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**Session 1 C. Construction and Use of Input-Output Tables in Transition Economies**

# Experience from Transition Economies with the Development of Supply and Use Tables integrated with the National Accounts in Current and Constant Prices

## by

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# 1. Background. Contact with Central and Eastern Europe Countries in the early 1990ies

## 1.1. From MPS to SNA

After the Russian revolution, official national accounts figures for USSR were from the 1920s based on a Marxian concept of production, later developed as the Material Product System (MPS) [1]. Since the 1950s, other centrally planned countries also adopted MPS for their national accounts. The version MPS69 was published in Russian in 1970 and became the official statistical standard for measurement of economic performance for the centrally planned economies (CPEs). The compilation of Input-Output Tables has a long tradition in the CPEs where the IOT were subordinated to the methodological principles of the MPS.

From 1971, the United Nations (UN) accepted that these countries used the MPS69 for their reporting to UN, while the rest of the world used UN "System of National Accounts" (SNA68).

A major conceptual difference between the MPS69 and the SNA68 is the production boundary, which is confined to "material production" in the MPS69. For example, the services of owner-occupied dwellings and government health care, education and defence were not regarded as production (or productive - as in the split of industries between the material or productive and the non-productive service sectors?. However, the MPS69 already included concepts as actual consumption ("Total consumption of the population"), first included in SNA from SNA93.

By the end of 1980s there were efforts in the international community to link or bring a revised SNA and a revised MPS closer together. Onset by the break up of the Soviet Union, the "Iron curtain" was finally removed during the years 1989/1990. As a consequence, the system of central planning rapidly gave way to market economy in Central and East European Countries (the CEECs). The political transformation had direct implications on the statistical system, which needed to serve the future needs of market economies.

As a result of the drastic political events and the fundamental institutional restructuring in 1989 and 1990 in the CEECs, plans for integration between the two national accounts systems, MPS and SNA, became outdated

## 1.2 Conferences, seminar and workshops in the early 1990ies.

### 1.2.1. Assistance to countries in transition

From 1990, the countries in the "West" offered their assistance to Countries in transition to facilitate the transformation in all areas including the transformation of statistics. Already in 1990 the Norwegian Parliament voted NOK100 mill. for assistance and cooperation with Central and Eastern European Countries (CEECs). Statistics Norway was given a substantial amount making it possible to participate actively in the cooperation with Statistical Offices in some of the CEECs.

The first meetings and contacts with national accountants from the CEECs opened a door to a statistical world many of the statisticians from the West did not know much about. We met new, very interesting colleagues and made many new friends. From the early meetings, Statistics Norway has had a special contact with the statistical offices in Bulgaria, Hungary, and the Czech Republic (at that time part of Czechoslovakia) and Slovenia (at that time part of Yugoslavia). We participated in workshops and seminars in these countries and invited study groups to visit Statistics Norway.

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[1] System of Statistical Balances of the National Economy, (United Nations)

The following sections cover conferences, workshops, seminars which give a background for Statistic Norway's assistance to the National Accounts/ Supply and Use Tables (SUT) and Input-Output Tables (IOT) projects described in chapter 4.

### 1.2.2. Conference on transition problems in statistical offices in ECE, Geneva, May 1990
Statisticians from the west and east of Europe had met over the years at the Conference of European Statisticians (UN, Economic Commission for Europe) , but they had lived within two economic and political systems.

The conference in Geneva, organised by UN/ECE and the WORLD BANK in May 1990 revealed a pressing need for statistical assistance in the fields of national accounts, statistics for private enterprises and foreign trade statistics for all the countries in a transition process to market economy. At this conference informal discussions with the high level statisticians from the "countries in transition" could be difficult since the majority spoke Russian as their second language and very little English.

### 1.2.3. Seminar on statistics for private enterprises, Prague, June 1990
The political and social changes, which took place after 17 November 1989 in Czechoslovakia, gradually found their reflection in the economic sphere. A new law, giving the prerequisites for private enterprises, was approved by the Parliament in April 1990, as the first step to a market economy.

Liv H. Simpson was asked by UN/ECE to organise and chair a seminar, covering the statistical requirement from the point of view of a fundamental economic change with thousands of new private enterprises in transition countries. Economists from different Ministries and statisticians from Czechoslovakia Federal Statistical Office, Czech Statistical Office, Slovak Statistical Office and also from statistical offices in Hungary, Romania and Yugoslavia attended the seminar The seminar had presentations by statistical experts from FRG, Hungary, UK, the Netherlands and Sweden covering "Business register", "Confidentiality" and "Data collection system for finance institutions and for private enterprises". Mr. Laszlo Drechsler presented a paper. "The system of national accounts (SNA) as a tool for the co-ordination of economic statistics". Mr. Drechsler also recommended that the countries started reading the draft of the revised SNA (93) instead of SNA68. Mr. Derek Blades, head of national accounts division in OECD, participated as an observer because OECD was to" organise the next conference in September 1990.

The seminar was conducted in English and Czech. Mr. Drechsler helped the interpreter, since many of the words in English, used by the statistician from the west, were unknown in the east. The seminar lasted a week, with nice informal evenings with new friends, admiring Mr. Drechsler playing chess (once a world champion in chess and at that time Hungarian world champion in national accounts with long experience from international organisations).

### 1.2.4. Conference on Statistics of the CEECs in OECD, Paris, September 1990.
Around 100 directors and chief statisticians from Statistical Offices from East and West Europe, USSR, USA, Canada and Australia met for the first time in Paris, at a conference organised jointly by OECD and UN /ECE. All the statistical offices of the CEECs were represented at the highest level.

<u>An important conclusion from the Conference was that the essential task in national accounting would be the introduction of SNA/ESA rather than modification of MPS.</u>

At this conference, the chief statisticians of the CEECs declared their intention to introduce UN's SNA or the European Communities version ESA within a short period of time (2-3 years). Experience has shown that the introduction of SNA/ESA has taken much more time and a lot of resources.

### 1.2.5. Statistical seminar at the seaside in Yugoslavia, September 1990.
EFTA organised this seminar for the directors and senior statisticians from the Yugoslavia Federal Statistical office and for the regional offices. Mr. Bader, director general from Austria, chaired the seminar. Liv H. Simpson presented the paper: "The national accounts system as a tool for co-ordinating and developing economic statistics".

### 1.2.6. Workshop on Major Fields of Transition Problems in Budapest, October 1990.
The most comprehensive workshop held was in Budapest, attended by 124 participants from 22 countries and from UN/ECE, ILO, EFTA, Eurostat, CMEA and OECD. National accounts, business registers, price statistics and foreign trade statistics were dealt with in parallel panels. Ms. Carol Carson chaired the National Accounting panel.

*An important conclusion after Bent Thage from Denmark Statistics had presented his paper was that Supply and Use tables with detailed Commodity flows were the best approach for starting national accounts compilation according to SNA.*

Hungarian national accountants had been participants at the IARIW conferences and had knowledge about the Norwegian national accounts system with annual Supply and Use Tables. Three of the previous chairpersons of IARIW were from Hungary and an IARIW conference had also been organised in 1973 at Balatonfured in Hungary. After a request from the Hungarian National Accounts statisticians, study trips to Statistics Norway and visits back to Hungarian statistical office in the beginning of the 1990ies were organised.

### 1.2.7. Workshop for countries in transition in Washington, February 1991
The workshop was organised after the UN Statistical Commission meeting in New York. At the UN meeting, only the delegations from China, Cuba and USSR declared they would continue with MPS or a modified MPS as their national accounts system.

At the workshop in Washington different researchers from Universities in USA met the directors of statistics from all the CEECs. Professor Vassily W. Leontief gave a very interesting lesson about the history of and the experience with input-output tables both in the MPS system and in the SNA system.

*Professor Leontief's view on the importance of input-output tables was a topic all the representatives from the countries in transition seemed to agree on.*

### 1.2.8. EFTA workshop on the relation between foreign trade statistics and national accounts in Bratislava, June 1991
In the framework of a declaration for cooperation between EFTA and the CEECs, the EFTA States organised a workshop on foreign trade statistics in Bratislava in June 1991. Foreign trade statistics are a major data source for the national accounts statistics and especially for Supply and Use Tables. The main topic on the workshop agenda was the relation between national accounts and foreign trade statistics, both concerning data collection in a market economy, classifications and price indices.

Liv H. Simpson chaired and organised the workshop together with the EFTA secretariat. Statisticians from Czechoslovakia, Yugoslavia, Hungary, Poland, from EFTA countries, Denmark and UK and also from the secretariat of EFTA, ECE and Eurostat attended the workshop.


## 1.3. Concluding remarks

The transition to a common national accounts system according to SNA93/ESA95 based on new statistical data sources; has been a very demanding task for all the countries in transition.

Different projects with experts from many countries in the "West" have contributed to implement SNA93/ESA95 and improve the quality of national accounts in the CEEC countries. A problem for the countries in transition has been that the national account experts from the countries in the "West" have different views on how to implement SNA93, ESA95 and what to give priority. The views of the experts were at the early stage often based on the methodology in their home country. An example is from the OECD meeting for the CEECs in Paris in October 1990, where Mr. Norbert Rainer from Austria presented an interesting paper about the role of input-output tables in the statistical program. Implementation of harmonised input-output tables among the CEECs started in the 1960's; in parallel with the elaboration of MPS. Mr Rainer explained how the long experience compiling detailed IO-tables and using IO for analytical purposes would be useful in their future national accounts work with SNA. The expert from UK said in the debate that experience with compiling detailed IO-tables according to MPS would be of no use. At that time UK as most of the EU countries had not integrated SUT and IO-tables in their current national accounts system.

Language problems were also serious in the early 1990s since Russian was the second language of the CEECs representatives, but during the transition period they have all achieved a very good knowledge of English, which has become the common language in the European statistical co-operation.

Many statistical offices had also a difficult working situation with low salaries and a lack of efficient computers and office equipment. This situation seems to have improved dramatically during the last years, but some of the CEEC countries still have problems. One IMF report on the Observance of Standards and Codes (ROSC) for one of the transition countries from as late as 2003 points out that the resources for national accounts, balance of payment and price statistics are not sufficient, especially in view of the intention to implement the EU guidelines in these areas.

# 2. Technical assistance in national accounts to transition economies.

## 2.1. OECD

Following this first conference in 1990, OECD organised special meetings and several visits to all the transition countries. At the annual OECD national accounts meetings in Paris, national accounts experts from the CEECs were invited as observers, and special meetings were organised back to back with the ordinary meetings. This gave a good opportunity to have formal and informal discussions with our new national accounts colleagues.

## 2.2. EUROSTAT and CMFB

During the 1990's, EU's statistical office, Eurostat, started projects to bring the countries of Central and East Europe up to the statistical standards of the Community, using classifications as NACE, CPA and PRODCOM.

Already in 1996 there was an urgent need for Eurostat to receive macro-economic statistics for all the areas relevant to future negotiations from the 10 CEEC countries, Cyprus and Malta. Priority for the "pre-accession countries" should be national accounts, financial accounts, balance of payments and price statistics. Upon entry into EU, the acceding countries were legally obliged to undertake the harmonisation work necessary to bring their statistics in line with legal requirements. The national authorities in the acceding countries had to take the necessary actions outlined in the "Action Plan on economic, monetary and financial statistics" as a matter of the highest priority

The Committee on Monetary, Financial and Balance of Payments Statistics (CMFB), established in 1991, had become an important forum for cooperation between Eurostat and the European Central Bank (ECB) for development of economic and financial statistics, national accounts and balance of payments. From 2000, representatives of all Candidate countries were invited to the meetings of the CMFB as observers. From May 2004 the 10 new EU countries were full members of CMFB and all Eurostat working groups and from 2007 also Bulgaria and Romania.

Informal contact and discussions at the CMFB meetings held in Eurostat with Directors of National Accounts from the statistical offices of Bulgaria, Slovenia and the Czech Republic lead to the formal request for technical assistance from Statistics Norway for the Supply and Use Table (SUT) projects, described in chapter 4, financed as Phare sectoral 2000/2001/2002 projects.


## 2.3. The Phare Statistical Co-operation Programme

The purpose of the Phare Statistical Co-operation Programme was to improve the provision of official statistics relating to all the beneficiary countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia. During several years, Eurostat offered opportunities for training and acquiring expertise for the CEEC countries. Different "Phare projects" have contributed to implementation of ESA95 in these countries.

Experts from Statistics Norway participated in several Phare statistical assistance activities in the field of national accounts. Areas covered have been "Supply and Use Tables", Constant prices".
"Private household consumption" and "Dwelling services". This paper only covers Norwegian assistance in the program for "Supply and Use Tables" and for "Constant prices".


# 3. Integration of Supply and Use Tables in the National Accounts


## 3.1. Annual Supply and Use Tables.

Annual Supply and Use Tables (SUT) should serve both statistical and analytical purposes. Integration of Supply and Use tables as well as Input-0utput tables in the national accounts work has become a key feature, *ref. SNA 93 chapter XV and European System of Accounts (ESA) 95, chapter 9.*

**Main functions/advantages**
- *An efficient confrontation and check of economic statistics and other data sources*
- *An ideal framework for different valuation concepts (basic value, purchasers' value etc.)*
- *An important tool for constant price estimates giving balanced SUT in both current and constant prices.*
- *Reliable constant price figures for value added by industries and GDP (the double deflation technique supported by documentation of price indices used))*
- *Important for analysing the effect of imports and exports on the country's economy.*
- *Database for converting to Industry format Input-Output tables (IOT) in current and constant prices*
- *Database for econometric models and economic planning purposes*


## 3.2. ESA 95 Regulation

The ESA95 transmission program requires that the EU Member States deliver:

*Supply and Use Tables (SUT) at both current and constant prices of the previous year on an annual basis with a deadline of T+36 months. The Supply table should be at basic value, including a transformation into purchasers' prices, (A60 x P60) and the Use table at basic values, (P60 x A60). Symmetric Input -Output Tables (IOT) at basic values are required five yearly. The Input-Output Table should be 60 products by 60 product (or 60 industries by 60 industries (homogenous branches).*

### 3.3. The long Norwegian tradition

The commodity flow method and double deflation estimation for constant price estimates have served as a cornerstone of the Norwegian National accounts work from the early 1950s.

Already in the 1960s, Statistics Norway had built up high level of expertise using computers for compiling the national accounts and balancing the supply and use of about 1700 commodities. These lead to visits for studying the Norwegian national accounts methodology, and to co-operation with other countries.

When SNA93/ESA 95 was implemented in Statistics Norway in 1995, the long tradition using computerised routines for compiling annual SUT was taken advantage of when designing the new SNA-NT application as a flexible and portable software.

### 3.4. The design of the Supply and Use Tables (SUT)

By the Norwegian methodology "System of National Accounts- Norwegian Technology" (SNA-NT), a documented, verifiable and efficient set-up for compiling national accounts with integrated SUT and IOT in current and constant, previous years' prices, has been developed.

Developed software following the SNA-NT methodology will establish, balance and update the detailed SUT by the different types of valuation, i.e. for basic values, producers' values, trade margins, transport margins, product taxes, product subsidies, VAT or sales tax and purchasers' values. The final stage of an automatic balancing process is simultaneous balancing and correcting SUT in both current and constant prices.

*See chapter 5. "Overview of the SNA-NT methodology introduced in some CEEC countries" and the Annex with references the Documents from Statistics Norway with a detailed documentation of the SNA-NT methodology.*

## 4. Supply and Use Tables in different CEEC countries, the Statistical Offices in Bulgaria, Slovenia, the Czech Republic and Hungary.

### 4.1. The Phare programme for "Supply and Use Tables" and "Constant price estimates"

Directors of National Accounts from Bulgaria, the Czech Republic and Slovenia requested assistance from Statistics Norway to implement an efficient methodology for compiling Supply and Use tables (SUT) and Input-Output Tables (IOT) in current and constant prices.

These projects became feasible by financing from Eurostat to Statistics Norway, as "Phare" grants. The Phare projects had defined phases, Eurostat required Terms of reference (TOR) for each action, a detailed report after each action and a final report. For these projects the reports were very important since Eurostat gave comments or acceptance after each activity.

The co-operation with Bulgaria, the Czech Republic and Slovenia started with a workshop in Statistics Norway in November 2002. Eight high-level statisticians and I/O experts from the national statistical offices of the three countries participated. The goal of the workshop was to explain how the quality of the countries' annual national accounts could be improved by integrating SUT and IOT in the current national accounts compilation process. The Norwegian SNA-NT methodology for compiling SUT/IOT was demonstrated by using the Norwegian software SNA-NT. The statistical offices were offered to use SNA-NT free of charge for training or for implementing in their ordinary compilation process; provided that the Statistical Office had an Oracle licence and could finance required training.

During 2003 one week training visits for "Supply and Use Tables" were carried out to each of the three countries. In all countries a test version of the SNA-NT software were installed with the active participation of the countries' own IT-experts. A significant amount of time was dedicated to the explanation and discussion of the requirements concerning classifications and statistical data and the work involved to prepare the data in the format required as input into the database. A part of the SUT-project involved customising the required classifications to meet the needs of the different countries. Significant effort went into establishing the level of classification necessary for analysis of industries, types of final use and products. The requirements of the European Union were also discussed and incorporated into the Supply and Use Table design, namely reporting to Eurostat aggregated SUT comprised of 60 specified industries (aggregated level of NACE) and 60 specified products (aggregated level of CPA).

Another important topic was to discuss and explain how the experience and the data from the existing Supply and Use tables in current prices for the three countries could be utilised when establishing the more detailed Supply and Use Table for the selected first year 2000 for Bulgaria and 2001 for Slovenia and the Czech Republic, using the SNA-NT software.

During the next training visits to the three countries, the aim was to assist the countries in improving the national accounts constant price estimates by following the EU Commission Decision in Constant prices to eliminate the use of "unacceptable methods". Improvement of the constant price estimation of the national accounts by compiling SUT in constant prices was explained in detail. Different alternative price and volume indices were evaluated. The methodology for compiling SUT in constant prices using SNA-NT was demonstrated based on the current price SUT and price indices and tax rates for products. Programs for the improvement of price and volume indicators were set up.

## 4.2. The SUT-compilation in the National Statistical Institute (NSI), Bulgaria

The compilation of Input-Output Tables in Bulgaria has more than 45 years of tradition. The first Input-Output Table was compiled in 1960. Until 1989, the general framework of the tables was subordinated to the methodological principles of the Material Product System (MPS), applied under the conditions of a centrally planned economy.

From 1990 NSI started experimental work compiling Make and Use tables following the System of National Accounts (SNA68). The first Supply and Use Tables (SUT) for Bulgaria for 1991, 1992 and 1993 were published in 1996. Since 1996, Bulgarian National accountants participated in several multinational projects and programs for adoption of national accounts methodology.

The year 2000 was the first reference year for a fully detailed and balanced SUT including detailed valuation matrices, using the SNA-NT methodology and software. Bulgaria NSI has later completed SUT in current prices for the years 2001, 2002. Aggregated Supply Tables and Use Tables for the years 2000, 2001, 2002 at Eurostat's A60/P60 have been published. SUT for the year 2001 in 2000 prices and the year 2002 in 2001 prices are produced, but not yet published.
The year 2003 will be finished by September 2007.

*The following has been achieved*:
*Have established a new procedure and infrastructure for establishing, balancing and updating detailed SUT.*

*At a detailed level the Supply and Use Tables specify 118 industries, all required final demand categories and 880 products.*

*The production accounts are split between market production, non-market production and production for own final use.*
- *Market producers (non-financial and financial institutional sectors) classified by 78 industries.*
- *Own account producers belonging to household sector, classified by 5 branches.*
- *Central Government services and Social security institutions, classified by 16 branches.*
- *Local Government services, classified by 13 branches.*
- *NPISHs, classified by 6 branches.*

Use Table The total resource of goods and services, domestically produced and imported, is distributed in the Use table by the following categories of final demand: individual consumption of households 77 COICOP groups; expenditure of Central Government and Local Government for individual and collective consumption 14 COFOG divisions; expenditure of NPISHs for individual consumption (disaggregated by 8 COPNI division); Fixed capital formation (by 20 groups); changes in inventories and exports."

*The detailed product classification in the SUT has six-digit codes, specifying 880 products (groups of goods and services).*
*The following types of products are specified in the SUTs' product catalogue:*
*Market goods and services - 727 separated items;*
*Goods and services for own final use - 51 separated items;*
*Other non-market services - 102 separated items, including the items for consumption of fixed capital for each type of other non-market services;*

*The products are separated with regard to different origin, different allocation and different prices:*
*- Processing services - 100 items are separated;*
*- Imported goods and services - 18 items are separated;*
*- Goods and services with specific allocation - 94 items are separated.*

Enabled to identify transactions subject to non-deductible VAT and introduced a detailed breakdown by rate of VAT.

***Important for the constant price compilation is:***
- *The Price catalogue for analysing the different price indices for a product*
- *Constant price compilation in basic prices.*
- *Balancing constant figures for supply and use of products at basic value.*
- *Value added in constant prices by double deflation.*

**Reference:** Paper prepared for the 29th General Conference of IARIW, Finland, August 2006: "Compilation of Supply and Use Tables and Input-Output Tables in Bulgaria", by Todor Todorov and Julia Kirilova. NSI, Bulgaria.

## 4.3. The SUT-compilation in the Czech Statistical Office (CZSO)

Until the year 2003, the constant price data were calculated only for the quarterly GDP estimates, related to the fixed year base. Since 2004 the CZSO has started with annual Supply and Use compilation in current and constant prices.

From 2006 the CZCO has introduced the Norwegian methodology and software SNA-NT for current and constant SUT compilation of the National Accounts (t+18 months). This has enabled compilation at more detailed SUT industry and product level. A more detailed SUT enabled improvements of the constant price estimation of VAT, product taxes and product subsidies by compiling more detailed valuation matrices in the Use table. It enabled also improvements of the constant price estimation of trade and transport services, by compiling more detailed trade and transport margin matrices in the Use table.

*The format of the Supply and Use Tables are:*
Market production, specified by 128 industries.
Central Government industries, Local Government services, specified 57 industries and NPISHS are also specified by the same industry classification where relevant.

250 basic products (extended CPA 3) that are further split into 5 categories which give a total of about 900 products (extended CPA). The following subcategories of products are introduced :
- Standard products from Market production
- Products from Non-market production.
- Specific products
- Goods imported for processing and exported after processing
- Goods exported for processing and imported after processing

The SUT compilation has become an integrated and common part of the Czech national accounts. CZSO will continue to use the SNA-NT for annual SUT both for current and constant prices. They use the system once a year from March to June when they compile their final annual national accounts. In September they prepare a preliminary version of SUT in MS EXCEL (only 60 x 60)

**Reference:** Paper prepared for the 16th International Input-Output Conference, Istanbul, Turkey, July 2007 "Use of the Supply and Use Tables in the Process of Constant Price Estimation, By Marek Rojicek and Jaroslav Sixta, Czech Statistical Office.

## 4.4. The SUT-compilation in the Statistical Office of the Republic of Slovenia (SORS)

As the other CEECs, Slovenia has a long tradition compiling Input-Output Tables. They were regularly compiled since 1960's.

From the year 1996 it has started compilation of SNA 93 / ESA 95 supply and use tables. Up to the year 2001 Statistical Office of Slovenia (SORS) compiled SUT at the working version of 220 industries (following the 3-digit NACE classification) and 220 products for supply and 150 products for use of CPA classification, using Excel worksheets. The tables were balanced at the level of 60 industries and products groups. The set of compiled tables included supply and use tables, valuation matrices for taxes and margins and use of imports table. At this basis there were compiled symmetric product-by-product input-output tables, including tables for domestic output and for imports.

During the Phare project period SORS started using the SNA-NT methodology and software system which enables more convenient work with more detailed data compared to Excel compilation.

*SORS introduced the following classification for the Supply and Use Tables:*
Total 206 industries (according to NACE) divided according to types of producers (sectors) into:
    4 producers' industries for own final use,
    164 market producers' industries,
    23 government producers' industries,
    15 NPISH producers' industries.

The Use Table specifies Household final consumption by products and 39 COICOP groups; Central and government consumption without specification by COFOG groups, Capital formation specified by products and 36 types of investment categories. There is also a cross-classification of types of investments and types of producers (sectors).

264 product groups (according to CPA).

As for many other countries, the limitation of the level of detail by products is on the Use side. For supply there are much more detailed data available but for use, especially for intermediate consumption, there are not more details possible.

By the SNA-NT methodology, the complete SUT have the following types of valuation:
Supply table at basic, producers' and purchasers' values (domestic production, imports);
Use table at purchasers', producers' and basic values (intermediate consumption, final consumption expenditures of households, government and NPISH, gross fixed capital formation, changes in stocks, exports), elements of value added;

Valuation matrices (table of trade margins, table of transport margins, table of VAT, table of other product taxes, table of product subsidies).

For the calculation of constant price SUT the same number of activities and products is used as it is for current price calculation.

During the Phare project period, SORS balanced current price SUT for the years 2001 and 2002. They compiled the SUT tables for the year 2002 at constant 2001-years prices, as part of the Phare project "Constant prices". For the constant price compilation, a price catalogue sorted by products, which lists alternative price indices to be selected for products to the domestic market, for imports and exports and for household final consumption was produced. The results were analysed and improved during the year 2006.

SORS has finished and published current price Supply and Use Tables for 2003 and are finalising SUT tables for 2004 and 2005 which will be published in 2007. SORS will also compile annual SUT at constant prices and start publishing it with the SUT for 2004 in 2003 prices in 2007.
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**Reference:** Paper prepared for the 15th International Input-Output Conference, Beijing, China, June 2005. "Establishing the compilation of supply and use and input-output tables at constant prices in Slovenia", by Janja Kalin, SORS

## 4.5 The SUT-compilation in Hungarian Central Statistical Office (HCSO)

The compilation of IOT has a long tradition in Hungary, and dates back to the fifties. Earlier five-yearly benchmark symmetric IOT were compiled and between the two benchmark years, simplified versions were estimated on the base of the latest detailed one. At that time IOT were constructed as an extension to the regular National Accounts (NA)

Hungary has been working on the full introduction of ESA'95 rules concerning the Supply and Use Tables (SUT) and Input-Output Tables (IOT) for several years. The first Hungarian SUT at current prices was compiled for the year of 1998 and the first SUT at constant prices was compiled for the year of 2000. From 2000 onwards the SUT are compiled at current and constant prices simultaneously. Hungary has published complete SUT at current prices and at constant, previous years' prices for the years 1998– 2003. The last published SUT at current and at constant prices are available for 2003 following the ESA'95 Data Transmission Programme. The SUT for 2004 will be published at the end of the year 2007.

The symmetric input-output tables with the related import matrix are compiled five yearly – for years ending 0 and 5 (excepting the year of 1998) according to the Data Transmission Programme under ESA'95.

*The theoretical concept and the definitions are the same for the SUT/IOT and the National accounts, but due to the different data sources, methodology and cross - checking possibilities, the data in the SUT can differ from the ones calculated in the frame of the regular National Accounts.*

*Integration of SUT in the annual national accounts compilation is an important strategic element of the recent improvements aiming to build a fully integrated, more standard, transparent and more reliable estimates of National Account figures. To achieve this, the Hungarian Statistical Office decided to evaluate the Norwegian SNA-NT methodology and software.*

The Hungarian SUT experts have studied the Norwegian SNA-NT Documents and had one week training from Statistics Norway in December 2005. In 2006 the Hungarian SUT experts had a study visit to the Czech Statistical Office where they already had implemented the SNA-NT model.
In November 2006 a one week training visit was carried out from Statistics Norway. This training was aimed at explaining the requirements of the accounting system of the SNA-NT model, the input data needs according to the model structure and the principal estimation and balancing procedures of the system. At the same time the SNA-NT software was installed on a separated PC environment and tested using the Hungarian test data prepared in advance.

The HCSO will continue doing test runs to evaluate the SNA-NT methodology and software and have the following work plan:
• compiling and balancing the system for 2005 (and 2004 as a base year for constant price calculation at prices of previous year) that serves as a reference point for the integrated accounts
• updating and balancing the SUT system for 2006 and 2007
• analysing the results of three consecutive years
• decision making on the implementation of the new integrated compilation method as a regular method of calculation of NA in 2008
• decision making on the revision of the time series.

**Reference:** Paper prepared for the 16th International Input-Output Conference, Istanbul, Turkey, July 2007 "Experience in integrating the SUT and National Accounts compilation in Hungary" by Maria Forgon and Csak Ligeti, Hungarian Central Statistical Office.

# 5. Overview of the SNA-NT methodology introduced in some CEEC countries for compilation of current and constant price SUT

## 5.1. Classifications required for SUT

### 5.1.1. Requirement using the SNA-NT application
*When starting a SUT project, using the SNA-NT methodology, the following classifications have to be established:*
Industry codes (aggregates of NACE),
Types of final expenditure (based on SNA93/ ESA 95),
Product codes (aggregates of CPA)
.
The SNA-NT software is quite flexible concerning how detailed classification to use for compiling SUT and gives no restrictions concerning details. An important requirement is that the same industry classification and the same product classification is used both in the Supply Table and the Use Table, For reporting to international organisations (EU, UN, and OECD) a minimum format is required with a 60 classification for industries and products. and types of final expenditure as given by SNA93/ESA95.

### 5.1.2. Classification of Industries in SUT
The classification for Industries should distinguish between "Market producers", "Producers for own final use" and "Other non-market producers". Other non-market producers could be further subdivided between "Producers of central government services", "Producers of local government services" and "Non profit institutions serving households" (NPISH).

The industry classification used in the Norwegian National Accounts with SUT is an aggregated version of NACE rev.1, with three-digit codes, specifying 200 industries. Overview of the format of the different industry classifications implemented in the 3 CEEC countries using SNA-NT is given in chapter 4.

### 5.1.3. Classification of Products in SUT
For a SUT project it is very important to decide the best product classification for the compilation. One goal is to specify important products in a country's economy. Another goal is that only one rate for product taxes and product subsidies apply to one type of use of the product. The product details are also important for the constant price compilation. It is also useful to identify products supplied from "Production for own use" and "Non-market production" as specific products. The need for specifications of products for Tourism Satellite Accounts and other Satellite accounts, such as Health accounts should also be considered.

In the Norwegian SUT, about 1250 products, specified by six-digit codes, are defined. The products are linked to the CPA-codes or aggregates of the CPA-codes. The 1250 NA-CPA products are divided by 700 for goods, 300 for services and 250 supporting products for aggregation and technical accounts. Overview of the product classifications implemented in the 3 CEEC countries is given in chapter 4.

## 5.2. The compilation process in current prices

### 5.2.1. The Supply Table at producers' value.
*The following input data are loaded into the SNA-NT application in a fixed Excel format:*
- Domestic production, specified by subgroups for Production for own use, Market production, Non market production and classified by NA-NACE industries and by NA-CPA products.
- Imports specified by NA-CPA products.
- Custom duty specified by NA-CPA products.

### 5.5.2. The Use Table at purchasers' value
*The following input data are loaded into the SUT application in a fixed Excel format:*
- Domestic intermediate consumption specified by NA-CPA products and by NA-NACE industries.
- Domestic final consumption specified by NA-CPA products and by COICOP, COFOG, and COPNI.
- Gross fixed capital formation specified by NA-CPA products, by capital type and by NA-NACE industries.
- Exports specified by NA-CPA products.

### 5.2.3. The Use Table, trade margin matrix and tax matrices:
*The following input data are loaded into the SUT application in a fixed Excel format:*
- Matrices for trade margin rates and transport margin rates by products and users
- Matrices for VAT rates (with exceptions for certain products and users).
- Total time adjusted figures for product taxes and product subsidies, classified by product codes.

### 5.2.4. The Use Table in producers' value
After the Use Table has been established in purchasers' value, matrices for VAT, trade margins, transport margins and producers' values are calculated for the Use Table to compile producers' value.

### 5.2.5. Balancing the Supply and Use Tables
The detailed SUT are balanced and corrected in producers' value. Preliminary residuals, recorded as Change in inventories are corrected, either manually or interactive. After the balancing of the Supply and Use Tables at producers' value, matrices for product taxes, product subsidies and basic values are calculated automatically both for the Supply Table and the Use Table. Finally both the Supply Table and the Use Table are calculated at basic value.

SUPPLY TABLE

**2. Production accounts**
22. Own final use
23. Market producers
24. 25. Government services
26. NPISH
27. Undistr. interm. ccnsump.

29505 Custom Duty

52. Imports

**1200 Products**
13. Produsers' value

12. Subsidies on products

11. Taxes on products

10. Basic Value
= 13V-(11V+12V)

Products
Goods and Services

---
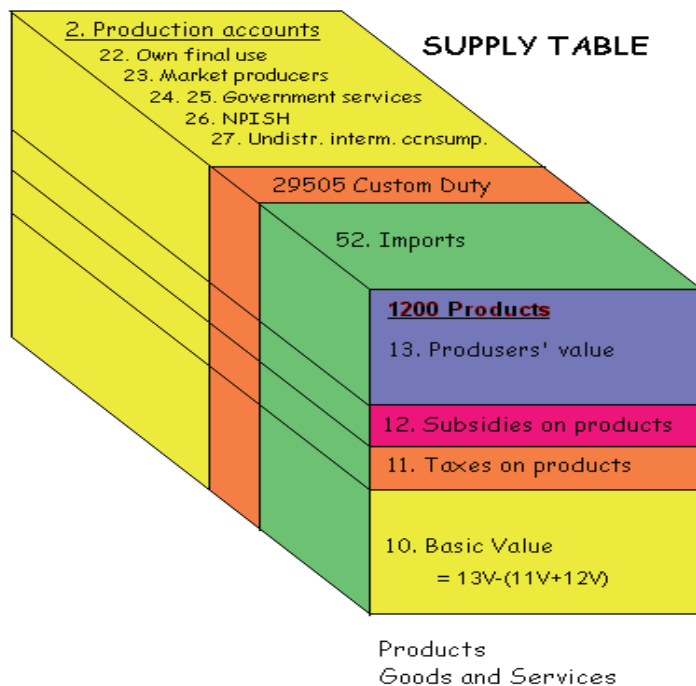
*The Supply Table has four layers, corresponding to different valuation matrices:*
*Account 10. Basic value*
*Account 11. Taxes on products (paid by producers)*
*Account 12. Subsidies on products (paid to producers)*
*Account 13. Producers' value*

*The Supply Table is first established and balanced in Producers' value (13-value).*
*By an automatic procedure:*
- time adjusted taxes, allocated to products, are distributed between domestic suppliers and imports of the products.
- time adjusted subsidies, allocated to products, are distributed between domestic suppliers of the products.

*Finally, the Supply Table is calculated in Basic value (10-value)*

USE TABLE

87. Changes in inventories. Residual
8. Capital formation
6. Final consumption
51. Exports
2. Production acconts

1200 Products
19. Purchasers' value
17. Value added tax
15. Net taxes on trade margins
14. Trade margins, basic value
13. Producers' value = 19. - (14.+15.+17.)
12. Subsidies on products
11. Taxes on products
10. Basic Value = 13V-(11V+12V)

Products
Goods and services
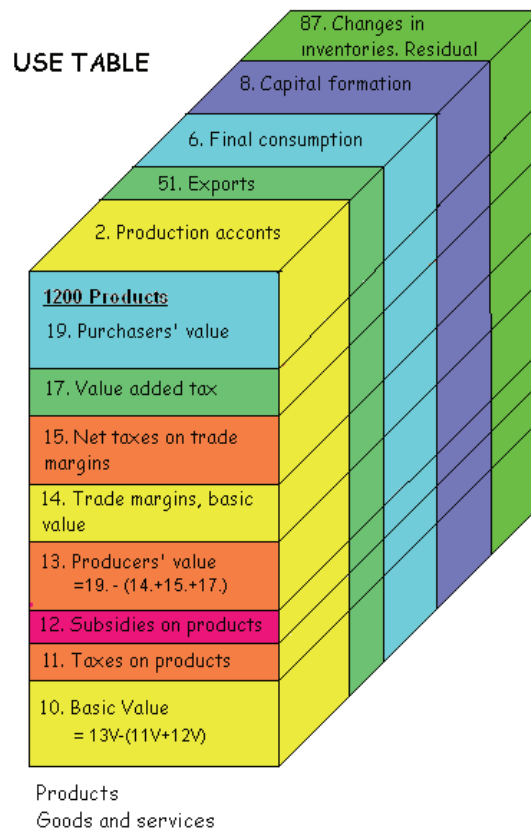
| | |
|---|---|
| *The Use table in Purchasers' value is automatic decomposed into the valuation matrices:* | |
| • Non-refundable VAT (Account type 17)<br>• Retail and wholesale margins, basic value (Account 14 R) and Transport margins (Account type14T)<br>• Producers' value (Account type 13) | |
| *After the balancing between the Supply and Use Table, the producers' value is decomposed:* | |
| • Subsidies on products (Account type 12)<br>• Taxes on products (Account type 11)<br>• Basic value (Account type 10) | |
| *Balancing and correcting changes in inventories:* In the first phase of the balancing of the supply and use of each product at producers' values, change in inventories is residually determined. The residuals are corrected to acceptable level by changing the Supply or Use of a product. The corrections are first made manually, based on an evaluation of data and statistical sources and finally by an automatic "RAS" method. | |

### 5.2.6. Corrections of SUT
Corrections can take place in different ways, either by loading an Excel file with absolute figures, with value indices or by interactive corrections. When a variable is changed, all dependent variables are recalculated automatically and instantly. Each round of corrections that are carried out results in a new automatic total balancing of the Supply Table and the Use Table in all types of valuation, giving new figures for change in inventories, specified by products.

### 5.2.7. A simplified "RAS" methodology for automatic balancing of services.
An automatic adjustment procedure (simple RAS) is used for final balancing of services where no change in inventories or residuals can be accepted. The starting point is a Use table where the Total for each User (e.g. Total intermediate consumption by industries) is assumed to be correct. The adjustment takes place in several automatic steps. The result is that the first automatic computed residuals for services will be redistributed and balanced. The final result is that all changes in inventories for services are removed and revised figures for changes in inventories of goods are revised.

### 5.3. Value added at basic value

Value added at basic value for each industry is calculated as a residual, defined as:
"Total output at basic value" minus "Total intermediate input at purchasers' value".

### 5.4. Update in current prices

After having finalised the National Accounts with integrated SUT in current prices for the first year, the updating of SUT to the next years can be simplified. Detailed data files with product information should be used for imports, exports, government accounts and industries or where new product information is known. For industries where product information is missing, value indices would give total output and total input. By an automatic routine, the complete Production accounts will be compiled using the input and output coefficients in current prices from the previous year.

For final domestic use, the value indices would give totals by category, and by the automatic routine, the product composition can be compiled based on the composition from the previous year. This automatic routine should be followed by several rounds of corrections to balance supply and use of all products.

### 5.5. Calculating SUT in previous year's prices.

### 5.5.1. The "constant price methodology"
National Accounts/ SUT tables are calculated in "constant prices" by calculating SUT for a year in previous year's prices. This methodology with compilation in previous year's prices and chain price indices is new for many countries, but is the recommended methodology in SNA93 and also for the European countries.

*SNA-NT methodology for compilation of SUT in constant, previous year's prices*
- The level of detail in the balanced SUT in constant prices is similar to the level of details in current prices, and the definitional relationships inherent in the current price SUT are also maintained in the constant price SUT.
- Value added measures? for the different industries in constant prices, ==are== calculated as balancing items (double deflation).
- An integrated set of value, price and volume measures are compiled within the framework of detailed, annual SUT in current and constant, previous year's prices.

*For the constant price compilation of the flows of products, 3 price indices (where relevant) are required for each NA-product to deflate corresponding current price figures:*
- Price index for each NA-product supplied from domestic production (Basic value).
- Price index for each NA-product supplied from imports (Basic/CIF value).
- Price index for each NA-product delivered to Exports (Purchasers'/FOB value).

*Methodology used for compiling trade and transport margin and tax rates in constant prices:*
VAT, trade and transport margins and product taxes and product subsidies are compiled in constant prices for the detailed products by user categories, by applying tax rates and trade margins from the previous year.

## 5.5.2. Price indices and other data input
- To prepare for the constant price compilation, price indices for all products and wage indices are registered in an "Assembling file". Up to 9 different price indices can be registered for each product, but for many countries the available price and volume indicators are restricted. The price indices used should be proper price indices or implicit price indices compiled from value and volume indicators following EU Commission Decision in Constant prices. "Unacceptable methods" as input price indices should be avoided except for Public administration, defence services, compulsory social security services.

## 5.5.3. Stages in the automatic compilation of SUT in previous year's prices:
The Use Table, Exports in constant prices:
> Exports, goods and services, fob /purchasers' value matrix is compiled in constant, previous year's prices by dividing the current price figures at purchasers' values with a set of price indices.
> From Exports, purchasers' values matrix, trade margin matrix and other valuation matrices in constant prices are deducted.
> Exports, basic value matrix are compiled in constant prices.

The Supply Table at basic value in constant prices:
Domestic production matrix at basic value and Imports matrix at basic value are compiled in constant, previous year's prices by dividing the current price figures at basic values with a set of price indices.

The balancing between Supply and Use Table at basic value in constant prices:
TOTALS by products for constant prices in the Use Table at basic values are fixed, identical with the compiled TOTALS (Domestic supply and Imports) from the Supply Table.

<u>Constant price figures for domestic use at basic value:</u>
The constant price figures for the different domestic use of a product at basic value are calculated as the difference between TOTAL supply of the product in constant prices and exports of the product in constant prices. The constant price figure for total domestic use of a product is distributed between the different domestic users of the product in the same proportion as the domestic use of the product in current prices. This implies that at basic value, the same price index is used to deflate all domestic use of a product.

***Note: This ensures that the supply and use of each product in constant prices is balanced at basic values.***

<u>Compiling the complete Use Table in constant prices:</u>
Constant price figures for trade and transport margins, VAT, product taxes and product subsidies are calculated, specified by products and users, as a supplement to the basic values in order to compile a complete Use Table in constant prices. Tax rates and trade margins from the previous year are used to compile margins, VAT, product taxes and product subsidies in constant prices.

<u>Compiling the complete Supply Table in constant prices</u>
The product taxes and the product subsidies in constant prices are calculated in the Supply Table by using the "basic rates" from year t-1.

<u>Correction of household consumption with the consumer price indices</u>
The constant price figure for the NA-product delivered to Household final consumption at Purchasers' value is, in a final stage, corrected by deflating with the consumer price indices. A revised constant price matrix for household final consumption of goods in purchasers' values, leads to a revision of the valuation matrices and the constant price matrix for household consumption in basic values.
By an interactive connection between the constant price SUT and the current price SUT, the estimated trade margins in current prices are changed so the current price figure for household consumption in purchasers' values is kept unchanged. This leads to a new interactive balancing of the Supply and Use table in current prices, with adjusted figures for change in inventories in both current and constant prices.

Corrections of the SUT can only be carried through by correcting current price values or by selecting other price indices for the constant price compilation, not by correcting the constant price figures directly.

## 5.6. Value added and gross domestic product in constant prices

Value added in constant prices for all industries are finally calculated by double deflation. GDP in constant prices is calculated by adding product taxes minus product subsidies to gross value added at basic values.

# Constant prices compilation

## USE TABLE



Final use

Industries

87. Changes in inventories. Residual
8. Capital formation
6. Final consumption
51. Exports
2. Production accounts

**1200 Products**
19. Purchasers' value

17. Value added tax

15. Net taxes on trade margins

14. Trade margins, basic value

13. Producers' value
=19. - (14.+15.+17.)

12. Subsidies on products

11. Taxes on products

10. Basic Value
= 13V-(11V+12V)

%
%
%

%
%

Products
Goods and services

## NA-CPA products

### THE COMPILATION STAGES FOR THE USE TABLE (T2):

**Stage 1.** EXPORTS, fob /purchasers' value are Compiled at constant, previous years prices

**Stage 2-4.** From EXPORTS, trade margins and other valuation matrices are deducted and Exports are compiled in basic values, at constant prices.

*Stage 5-6 The Supply table, Domestic production and Imports at basic values are compiled at constant prices.*

**Stage 7.** TOTAL USE BY PRODUCTS at basic values are fixed, identical with the compiled TOTAL SUPPLY BY PRODUCTS at basic values (Totals compiled in Supply table are transferred to Use table).

**Stage 8.** For each of the detailed products, the same price index is used for all domestic use of that product at basic value.

**Stage 9.** For domestic use by products, constant price figures are compiled for the different valuation matrices and added up to domestic use by products in purchasers' value at constant prices.

**Stage13**. Finally: Consumer price indices are used to compile revised constant price figures for household final consumption of goods in purchasers' values.

**Stage 14.** After the constant price figure for household consumption in purchasers' values has been revised, follows revision of the valuation matrices and the constant price figures for household consumption in basic values.
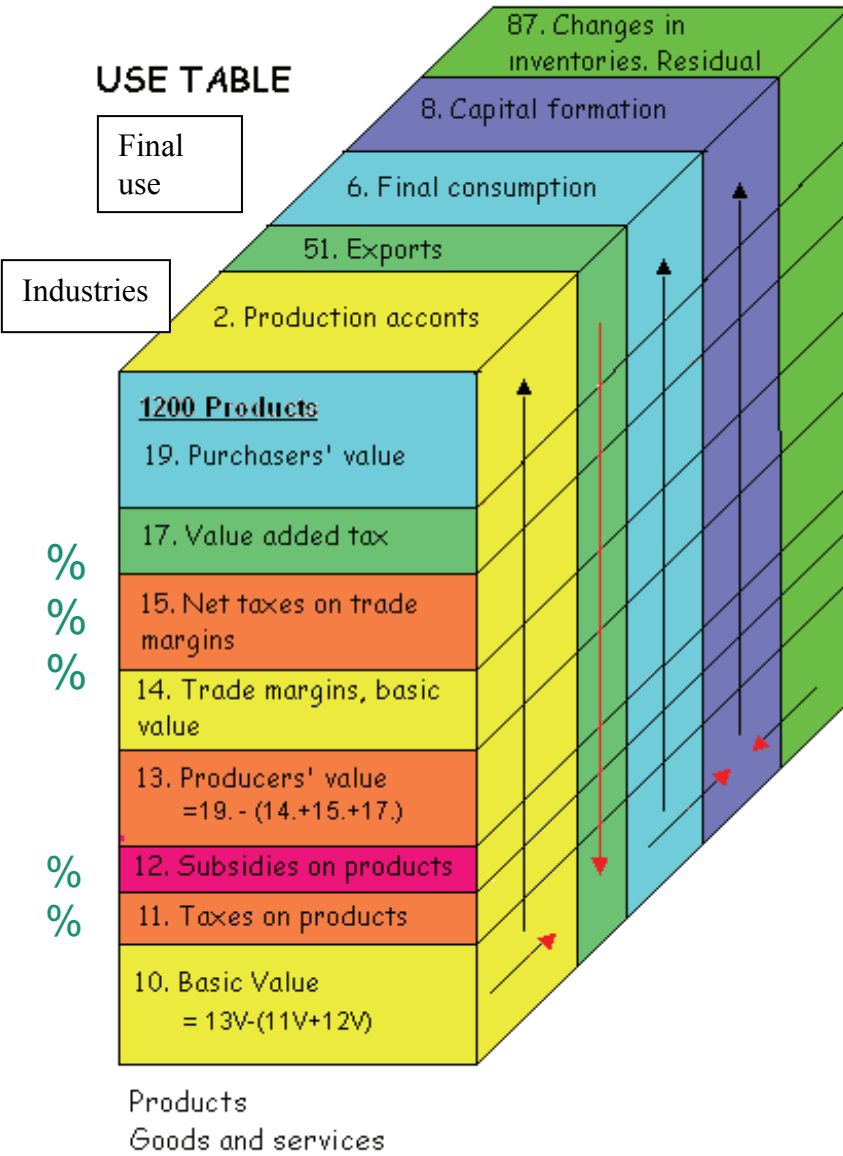
**Stage15.** An interactive connection between the constant price SUT and the current price SUT, change the estimated trade margins so the current price figure for household consumption in purchasers values is kept unchanged.

**Stage16**. The change of the trade margin matrix in current prices for products to household consumption, leads to a new interactive balancing of the Supply and Use table in current prices.

**Stage17.** The revision of the Trade margins in current prices, results in a revision of the production in the Retail and Wholesale industries. The SUT will be balanced with adjusted figures for change in inventories in both current and constant prices.

**Stage18.** Value added for all industries are calculated by double deflation,

**Stage19.** Gross domestic product at constant prices is calculated by adding net product taxes to gross value added at basic values minus correction for product subsidies.

## 5.7. Input-Output Tables in current and constant prices.

*The automatic conversion from SUT to IOT is based on the main assumption that each of the detailed products has its own specific sales structure.*

The Supply Table (Suppliers x Products) and the Use Table (Products x Users) at basic value are by the software converted to an "Industry format" Input-Output Table (IOT) by distributing the supply and use of products. For *each product*, domestic use of the product and exports will be linked directly to the domestic supplying industries and to imports of the product.

The first assumption is that *export of all the detailed **products** is primarily supplied by domestic industries*. Distribution of exports of **a product** by supplying domestic industries at basic value is assumed proportional with the production of **the product** by the supplying industry (industries) at basic value. (Exceptions are transactions between Users as purchases/sales of fixed assets and products imported for re-export).

Imports and the remaining part of domestic production of **the product** at basic value are then subsequently distributed proportional with the different domestic use of **the product** (intermediate consumption, final consumption, capital formation, changes in inventories) at basic value. The automatic split between use of products from domestic production and from imports is carried out at the detailed product level assuming constant import ratios along the row for intermediate and final domestic use. This means that the same import share applies to all domestic use categories of **a product**, and that all industries that supply **a product**, have the same market share for all types of use of **that product**.

In the SUT, imports are specified by products. In the I-O tables, imports are encoded from the NA-product classification to the NA-industry classification (main producer) used for domestic production.

For analytical use imports can also be split into the two main categories: "Imports of competitive products" and" Imports of non-competitive products".  Both categories if import should be by the NA-industry classification used for domestic production.

Since the automatically compiled SUT in constant, previous years' prices will have the same format as the current price SUT, IOT in constant prices can also automatic be compiled from constant price SUT.


## ANNEX. SNA-NT Documents

**S**tatistics Norway. Documents 2005/5 National Accounts Supply and Use tables in Current Prices "SNA-NT SUT/STARTER".

Statistics Norway. Documents 2005/4 National Accounts Supply and Use tables in Constant Prices "SNA-NT SUT/CONSTANT".

Statistics Norway. Documents 2005/6"SNA-NT User's guide for Supply and Use tables in Current and Constant Prices".

**Reference:** Paper prepared for the 16th International Input-Output Conference, Istanbul, Turkey, July 2007 "The effect on GDP by integrating Supply and Use Tables in the National Accounts for a developing country" by Lizzie Chikoti, Liv Hobbelstad Simpson and Steinar Todsen.