

# Supply and Use Tables at Basic Prices for the Czech Republic

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## Abstract

Supply and use tables are mainly prepared by official statistical institutions. Although supply and use tables represent a quality check and a tool for deflation, they are sometimes on the edge of interests. Supply and use tables should be compiled within the process of compilation of national accounts but many times they are compiled ex-post. On the first sight, the use table valued at purchaser's prices offers only commodity to industry flows. But the key importance is in valuation at basic prices. When analysing the use table and its development at basic prices, many statistical errors should be found. The paper describes the techniques used in the Czech Republic. The description of the annual system of supply and use tables is provided. Special emphasis is put on VAT matrix, trade and transport margins, other taxes and other subsidies on products and use of imported products.

Key words: Supply, use, basic, prices

## 1. Foreword

The input-output agenda has a long tradition in the Czech Republic because this agenda was started with in 1960s. Tables for former Czechoslovakia, for the Czech Socialist Republic and for Slovakia were compiled. These tables were very similar to contemporary tables including valuation at basic and purchaser's prices. After the fall of communist regime, the transformation of macroeconomic statistics from Material Product System (MPS) to System of National Accounts (SNA) started. The process of transformation was quite long and complicated by the separation of Czechoslovakia in 1993. A lot of new tasks like sector accounts caused that supply and use tables were still waiting for full implementation until 2004. Between the years 1993 – 2004 supply and use tables and input-output tables were compiled ex-post of sector accounts. It means that they could not be used for regular balancing process and deflation. Since 2004, the process of balancing of supply and use tables (SUT) is standardized as following:

1. **Preliminary** SUT compiled  $t+9$  months after the referring year. This version is compiled in excel in 60x60 dimension. The main purpose is balancing and deflation.
2. **Semidefinitive** SUT compiled  $t+21$  months after the referring year in detailed breakdown (more than 1000 commodities) in Norwegian SNA-NT system.
3. **Definitive** SUT compiled  $t+33$  months after the referring year in the same way as semidefinitive SUT.

The system of supply and use tables and consequently symmetric input-output tables represent not only consistent check for quality of product transactions but a necessary tool for a double deflation. If supply and use tables are not a part of system of nation accounts, they lose one of the most important purposes. At least on annual level, balancing and deflation should be integrated into the process of compilation of GDP. Quarterly estimates of GDP are compiled in very limited time but annual figures of resources and uses should be balance ex-ante of sector accounts; in time when there is a possibility to change obvious inconsistencies

in different sources<sup>1</sup>. From the experience of the Czech Republic, it can be stated that balancing total aggregates instead of commodities (products) may lead to incorrect figures of GDP.

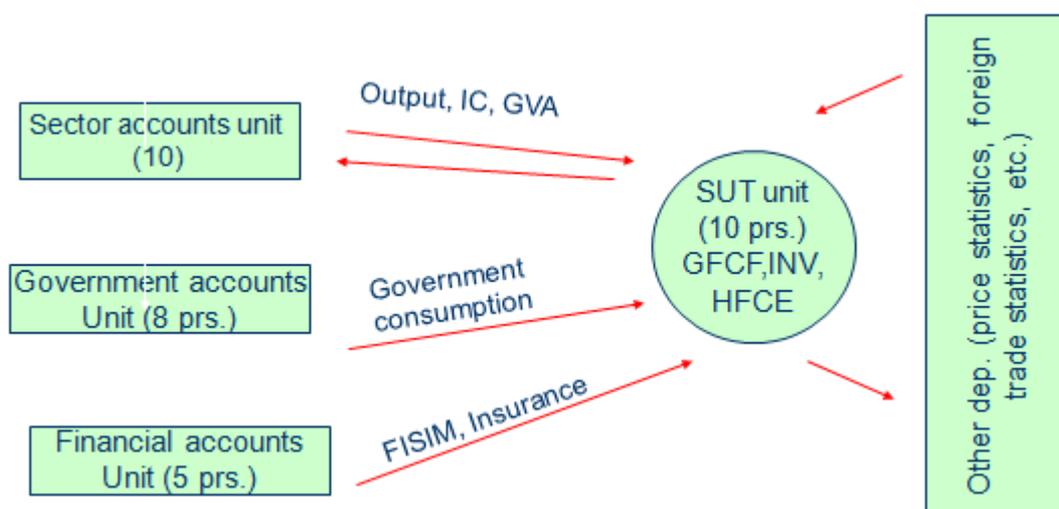
## 2. Supply and Use Tables in the Czech Practice

Supply and use tables are compiled annually for three versions (preliminary, semidefinitive and definitive) and they are finished by September 15th. Even the used software is different; the basic concept of preliminary version is the same as for semidefinitive and definitive versions. Compilation of annual national accounts consists of following steps:

1. Taking over data sources (business data, household budget surveys, foreign trade data, administrative data etc.).
2. Models and extrapolation mainly aimed at the differences between national and business accounting and non-observed economy.
3. Balancing of data. It covers transactions with products (GDP agenda), distributions and other flows and financial account).
4. Final data after balancing process are incorporated into the system of accounts and financial account is closed.

Balancing process usually takes 5 weeks for semidefinitive and definitive SUT (working is parallel) and starts at the beginning of May. Balancing of preliminary version takes 2 weeks and starts at the beginning of September. The main goal of balancing process is to find a solution of balancing difference in compliance with other information (data from other statistics, experts' opinions etc.). The process of balancing is organised as a team work where all members of so-called balancing team have their responsibility given by groups of commodities and industries. The process is decentralised and it is organised and managed by the head of input-output unit. A figure 1 describes the internal links related to transactions with products.

Figure 1 Scheme of work in the Czech Annual National Accounts



<sup>1</sup> It covers data sources and models, as well. In nowadays world everything is changing very fast and statistical assumptions (e.g. on hidden economy) may become old very soon.

When balancing, all balancing adjustments are recorded in balancing protocols. The main goal is to track all the adjustments that were done by responsible staff. A key issue is that supply and use tables are compiled both at current and previous year's prices in all versions. The main goal is to compare volume indices with industrial production index and natural indicators. The process of deflation is mainly automatic and it is controlled by responsible person.

### **3. Methodology**

During the compilation process, supply table is split into:

1. Output at basic prices
2. Output at producers' prices
3. Output for export
4. Output for domestic use
5. Specific output deflated by different methods (FISIM, imputed rent etc.)

Use table covering intermediate consumption and final use is compiled at purchasers' prices at first and then other matrices are subsequently estimated. The process contains following:

1. Use at purchasers' prices
2. Value added tax matrix
3. Transport margins
4. Trade margins
5. Subsidies on products
6. Taxes on products (excluding VAT)
7. Use at basic prices
8. Use from import
9. Use from domestic output
10. Specific type of use deflated by different methods.

Both supply and use side is compiled similarly for semidefinite (and definitive) and for preliminary version. Semidefinite and definitive versions are based on SNA-NT (Norwegian technology). The Czech system is slightly different from Norwegian. The main difference is in technology; Norwegian use Oracle, Czech just spreadsheet. The deflation is also not 100% identical. The basic concept is the same, split output and transforming the use side to basic prices. In the Czech system, all valuation matrices are explicitly seen in contrary to Norwegian system.

The main aim is to obtain consistent data disregarding the system that is used. SNA-NT is Oracle based system using more than 1000 commodities (extend CPA digit 3):

XXXXYY, where XXX is CPA three digit code and YYY code for special purpose (e.g. XXX002 is used for inward processing). The following list of specific commodities is used.

Figure 2 Specific commodities used for semidefinite version

CPA	Label
702001	Imputed rent
011001	Self-Supply - Crops, products of market gardening and horticulture
012001	Self-Supply - Live animals and animal products
014001	Self-Supply - Agricultural and animal husbandry services, except veterinary services
020001	Self-Supply - Products of forestry, logging and related services
050001	Self-Supply - Fish and other fishing products; services incidental to fishing
151001	Self-Supply - Meat and meat products
153001	Self-Supply - Processed and preserved fruit and vegetables
157001	Self-Supply - Prepared animal Leads
158001	Self-Supply - Other food products
159001	Self-Supply – Beverages
192001	Self-Supply - Luggage, handbags and the like; saddlery and harness
205001	Self-Supply - Other products of wood; articles of cork, straw and plaiting materials
244001	Self-Supply - Pharmaceuticals, medicinal chemicals and botanical products
261001	Self-Supply - Glass and glass products
287001	Self-Supply - Other fabricated metal products
366001	Self-Supply - Miscellaneous manufactured goods n.e.c.
111A00	Crude gas
111B00	Crude oil
401A00	Electricity for households
402A00	Gas for households
452001	Individual housing construction
452002	Dwellings
703001	Cost of transfer of ownership - taxes
701001	Cost of transfer of ownership - other cost
921001	Self production of movies
651001	Output of national bank
659000	FISIM
159B01	Wine without excise tax
159C01	Beer without excise tax
160001	Tobacco products without excise tax
232001	Fuel without excise tax
XXX002	Inward processing

Aside from commodities listed above, there are also specific commodities given by SNA-NT system for non-market output, trade and transport margins. Figure 3 compares advantages and disadvantages of both systems used in the Czech Republic.

Figure 3 Advantages and disadvantages of SUT systems in the Czech Republic

Item	SNA-NT		Czech spreadsheet system	
	+	-	+	-
Technology	Oracle based, easy to handle more users, more commodities			Spreadsheet – difficulties with more users. Less stable

	more stable			
Details	More than 1000 commodities, better results with deflation			With larger matrices inefficient, maximum about 100 commodities
Difficulty		High, SNA-NT needs skilled users, training takes several months	Low, rookies can easily handle with.	
Time demands		Completing of input data, balancing and finishing take 5 weeks	It is possible to finish the work within two weeks.	

When comparing both systems used in the Czech Republic, it is obvious that developed systems are suitable for skilled (or better trained) workers and simple system can provide acceptable results in a very short time. The Czech Statistical Office (CZSO) has own experience with transformation of its statistics and moreover, the CZSO has been taking part in technical assistance to various countries (Egypt, Ukraine, Macedonia, Azerbaijan etc.). It is necessary taking this into mind, when analysing the experiences from several countries trying to establish the whole national accounts or just supply and use tables including double deflation. Even the background and effort of staff are very different, all of them faced the issue, how to handle with the whole SNA. The problem is mainly in priorities. All the countries estimate GDP and they were trying to establish sector accounts, later then they speak about input-output agenda. But this is not correct. For succeeding in the compilation of national accounts, it is necessary to establish it as a system from the beginning. The problem is that many countries (even facing serious problems with data and hidden economy) have lots of fragments of accounts and they are very reluctant to change it. The quality of accounts and volume indices can be check when looking for inventories in supply and use tables.

#### 4. Valuation matrices

Valuation matrices represent the most difficult part of supply and use agenda. Practical computation slightly differs according to the used system but the main concept is the same. All valuation matrices in both systems used in the Czech Republic are interactive; it means that they are changing when supply and use tables are being balanced.

##### Value added tax

Value added tax matrix is estimated for all types of use excluding inventories. It also covers export (only non-resident purchases). Generally, it is estimated by following formula:

$$VAT = \left( U^{PP} - \frac{U^{PP}}{1+r} \right)_s \quad (1)$$

where  $U^{PP}$  use at purchasers' prices,

- $r$  tax rate,
- $s$  share of VAT non-payers.

The main issue to set  $s$ , the share of VAT non-payers for intermediate consumption and gross fixed capital formation, ranging from 0 to 1. It is estimated on the basis of the share of taxable revenues to total revenues (on the level of industries and sectors). Alternatively (used mainly for the government sector), it is estimated as a share of costs (intermediate costs and investments) with VAT deduction to total costs. Tax rate ( $r$ ) is an estimated average tax rate for CPA three or two digit code. The issue of VAT has also another dimension. In the Czech case, there is a necessity to keep administrative data and therefore computed VAT should be adjusted. It is not clear which approach (model or administrative) is better. In the Czech case, total VAT figure is based on so-called shifted cash prepared by the Ministry of Finance. This administrative model has also its positives and negatives.

### Transport and trade margins

Transport and trade margins are estimated separately. We do not distinguish wholesale and retail sale. In our system, trade matrix precedes transport margins (on the way from basic prices to purchaser's prices). Both trade and transport margins are based on rates applied on use at purchaser's prices less VAT. Trade margins totals are obtained from structural business statistics (SBS) and other data sources. It means that computed figures have to be adjusted to the totals that are available for all industries. Contrary to it, it is not easy to find the total for transport margins. There are two ways how companies can handle with transport invoices. The first is that the price of goods, material or investment is increased by transport costs. The second, if the transport is invoiced separately and more products are transported, it is included directly in companies' costs (intermediate consumption). Transport margin is estimated according to formula (2).

$$TM = \left( U^{PP} - VAT - \frac{U^{PP} - VAT}{1 + tm} \right) \quad (2)$$

- where  $U^{PP}$  use at purchasers' prices,
- $VAT$  value added tax,
- $tm$  rate of transport margin for each commodity (industry specific).

The following formula is used for trade margin.

$$RM = \left( U^{PP} - VAT - TM - \frac{U^{PP} - VAT - TM}{1 + rm} \right) \quad (3)$$

- where  $U^{PP}$  use at purchasers' prices,
- $VAT$  value added tax,
- $TM$  transport margin,
- $rm$  rate of trade margin for each commodity (industry specific).

Detailed data on transported products used for deriving  $tm$  are obtained from different sources. Mainly tonne-kilometres are used. It is known, what is transported by different means of transport and they are known total sales for industries. We derived rate per one ton-kilometre for different type of transport and consequently estimated total transport costs for different commodities.

Data for  $rm$  are taken over from annual surveys in trade and manufacturing (sales of goods, cost of sold goods and stock of goods). There also some data for agriculture and services. The

main problem is that product classification used in trade is not in compliance with national accounts' needs. For transforming trade products to "standard" products, we use following matrix transformation.

$$\mathbf{C}_{n,i} = \mathbf{B}_{n,t} \cdot \mathbf{A}_{t,i} \quad (4)$$

where  $\mathbf{B}_{n,t}$  estimated transformation matrix between trade classification (t) and standard products (n), columns totals (100%).

$\mathbf{A}_{t,i}$  trade matrix, trade products (t) x industry (i),

$\mathbf{C}_{n,i}$  final trade matrix for standard products (n) in industries (i).

### Other taxes and subsidies on products

These categories cover administrative data that are obtained from the Ministry of Finance for specific products. These data are split to the use proportionally to the use at purchaser's prices less VAT, trade and transport margins. Since 2004, when the Czech Republic joined the EU, we have no opportunity to distinguish taxes on domestic and on imported products.

### 5. Conclusion

Supply and use tables are compiled both at purchaser's prices and basic prices. The process starts at purchaser's prices and finishes with basic prices. This is done annually for three versions of supply and use tables. The first, preliminary compiled in t+9 month after a referring year is compiled in Czech excel based system. Semidefinite (t+21) and definitive (t+33) versions are compiled in Norwegian SNA-NT system. The main purpose of the compilation of supply and use tables (SUT) is annual balancing and double deflation. The main approach to valuation matrices is the same in both systems, there are only slight differences. We publish only semidefinite and definitive versions of SUT but preliminary version is provided on users' requests, as well. The basic idea of the Czech national accounts is the consistency between sector accounts (including non-financial and financial) and supply and use tables. Supply and use tables are used regularly for balancing and deflation of annual accounts and it means that all the balancing adjustments are finally incorporated to sectors and industries.

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