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Experience with the Compilation of SUT at Constant Price in Hungary

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Abstract

Recently considerable amount of progress and extensive harmonisation work have been made in the Hungarian SUT and IOT compilation to improve compliance with the ESA' 95. As a result of these improvements the SUT at current prices have been made since 1998 on a regularly base. The aim at this paper is to describe the next step of development. That is the simultaneous compilation of SUT at current and constant prices.

The first part of this paper gives an overview on the background to this development and on the extension of the data sources with the price indices. Some conceptual issues on deflation are involved as well. It deals with the main features of the new system and the methods. Special attention is made on the solutions of problems raised during the compilation.

The second part of this paper focuses on the advantages and difficulties of this method and on the result of this improvement. The next step is to continue with the full integration of SUT at current and constant prices as well into the National Accounts balancing process.

Introduction

Hungary has been working on the full introduction of ESA'95 rules concerning the SUT and IOT framework for several years. The compilation of IOTs has a long tradition in Hungary. Earlier there was compiled five-yearly benchmark symmetric IOT and between two benchmark years simplified versions were estimated on the base of the latest detailed one. At that time IOTs were constructed as an extension to the regular NAs (like a satellite account) rather than an integrated part of them, without having central role in estimation of GDP. Compilation of main aggregates of GDP and IOTs were separated therefore there were hardly feedback between the two systems. The IOTs were used as a weighting scheme for double deflation method for production-side figures of GDP. In this period the IOTs served, first of all, analytical purposes, and was used by economic researches.

The main milestones of the methodological developments

In 1998 there was a big turning point in our work. Since that the conceptual and practical compliance with the ESA'95 have been continuously improved. Having studied the international (Norwegian, English, Dutch) practices of compiling national accounts we came to the conclusion that there was an important change in ESA'95 in respect of SUT and IOT framework. The SUT has shifted into the centre of the compilation process of National Accounts (NAs). The SUT and the benchmark IOT for **1998** were compiled on the base of the newly introduced **commodity flow method**.

The Hungarian SUT for 1998 were compiled at current prices only, but according to ESA'95 requirement it would be necessary to **construct** them **at constants prices** as well. In the frame of the Hungarian National Programme for the adoption of the statistical acquis of the EU, the full harmonisation was planned concerning the SUT. The ESA'95 describes the requirements and definitions in a rather accurate way, but does not give a precise methodology to know from what data to start and by what steps to reach the target. Therefore it was important to study the EU members' practices. At that time there was a "Co-operation project between the Netherlands and Hungary in Statistics". The compilation of NA has got a high priority within this project in the management of the Statistical Office. This project gives us a good opportunity to study and implement a part of the Dutch NA System. **The level of GDP and the GDP volume growth rate** are calculated **simultaneously** in a process, where **the SUT framework** plays a fundamental role as balancing instrument. In the SUT **for every entry** there are available the following figures:

- data for n. year at current prices
- data for n. year at n-1.year's prices
- data for n-1.year at current (n-1. year's) prices
- price, volume and value indices.

The main **advantages** of compiling price and volume measures in that framework are:

- the extended **checking on consistency** of the set of data (finding mistakes in the balancing of data at constant prices may lead to change the figures at current prices);
- the **plausibility checking** by product (price indices gathered from different sources for the same commodity can be checked) and by branch (the volume change of intermediate consumption, value added and output for an industry can be contrasted with each other);
- it provides the indices for the balancing items (for example gross value added by double deflation method).

Within the project the annual SUT for **2000** were compiled **simultaneously at current and constant prices** on an experimental base. For that at first the SUT for 1999 was extrapolated based on the SUT for 1998. This work was very labour-intensive and in the first year is extraordinary because tables for two years have to be compiled parallel. An important part of the implementation of the Dutch method was the specification of the level of aggregation, the choice of index formulae and the choice of the base year to be used in the Supply and Use framework. First we have worked out a shorter, more

aggregated list of commodities (135 groups) than it was applied by SUT compilation for 1998 taking into account:

- the level of availability of basic value, volume and price information (PRODCOM statistics, agricultural account data, statistics of service activities etc.);
- the destination purposes (households consumption, gross fixed capital formation, intermediate consumption);
- to make possible aggregation of commodity data into 2-digit level of CPA;
- the weight of a commodity group within the total supply;
- the homogeneity of taxes (different VAT rates, commodity liable to excise duties)
- the homogeneity of price movements.

The Dutch suggestion for the constant price estimation was the use of a combination of indices **Paasche price and Laspeyres volume indices and the changing base year** (n-1).

For the year of 2000 in addition to traditional current price input data we had to collect all the available price and volume indices and information concerning the use and supply side. There is a big lack of information for the service activities especially. To reduce the missing data we have organised expert estimations to get volume indicators for the services.

Compiling the SUT at current and constant prices simultaneously, we applied the Dutch **working procedure** that is the column-row-column method. **First** the specialists transform data received from basic sources into the NA format. They are responsible for completing the data for some estimation and for prices. The inputs from them are the columns in the SUT. There is an extra team of so called integrators, whose task is the balancing of the rows of the SUT. In that **second step** the data are "adjusted" in row-wise only, and at the same time, the data in column-wise are "untouched". The large discrepancies in row-wise are analysed and discussed between the integrator and specialists. Automatic balancing is used for eliminating the small problems only. Otherwise the integrators balance the data manually. **Third step**: the occasional unacceptable changes in the columns are checked by the specialist and can be replaced. One of the characteristic features of the Dutch system is the automation. The main advantages of the automated integration system are the following:

- it is easy to investigate the major problems;
- it gives an efficient search to find the cause of these problems and their solutions;
- several calculations at detailed level can be performed automatically (for example: the margins and taxes on productions).

We implemented the Dutch software for balancing process. Originally it was used for calculation of quarterly GDP.

The data sources of the Hungarian SUT tables

The most important sources of the **Supply table at current prices**:

- the data of questionnaires of the structural business statistics survey,
- the PRODCOM survey (statistics of industrial products),
- agricultural production data from the Economic Accounts for Agriculture (EAA) and the commodity balances,
- data of the annual survey of the construction,
- data of the following activities: post and telecommunication, tourist accommodations and services, computer and related services, research and development services, cultural activity, sewage and refuse disposal services, repair services,
- output of the government sector broken down by functional tasks in details,
- output of the financial corporations sector,
- output of the sector of the NPISHs,
- estimation of the output of the household sector,
- data on imports from external trade statistics and INTRASTAT (database by CN code of product and by importer classified to branches), imports of services from the Balance of Payments and from statistical survey by titles and broken down by estimation into commodities,
- administrative data sources (tax declarations, profit and loss accounts, and VAT statistics).

The most important sources of the **Use table at current prices**:

- input data on the structure of the intermediate consumption from statistical survey,
- the structure of the expenditure of government institutions from the budgetary reports,
- data collection of branch statistics related to the intermediate consumption structure of the agricultural activity,
- experts' estimation for the cost structure of the financial corporations,
- estimation for the cost structure of the own-account construction of dwellings by households and for the imputation of the own-account housing services by owner-occupiers,
- the energy consumption data from the energy balance,
- household consumption in detailed groups of commodities (household final consumption expenditure, the agricultural production for own final use, social transfers in kind, the balance of tourism expenditure),
- collective consumption at detailed level,
- data on the investment statistics and other items of the gross capital formation,
- data on the inventory statistics broken down into own produced and purchased goods,

- data on exports from external trade statistic database and from INTRASTAT, export of services from the balance of payment and from statistical survey,
- data on the value added components (compensation of employees, other taxes on production, other subsidies on production, gross operating surplus).

The most important sources of the **valuation matrices**:

- the turnover data on the trade activities, the turnover data broken down by the CPA classification for sale of motor vehicles and automotive fuel, wholesale trade, retail trade and repair services,
- data of the survey on the transport tariffs of goods by type of them in the field of railway and other transport, in the case of transport of goods the use of data of the transport performances report in natural terms,
- VAT and excise duty rates and items by groups of commodities, other taxes on products and customs data for the calculation of the matrix of taxes less subsidies on products.

The main price indices used in our system are the followings:

- representative producer price indices (**PPI**s) of industrial goods and services from representative price survey;
- representative price indices and unit value indices (**UVI**s) of imported/exported goods from external trade statistics;
- representative consumer price indices (**CPI**s) of goods and services based on different calculation methodology depending on type of CPI;
- price indices of investment goods (**IPI**s);

We have strong **industrial producer price indices** based on the monthly survey. The representative price observation refers to nearly 7000 products in the NACE C, D, E activities and covers about 1400 enterprises. The observed price is a basic price. The PPI is the weighted average of the domestic and export price indices so the composition changes by destination of sales are included in the volume changes. In the basic statistics the price indices are aggregated according to the branch classification that is the standard industrial classification of all economic activity (NACE Rev.1.) but we need the aggregation according to CPA. Therefore we have taken over the price indices at the possibly deepest level and we have constructed the price indices for the commodity groups of SUT using the weighting scheme matching the NA needs.

Up to now the **price index for construction** activities is calculated **on a cost base**. It belongs to the C method according to Commission Decision'98 on price and volume measures in the NA and should not be used for our purposes. In result of the progress in the basic statistics we will solve this problem in a short-term period. There is coming to an end a project to introduce a **new methodology** for calculation of construction producer price indices. The **"component cost"** method is used that is: the

construction working processes are broken down by type into homogenous groups, price changes per unit of these groups are observed quarterly on the base of contract prices. The price observation concerns about 900 construction enterprises. The producer price indices of main construction groups are calculated on collected prices with the appropriate weighting system coming from the annual construction statistic survey (SBS). The price indices exclude the VAT, plot costs, planning, engineering and lawyer's fees.

The PPIs **for agricultural product** come from the EAA (satellite Economic Accounts for Agriculture).

Recently a great progress has been carried out in the calculation of **import and export price indices**. Up to 2002 for the measurement of price level changes of the external trade in goods were computed unit value indices (UVI). These indices were based on the value and quantity turnover data of custom statistics. From 2003 **new methodology** has been implemented for calculation of price indices based on representative monthly survey of real market prices of imported/exported goods. This survey covers the manufactured goods, machinery and transport equipment - about 90 % of the turnover. The price movements of these groups are considered heterogeneous. Measuring of the price level changes of these groups is based on actual transaction prices of the representative goods at border parity. The sample survey of prices covers about 6000 representative goods and 1600 enterprises. For the goods belonging to the groups of food, beverages, tobacco, crude materials and fuels (about 10 % of turnover) the price level changes are estimated by unit value indices. These product groups can be considered homogenous and stabile from point of view of composition changes. The UVI of these groups are calculated from value and quantity data of Extrastat and Intrastat. The external trade price index statistics produces indices broken down by groups of countries beside the detailed product level. It makes possible to estimate the EU and extra EU import and export at constant prices according to the ESA data delivery requirements.

In Hungary the **CPI** is a weighted Laspeyres type index. At present there are approximately 900 representative items to be observed in 35-150 outlets by item depending on their character. The publication level has 156 major headings. The weights are derived from the National Accounts completed with the data of Household Budget Survey and other additional sources. The weights are revised annually and they refer to the household expenditure structure of the year t-2. We used the CPI at the most elementary level to compile the household final consumption expenditure at constant prices. One of the most important developments of the CPI statistics of the latest years was the introduction of **constant tax rate index** (**CTI**). It contributes to improve the constant price compilation of HNA and SUT according to the EU Commission decisions concerning the principle of price and volume measure in NA. The CTI eliminates from the CPI the impact of changes of the most important indirect taxes (VAT, excise duties and registration taxes for new motor cars). So the impact of indirect tax changes can be separated within the CPI. The CTI is calculated according to the taxation rules of the base year and not to rules forcing in the current year, so the CPI excludes the changes of taxes from base year to current year. The CTI has been calculated in HCSO regularly from 2003.

The **price index for gross fixed capital formation** belongs to the type of **secondary indices**. The price index for construction, for industrial domestic sales of capital goods and the representative price index for import of capital goods (machinery and transport equipment) are used for its calculation.

Based on the improvements on investment price statistics we can get indices at more detailed level for groups of machines and motor vehicles by type. The weighting system used for the calculation of average price indices is based on extra data collection system on the composition of investment goods by type. The further progress will be the decomposition of the investment price indices by type of buildings and other constructions due to the above mentioned improvements on calculation of construction producer price indices.

Some problems arose during the simultaneous compilation and **their solutions** are the followings:

- Compilation of **valuation items** (trade margins, transport margins, taxes and subsidies) at current and especially at constant prices. We used a **proxy** for estimation of the volume indices for the trade margins on products. As an initial estimation we assumed that the volume changes in trade margins equal the volume changes of the corresponding commodity groups, in other words the margin to sales ratios are constant in constant prices. It includes that no quality changes in the trade services. Making our estimate we split up the trade margins into wholesale and retail trade margins. It would be better to **distinguish** more trade **distribution channels** in that cases the shifts between trade channels will be included in the volume component of output. It was not possible to deflate the sales and purchases for resale separately and take the difference between these amounts. **Volume projection** was used for **deflation of taxes and subsidies** on products (changes of tax rates belong to the price aspect);

- Deflation of the supply data in a number of **services** because of the large **lack of price indices**. To solve this problem for example for the transport services volume indicators were used by different type of transport. For deflating some services we could use only the CPI. It was not big problem in case of personal services but in other cases we should have avoided this method. A large improvement in the HNA and SUT compilation can be made in the near future in deflation methodology of service market outputs. In the HCSO a **Grant project** is going on to establish **producer price statistics for business service activities** (**SPPI**) mainly for section I and K. In the frame of this project there are worked out price observation methods and data collection systems on producer prices by type of activities. In line with the price observation system a separate data collection will be launched on survey of output values of services at detailed CPA level. The output value data will be available with breakdown by destination (domestic and export sales). For the biggest part of activities sample survey of representative prices will be introduced, but in several cases can be collected full scope price information about the changes (railway, airway transport, post and telecommunication). On the base of collected data the representative price indices can be weighted and aggregated to higher level in two direction: as average price index for commodity groups or average price indices for service industries. The breakdown of services by type takes into account the expected changes of NACE and CPA classification in EU.

- Constant price data for the **output of government** and non-profit institutions serving household sector are **fixed based** (2000), we had to change the base year to the previous year. Two years ago to improve the volume measure of non-market output of government sector an **experimental work** started in the government sector accounts compilation concerning the output of education

and health services. Based on the new methodology the **output** of those government activities is **measured directly**. For the health care and education that are supplied individuals the output is broken down at detail level by type of services. The **output indicators** at detailed levels are collected from the governmental reports (for instance from the National Health Insurance Fund report), and these output indicators are weighted by costs of each type of output in the base year. For the health services are distinguished the in-patient and out-patient hospital services, dental services, veterinary services. Within these levels the treatments are separated and calculation are carried out by type of diseases, by so called Diagnose Related Groups. The education services are broken down by the level and type of education system - primary, secondary (general-technical), higher education, adult education services and so on. The basic information for these service groups are the number of learners and the cost norms per capita related to that level of the commodity group in the base year For the time being these calculations have not been introduced into the official National Accounts figures. For the **collective services** there is no plan to change the traditional **input methods**.

- Deflation of intermediate consumption. Complete lack of information on intermediate consumption price indices (**ICPI**s) collected from the purchasers or from wholesale traders. The situation in Hungary is that a meaningful part of intermediate consumption is imported, and the price changes of domestic output and imports are different. To solve this problem we calculated **weighted price indices for the intermediate consumption** using the domestic - import shares from the IOT and Import matrix for the benchmark year and the PPI of domestic sales and the UVI/or representative import price indices of imported goods product by product. In case of some commodities we had to face **valuation inconsistency**. For example the changes in taxes (excise duty) on petrol were not as high as the changes in PPI of that product. We made an adjustment to overcome this problem. Other problem was that for some homogeneous products (for example gas) there are different price movements for different user groups.

- Typically in the case of **high-tech goods** we realised that the deflator for the export sales of a certain product on the production side was significantly different from the one for the same product on the expenditure side. It was caused by different treatment of the quality changes in the basic statistics.

- In the past when the **FISIM** was treated as intermediate consumption of the nominal industry the **overall CPI** was used for deflating it. But **now the FISIM is allocated** to the users according to the Regulation of FISIM. The calculation of FISIM at constant prices starts from calculation of the **base-year margin** for loans and deposits by users' sector and export and import. This margin is equal to the difference between the effective rate on loans and deposits and the reference rate for base year. The calculation of FISIM at constant prices is carried out by applying the base year margin to the **stock of loans and deposits** which **is revalued** to base year prices using the general deflator of domestic final demand.

The current situation and future plan

Recently a lot of **progress** has been made in the Hungarian **National Accounts System** to improve compliance with the ESA'95. In this connection the experiences obtained in the SUT compilation, the problems occurred in the balancing processes and their solutions make a contribution to the NA developments. Besides the change of base year (to 2000) some other methodological changes were introduced in the annual National Accounts to improve compliance with the regulations of the EU.
Some of them were **based on the SUT/IOT feedback** or were tested in the SUT framework.
For example:

- In the new system the gross **output of restaurants** includes the consumed food and beverages, not only the "trade margins" on them.
- Some **adjustments** on the structure of the **households' consumption expenditure** are based on the commodity flow approach.
- In the case of some special industries **subcontractors**' performance is accounted by gross method as intermediate consumption, and of course as a part of the gross output. This way of accounting does not affect the GDP, but it affects the structure of gross output and intermediate consumption.
- **Major processing work on imported materials** is accounted by gross method in contrast with the earlier practice (net method); this adjustment is calculated and tested in the SUT framework.

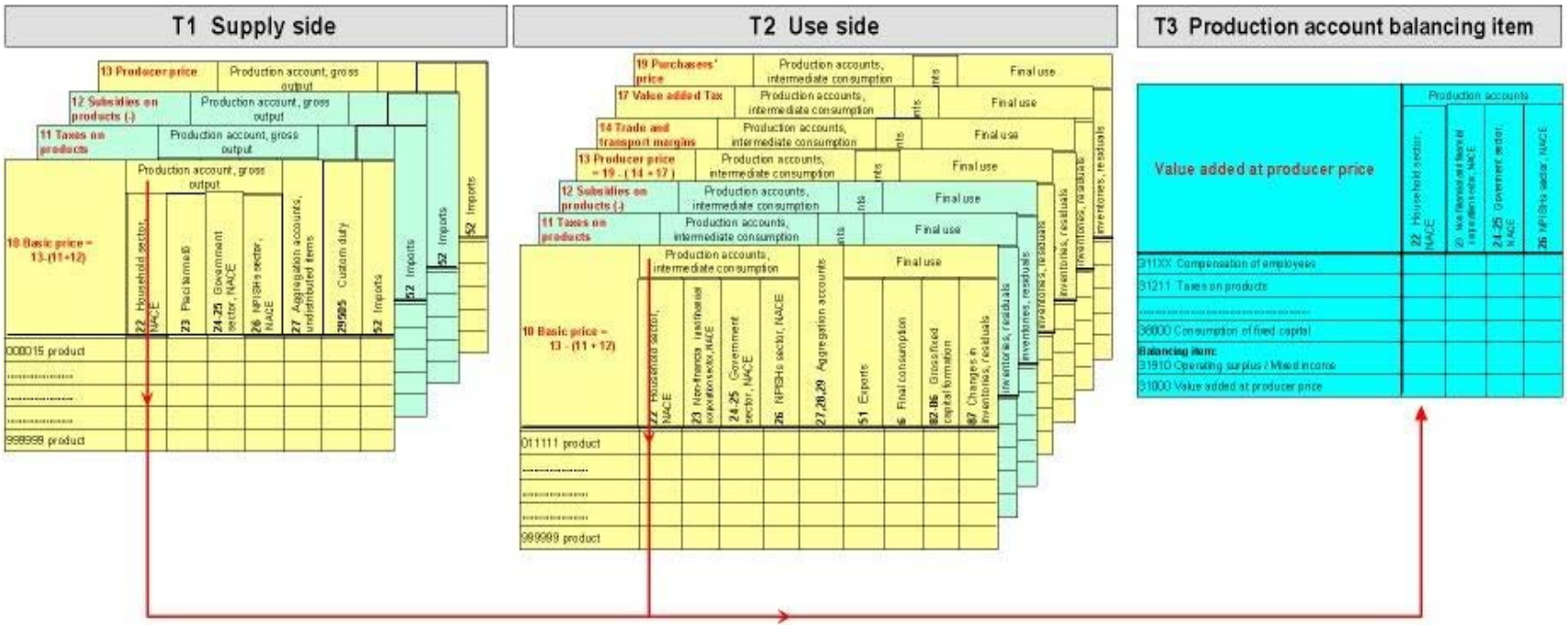
According to ESA'95 the SUT should play an important role as a co-ordination **integration framework** in System of National Accounts. The integration can be attained in two ways: fully and softer way. In the first way there is only one simultaneous compilation process, in the second way the integration means: basing provisional NA calculations on the – latest available – SUT, and revising them with the SUT after three years of reference year. The final goal at the development of the SUT/IOT was the **integration of SUT compilation into the system of NA** - by the means of a consistency "bridge" between the basic data sources and the calculation of GDP - but it can be achieved step by step.
GDP can be estimated by production, expenditure and income method. Theoretically each measurement should result the same estimation, but in practice the three approaches compiled independently can result three different estimates of GDP. In the traditional NAs the **reconciliation between the three approaches** is taken place at the global level, manually. Using SUT as an integration framework for the compilation of NA data the reconciliation between the three approaches to GDP is achieved during the preparation of the SUT at a detailed product level. The main difference between the SUT and the regular NAs is the **product dimension**.
The **full integration** of SUT/IOT into the National Accounts has got a high priority in Hungary. The integration is one of the **strategic element** of the recent improvements aiming to build a fully integrated, more standard, transparent and more reliable estimates of National Account figures. The beginning of this year a **new project** was launched aimed at **adopting the Norwegian** "System of

National Accounts – New Technology" (SNA – NT") **software.** The integration is one of the most important elements in point of view of the constant price calculation as well. First the SUT are filled up and balanced at current prices and than deflated with price indices. The **main principle** of the **constant price calculation** with the SNA-NT software is the followings:

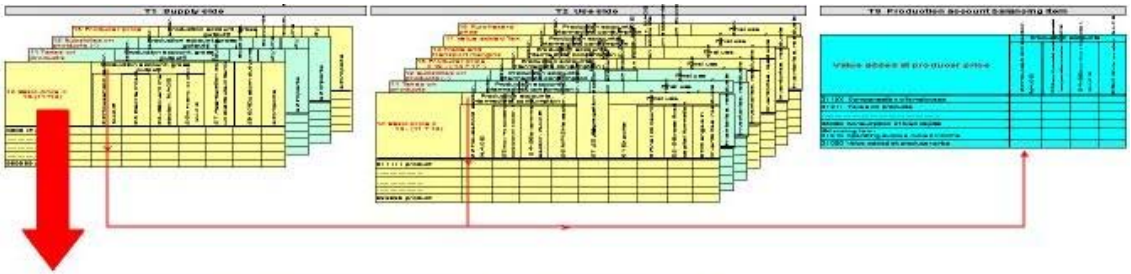
- double deflation method is used for GDP
- the type of price data used by deflation is consistent with the valuation of variable being deflated (producers' prices, purchasers' prices)
- the deflation is carried out at the very detailed product level
- the supply and use part is deflated by consistent price indices
- the constant price calculations for each value classes (basic value, taxes and subsidies on products, producers' value, trade and transport margins, VAT and purchasers' value) are integrated in a complete process and supported by an efficient software,
- constant price data are consistent with the current price data.

The structure of the SUT framework is illustrated on the next page.

Model structure



Supply side



10 Basic price = 13-(11+12)	Production account, gross output: 22 Household sector, NACE	23 Piaci termelő	24-25 Government sector, NACE	26 NPISHs sector, NACE	27 Aggregation accounts, undistributed items	29505 Custom duty	52 Imports
000015 product							
.....							
.....							
.....							
999999 product							

13 Producer price — Production account, gross output

12 Subsidies on products (-) — Production account, gross output

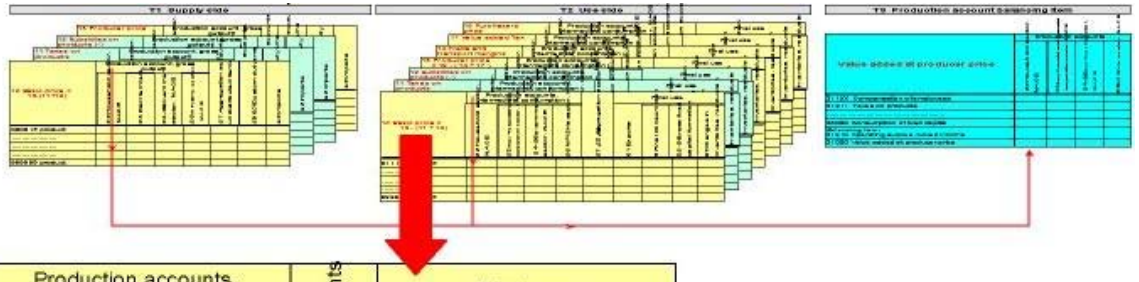
11 Taxes on products — Production account, gross output

52 Imports

52 Imports

52 Imports

Use side



19 Purchasers' price | Production accounts, intermediate consumption | ounts | Final use

17 Value added Tax | Production accounts, intermediate consumption | ounts | Final use

14 Trade and transport margins | Production accounts, intermediate consumption | ounts | Final use

13 Producer price = 19 - (14 + 17) | Production accounts, intermediate consumption | ounts | Final use

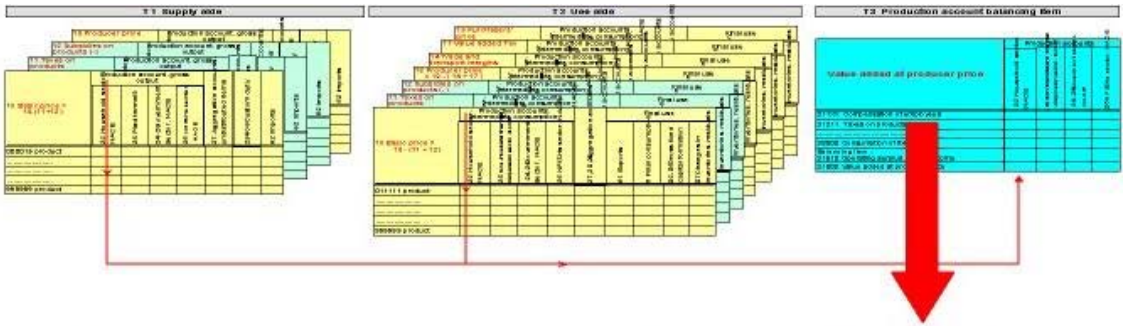
12 Subsidies on products (-) | Production accounts, intermediate consumption | ounts | Final use

11 Taxes on products | Production accounts, intermediate consumption | ounts | Final use

10 Basic price = 13 - (11 + 12)	Production accounts, intermediate consumption					Final use			
	22 Household sector, NACE	23 Non-financial and financial corporation sector, NACE	24-25 Government sector, NACE	26 NPISHs sector, NACE	27,28,29 Aggregation accounts	51 Exports	6 Final consumption	82-86 Gross fixed capital formation	87 Changes in inventories, residuals
011111 product									
.....									
.....									
.....									
999999 product									

inventories, residuals | inventories, residuals | inventories, residuals | inventories, residuals

Production account balancing item



Value added at producer price	Production accounts			
	22 Household sector, NACE	23 Non-financial and financial corporation sector, NACE	**24-25** Goverment sector, NACE	**26** NPISHs sector, NACE
311XX Compensation of employees				
31211 Taxes on products				
.....				
38000 Consumption of fixed capital				
Balancing item: 31910 Operating surplus / Mixed income				
31000 Value added at producer price				