

## Session 8 Supply, Use and Input-Output Tables

### Balancing Supply and Use contd.

#### Supply and use tables and the link with the institutional sector accounts

- The supply and use system is not a standalone system in the compilation of macroeconomic data.
- It is a balancing framework in the core of the national accounts. Generally supply and use tables are accompanied by the institutional sector accounts and by labour accounts. Another extension of the compilation system is satellite accounts (regional, energy, tourism, health) which are linked to the core system.
- The integration of these basic statistics provides a complete and detailed picture of the economy.
- An important feature of the core system is the link between supply and use tables, the institutional sector accounts, and the satellite accounts.
- Inconsistencies must lead to adjustments in at least one of the frameworks involved.
- Causes for inconsistencies can be analysed in greater depths and balancing adjustments will be better founded.
- This integration will result in an increase in reliability and quality of macroeconomic estimates in the national accounts.
- Together with the supply and use tables, the institutional sector accounts are in the core of the national accounts.
- The sector accounts provide an overview of the various economic activities covering production, consumption, generation of income and distribution of income, accumulation of wealth and relations with the rest of the world.
- While for supply and use tables the establishment (Kind of Activity Unit) is the unit for which the basic data should be collected, the unit of observation for the institutional sector accounts is the enterprise.
- Institutional sectors are classified, according to their principal activity in the economy:
  - Non-financial corporation

Principally engaged in production of market goods and non-financial services

- Financial corporations

Principally engaged in financial intermediation and auxiliary financial activities

– General government

Principally engaged in production of non-market goods and services and in redistribution of income and wealth

– Households

Consists of all physical persons in the economy. Principal economic functions are labour supply, final consumption, and production of selected market goods and services.

– Non-profit institutions serving households

Principally engaged in production of non-market services for households. Main resources are voluntary contributions from households.

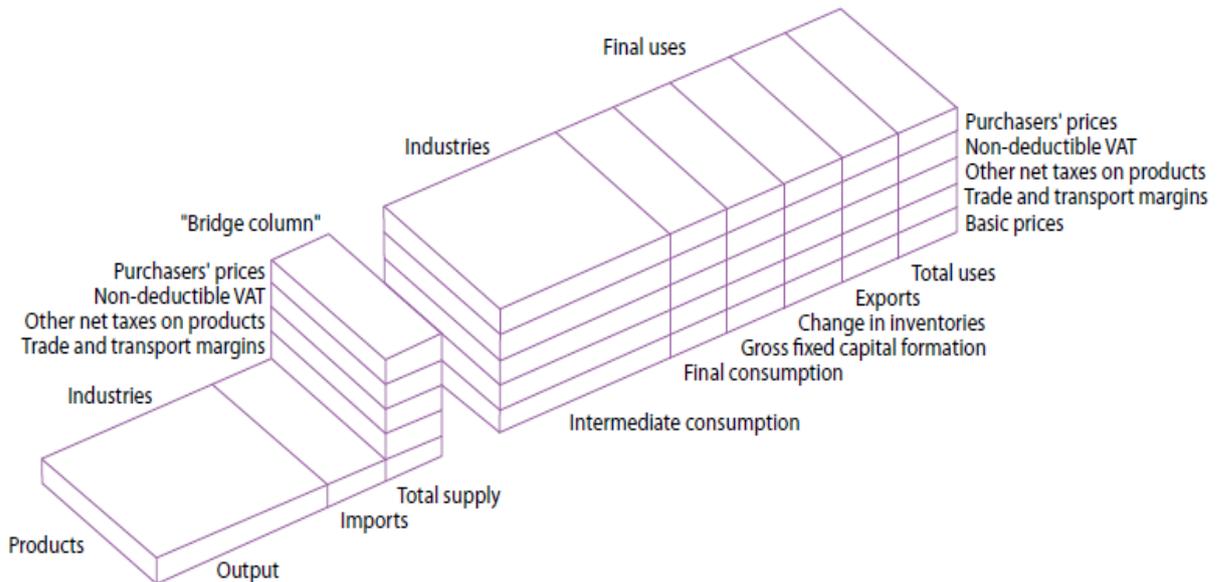
– Rest of the world

Not a real sector. The rest of the world account presents all transactions between residents and non-residents.

- Like the supply and use system, the institutional sector accounts constitute a balancing framework consisting of a set of well-defined variables and a number of basic identities.
- For the total economy, the production account and the generation of income account are in fact an aggregate of the domestic production part of the supply and use tables without the dimensions products and industries.
- From a conceptual point of view, the links between supply and use tables and institutional sector accounts are strong.
- However, in statistical practice it is not always easy to transform industry data on production into institutional sector data and vice versa.
- For that purpose, a set of tables is constructed with a dual classification.
- In this table the transactions are classified by industry (supply and use tables) and by institutional sector (sector accounts).
- The supply and use tables are the most elaborated and detailed framework to estimate GDP and other macroeconomic variables in the scope of production, consumption, gross capital formation, exports, import, and income.
- The three methods for estimating GDP are combined in one system based on a great variety of source data which are confronted and compared with each other in order to find possible causes of inconsistencies.

## Balancing the Supply and Use System

System of product balances



- The sub matrices for basic values, trade and transport margins, net taxes on products, non-deductible VAT, and purchasers' values are stacked as "layers" to visualise the transformation from basic to purchasers' prices for each cell of the system.
- As a starting point, supply is shown as a matrix of basic values in the left side of the figure. In the balanced commodity flow system, total supply at basic prices must equal total use at basic prices for each product.
- Trade and transport margins are a special case.
- On the supply side they are shown as output of trade services at basic prices from the industries in which they are produced but they are left out from the basic price level on the uses side.
- Here they are shown in the margin matrix where they are distributed together with the basic values to which they are related.
- Taxes and subsidies on products and non-deductible value added tax are also distributed as matrices for the use side.
- The gap between total supply and use at for each product is closed by a "bridge column" that is shown at the right side of the supply.
- Here margins are moved from the basic value layer to the margin layer.
- In the basic values layer the margins are shown as negative values that cancel out the supply of the "margin- products".

## Numerical example

CATEGORIES PRODUCTS (CPA)		SUPPLY									Supply at purchasers' prices
		Output at basic prices	Intra EU imports CIF	Extra EU imports CIF	Wholesale trade margins	Retail trade margins	Transport margins	Other taxes on products	Subsidies on products	Non-deductible VAT	
No		1	2	3	4	5	6	7	8	9	10
1	Products of agriculture	6 467	1 039	874	893	731	279	36	- 522	224	10 021
2	Products of industry	115 925	48 544	24 269	19 028	15 213	1 940	6 159	- 405	10 234	240 906
3	Construction work	29 161	217	143				10	- 22	1 716	31 225
4	Trade, hotel, transport services	84 164	2 044	1 512	- 19 921	- 15 944	- 2 219	191	- 1 297	2 805	51 334
5	Financial, real estate, business	70 961	3 580	1 493				1 412	- 36	1 344	78 754
6	Other services	56 112	559	281				590	- 256	517	57 802
7	Total	362 790	55 983	28 571				8 397	- 2 538	16 840	470 043

CATEGORIES PRODUCTS (CPA)		USE									Total use at purchasers' prices
		Intermediate consumption	Final consumption expenditure by households	Final consumption expenditure by non-profit organisations	Final consumption expenditure by government	Gross fixed capital formation	Changes in valuables	Changes in inventories	Exports intra EU FOB	Exports extra EU FOB	
No		11	12	13	14	15	16	17	18	19	20
1	Products of agriculture	6 426	2 561		176	108		242	397	112	10 021
2	Products of industry	91 384	55 434		2 111	22 231	163	792	42 232	26 561	240 906
3	Construction work	8 724	1 032			20 761			429	280	31 225
4	Trade, hotel, transport services	18 847	26 586		328	67			3 285	2 223	51 334
5	Financial, real estate, business	46 221	22 156		195	4 254		- 24	3 606	2 345	78 754
6	Other services	7 049	9 507	3 670	36 988	251	61		187	90	57 802
7	Total	178 652	117 274	3 670	39 797	47 672	224	1 009	50 135	31 611	470 043

- Table shows the balancing of supply and use of products in practice.
- For each product, an empirical example demonstrates how the balance of supply at purchasers' prices is attained with the corresponding use at purchasers' prices.
- At first the output of a product is calculated at basic prices. Then imports (CIF) are added to define total supply of a product at basic prices.
- In a third step, trade and transport margins are added to total supply at basic prices.
- Note that trade and transport margins, in contrast to net taxes, reflect only a different allocation of trade and transport margins at purchasers' prices.
- While at basic prices the trade margins are deducted from trade, hotel and transport services, they are added to the traded products to reach purchasers' prices.
- In other words, at purchasers' prices each product contains not only the basic production costs but also the trade and transport margins and the net taxes on products.
- The net taxes on products contain other taxes on products, subsidies on products and the non-deductible value added tax (VAT).
- Despite the apparent simplicity of a simplified system it may actually create complications that could be avoided by simultaneous balancing of all levels.
- Supply at purchasers prices must be calculated before balancing can be carried out at purchasers' prices.

- Trade and transport margins, net taxes and VAT by product might, for instance, be calculated using information from previous years or other information that does not depend on the balancing procedure itself, disregarding the fact that this will probably create an internal incoherence in the system.
- The process of compiling a balanced commodity-flow system can be summarised in the following way:
  - The first step will be to gather all information on target totals and the values that can be entered directly into the system as predetermined. It is here assumed that these have already been prepared and that all data from subsystems that produce input to the balancing process have already been compiled.
  - The next step will create an initial version of the product balances. This version can be compiled using automatic processes, but at this stage a number of unsolved problems will remain: For some products supply will not equal uses. For most categories of use the totals will usually differ from their targets. Total trade and transport margins and total VAT may also differ from their respective targets. This step will be referred to as “Automatic balancing”.
  - Then follows a step in which the initial version of the product balances is adjusted manually. The unsolved problems are examined closely. In many cases such problems will reveal errors in the calculations that produce data input to the product balances or in the primary statistics itself. Solutions to such problems may be found in co-operation with the relevant sections of the statistical office and may involve changes in supply, predetermined uses, or target totals. A number of products are redistributed between uses to bring the distance between totals and targets within an acceptable range for each category of use. Corrections to the initial balances are entered into the system to create a new - but not yet final - version. This step will be referred to as “Manual balancing”.
- It should be noted that the following identities hold after balancing:
  1. Total supply at purchasers’ prices equals total uses at purchasers’ prices in column 17 of the use table at purchasers’ prices.
  2. Total supply at basic prices in column 11 of Table 8.2 equals total uses at basic prices in column 17 of the use table at basic prices.

#### **Assumptions about available data for the current year**

- Before the supply and use system can be compiled, the necessary data must be available. It is assumed, that the following data have been prepared in a suitable form.
  1. Supply side at basic values
  2. Use side at purchasers’ prices: targets for column totals
  3. Use side at purchasers’ prices: targets for row totals
  4. Use side: targets for total use
  5. Use side: predetermined values

## Balancing Procedures

### 1. Automatic Balancing

- Before the start of the automatic balancing procedure all data are put together as a complete unbalanced commodity flow system for the current year.
- In practice an EDP file is created with values in all cells that are supposed to be non-zero in the finished system.

#### 1.1 Vertical balancing

#### 1.2 Horizontal Balancing

### 2. Manual Balancing

- The initial version of the master file should, despite the unsolved problems mentioned above, be reasonably close to the final version in its general structure.
- Now it is up to the responsible persons who are going to manually correct the system to find explanations to these problems, to check the credibility of the results from the automatic balancing and to redistribute products between uses until column totals are within an acceptable distance from their targets.
- To keep the system manageable, the rules of good conduct should also imply that all products are kept balanced with the identity of total uses = total supply during the balancing process.
- This also applies to net taxes on products other than VAT.
- Usually the first task of the balancers is to remove such differences that still exist after the automatic balancing.
- When all independently motivated corrections have been made, differences between column totals and their targets will still exist.
- The target values will usually not be equally well founded on statistical sources. Some columns should be fully adjusted to the targets, while discrepancies should be allowed elsewhere.

#### **EDP use in manual balancing**

- In a modern PC environment, the use of spreadsheets is often the preferred way of handling small and medium sized calculations.
- A detailed commodity flow system will usually be too big for a pure spreadsheet system.
- In Denmark, for example, the master file contains of some 50.000 records each with information on all levels from basic to purchasers' values for the system with approximately 2.700 products.
- Procedures for extracting data from master file to spreadsheet and transferring corrections from spreadsheet to the updated master file can be made available as macros in the spreadsheet.
- When updating a shared master file it is important that no invalid data are allowed as corrections. All corrections should be tested for errors before they are accepted.

### 3. Final Balancing

- When all manual corrections have been made, a complete picture of the accepted column totals should exist. In principle, all totals with binding targets are adjusted to their target values.
- **Input Output Tables for Sri Lanka – 2000**

The integration of input output (I-O) accounting framework in the overall system of national accounts has become an important development of many developed countries' System of National Accounts (SNA) in recent years following the introduction of SNA93. The first Sri Lankan I-O table was compiled for the year 1963 and since then a number of I-O tables have been compiled for the economy over the last four decades. However, the compilation of I-O tables for the Sri Lankan economy has become irregular compared with many other countries and no attempts have been made to integrate I-O accounting fully into national accounts of Sri Lanka yet (except the publication of supply and use tables for selected commodities). In recent years, there has been a need for an updated I-O table for statistical and analytical purposes. The main objective of this project is, therefore, to compile an I-O database for the Sri Lankan economy for the year 2000.