the relationship between outputs and Inputs.
- Symmetric input-output tables are the basis for input – output analysis.

Outline of the Supply and Use System

A simplified supply table;

Industries Products	Industries			Imports	Total
	Agriculture	Industry	Service Activities		
Agricultural Products	Output by product and by industry			Imports by product	Total supply by product
Industrial products					
Services					
Total	Total output by industry			Total imports	Total supply

- The supply table is a product by industry based table with products in the rows and industries and imports in the columns.
- Primary activities of industries are reported on the diagonal of the production matrix while secondary activities of industries are reported off the diagonal.
- In order to distinguish between primary and secondary output of an industry, a relation between industries and products has to be defined based on the criteria of industrial origin.
- The applied European classifications are structured upon the relationship between industries and characteristic products.

Outline of the Supply and Use System

A simplified use table;

Industries Products	Industries			Final Uses			Total
	Agriculture	Industry	Service Activities	Final Consumption	Gross Capital Formation	Exports	
Agricultural Products	Intermediate consumption by product and by industry			Final uses by product and by category			Total use by product
Industrial products							
Services							
Value added	Value added by component and by industry						Value added
Total	Total output by industry			Total final uses by category			

- A use table shows the use of goods and services by product and by type of use i.e. as intermediate consumption by industry, final consumption, gross capital formation or exports.
- Further, the table shows the component of value added by industry, i.e. compensation of employees, other taxes less subsidies on production, consumption of fixed capital and net operating surplus.
- A simplified use table can be subdivided into three tables
 1. Table of intermediate use
 2. Table of final uses
 3. Table of value added
- The table of intermediate use shows the intermediate consumption by products and by industry. This table thus identifies goods and services that are necessary to produce the primary and secondary outputs of industries.

- The table of final uses shows the uses of products for final consumption, gross capital formation and exports
- The table of value added shows the components of value added by industry.
- Totals over the columns of intermediate and final uses show total use by products.
- Totals over the rows of the intermediate table and the value added table identify total inputs by industries.

Supply and Use Framework

- The supply and use framework integrates the supply table and the use table in one matrix. In the framework, the production matrix of the supply table is transposed to the make matrix, and the vector of imports of the supply table is transposed to a row vector of imports.

The Supply and Use Framework

		Products			Industries			Final uses			Total
		Agricultural products	Industrial products	Services	Agriculture	Industry	Service activities	Final consumption	Gross capital formation	Exports	
Products	Agricultural products	= not applicable			Intermediate consumption by product and by industry			Final uses by product and by category			Total use by product
	Industrial products										
	Services										
Industries	Agriculture	Output of industries by product			= not applicable			= not applicable			Total output by industry
	Industry										
	Service activities										
Value added		= not applicable			Value added by component and by industry			= not applicable			Total value added
Imports		Total imports by product			= not applicable			= not applicable			Total imports
Total		Total supply by product			Total output by industry			Total final uses by category			

 = not applicable

Outline of Symmetric Input-Output Tables

- Compiling input-output tables is an analytical step.
- Input – output tables are derived from the supply and use system.
- For the transformation of supply and use tables into symmetric input – output tables, various assumptions are needed and sometimes adjustments are required.
- The symmetric tables can either be made on the basis of an industry by industry or product by product classification.

- The selection of the appropriate type depends on the specific objective of economic analysis. Industry by industry input - output tables are closer to statistical sources and actual market transactions where product by product tables are believed to be more homogenous in terms of cost structures and production activities.
- In ESA 1995, compiling product by product input – output table is promoted.
- Basic Assumptions:

1. Product by product input-output tables

- Product technology assumption (Model A)

Each product is produced in its own specific way, irrespective of the industry where it is produced.

- Industry technology assumption (Model B)

Each industry has its own specific way of production irrespective of its product mix

2. Industry by industry input – output tables

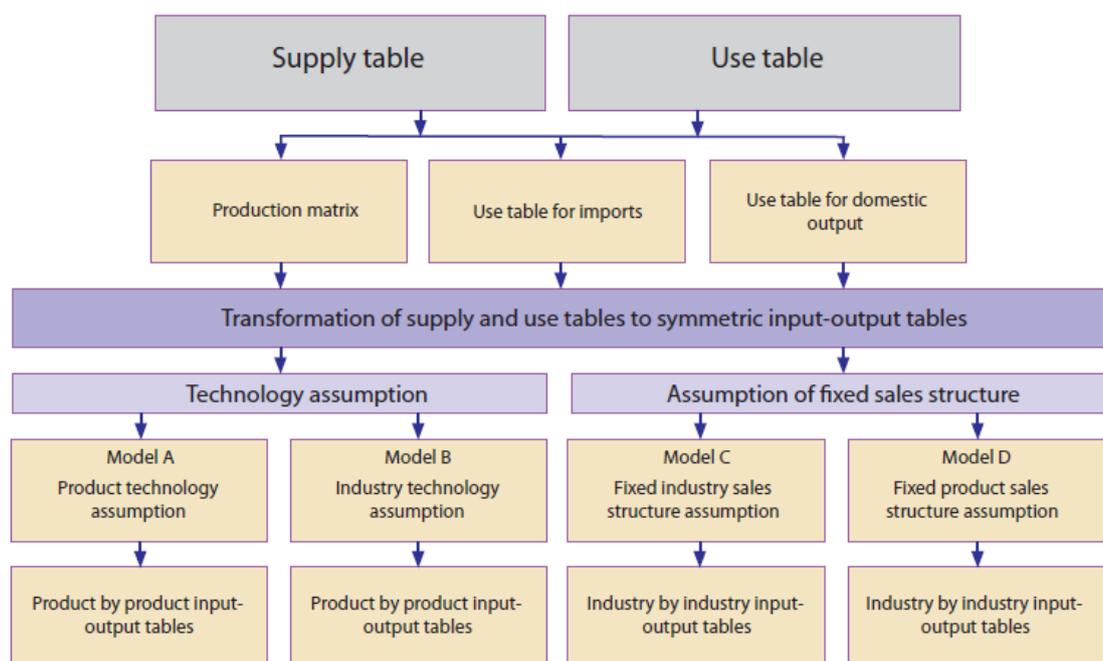
- Fixed industry sales structure assumption (Model C)

Each industry has its own specific sales structure irrespective of its product mix.

- Fixed product sales structure assumption (Model D)

Each product has its own specific sales structure, irrespective of the industry where it is produced.

Transformation of supply and use tables to input output tables



Source: Eurostat manual of supply, use and input – output tables

Note: A transformation of supply and use tables to symmetric input-output tables is not necessary if no secondary outputs are observed. In such a case the use table is equivalent to with an input – output table.

A simplified symmetric input – output table (product by product)

Products	Homogeneous units of production			Final uses			Total use
	Agricultural products	Industrial products	Services	Final consumption	Gross capital formation	Exports	
Agricultural products Industrial products Services	Intermediate consumption by product and by homogeneous units of production			Final uses by product and by category			Total use by product
Value added	Value added by component and by homogeneous units of production						
Imports for similar products	Total imports by product						
Supply	Total supply by homogeneous units of production			Total final uses by category			

Source: Eurostat manual of supply, use and input – output tables

- A symmetric input – output table is a product by product or industry by industry matrix describing the domestic production processes and the transactions in products of the national economy in great detail.
- A symmetric input – output table rearranges both supply and use in a single table.

(Exercise 1.1)

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Requirements of the ESA 1995 for the input- output framework data

Main features of the ESA 1995 supply and use tables

Classifications

- **Supply table**
Industries: NACE
Products: CPA

Domestic output and imports. Market output, output for own final use and other non-market output is only shown for the total output by industry, the distinction is not required for each product group. Distinction between market producers and producers for own final use on the one hand and other non-market producers should only be used by industry when both types of producers are present within one industry.

- **Intermediate use table**

Industries: NACE

Products: CPA

- **Final uses**

Final consumption expenditure: by households, by NPISH, by government

Gross capital formation: gross fixed capital formation and valuables, changes in inventories exports

- **Value added**

Compensation of employees, other net taxes on production, consumption of fixed capital, operating surplus, net

- **Valuation**

Supply table

Basic prices including a transformation to purchasers' prices

Use table

Purchasers' prices

- **Statistical units**

Local kind-of-activity-units

- **Supplementary information by industry for use table**

Fixed capital formation

Fixed capital stock

Labour inputs (persons)

Main features of the ESA 1995 symmetric input – output tables

- **Kind of table**

Product by product input-output table

Industry by industry input-output table

- **Transformation method**

Product technology assumption

Fixed product sales structure assumption

- **Classifications**

Products: CPA

Industries NACE

- **Valuation**

Basic prices

- **Domestic output and Imports**

Product by product input-output tables for domestic output and for imports

Industry by industry input-output tables for domestic output and for imports

The transmission programme of the ESA 1995 requests regular data provision on all three data sets of the input-output framework:

- Annual supply table at basic prices, including a transformation into purchasers' prices, both at current and constant prices,
- Annual use table at purchasers' prices, both at current and in constant prices,
- Five-yearly symmetric input-output tables, including separate input-output tables for both domestic output and imports, at current prices.
- The supply and use tables and the symmetric input-output tables have to be provided by each country of the European Union within a maximum delay of T + 36 months.

Exercise (1.2)