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Supply and Use Tables, Input-Output, and a 2000 Social Accounting Matrix for the Slovak Republic

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Supply and Use Tables, Input-Output, and a 2000 Social Accounting Matrix for the Slovak Republic

Karol Koronczi
1. Introduction

The aim of this paper is to present macroeconomic data of the Slovak Republic (Slovakia, or SR) arranged in a Social Accounting Matrix (SAM) for the year 2000, accompanied with Supply and Use tables, and notes on how to build a symmetrical or so-called Leontief-type of Input-Output (I-O) table. The compilation of SAMs is relatively widespread in industrialized countries in the west and also in the East Asian region. These countries already are in possession of significant theoretical knowledge base and have developed related practical technology. However, not a few transition countries that were socialist countries are in lack of fundamental data system, which is related to the difference of statistical methodology, while the rearrangement of existing data to be comparable with western standards is encountering numerous difficulties. Regarding this fact, it is necessary to stress that the research this paper, aimed to present a full scale SAM for the economy of Slovakia, is a pioneering project of its kind. The author, who has undergone intensive data collection and arrangement, has proved that it is not an unfeasible task to construct such a matrix. The significance of this paper exists in this point. By constructing this project, the author makes a big example and a direct response to such demand not only in Slovakia, but also in the world. Theoretical basis or data applicability is not the center of emphasis here. Effort was aimed to prove that the construction of SAM tables is possible even from scattered sources with non-consistent or insufficient data. It should be noted that in order to make the presented results even more valuable for regional research and macroeconomic analysis, further collection of consistent data in frequent intervals for long time periods is necessary, and further adjustment of long-term data is expected. However, this kind of effort is inevitable to have a key database available in the official national statistics in the near future.

Since its independence, Slovakia has been integrating into world economic structures. Slovakia, together with the Czech Republic, Poland, Hungary and other 6 countries enters the European Union (EU) on May 1st, 2004. However, Slovakia is facing problems with insufficient data or in some areas with its lack. Slovakia in its process of transformation should not lag behind other countries in any sphere, and in order to make sound economic decisions, it is necessary to provide a progressive analytical tool, such as the SAM. SAM, accompanied with Supply and Use tables, and also with symmetrical I-O tables, is a necessary tool, e.g. for Computable General Equilibrium (CGE) modeling. It is impossible to build
macroeconomic models without the availability of SAM and I-O tables. The methodology of building such tables presented in this paper may help others to approach similar problems.

SAM is an excellent descriptive tool, showing in detail the structure of an existing national economy. It provides important information on individual industrial sector size, behavior, and interaction with the rest of the economy. It shows the relative importance of sectors in terms of their sales, wages, and employment. It also provides a way to predict how the economy will respond to exogenous changes or changes that are planned. Therefore, it is useful in predictive exercises where various actions are being considered and the relative merits are to be determined based on alternative outcomes.

Developed industrialized countries in the west already are in possession of significant theoretical knowledge base and have developed related practical technology of statistical data collection. However, transformation process in Slovakia is accompanied by various problems with authenticity of aggregate and regional macroeconomic data. Although the transformation process begun 14 years ago, Slovakia still suffers by lack of fundamental data, arising from difference in statistical methodology. Difficulties are being encountered also during rearrangement of existing data in order to make them comparable with western standards. Nevertheless, confirming basic long-term tendencies, accompanied with effort makes collection of fundamental data possible. Depending on applied methods, it is also possible to build considerably complex data from limited sources. Besides the data acquirable from the constructed SAM and I-O tables, the significance of research presented in this paper is meant to prove this fact. This research shows that collection of macroeconomic data, in this case accompanied with construction of I-O table, is possible even from scattered sources with inconsistent or missing data in case of Slovak economy.

This paper constructs a Social Accounting Matrix that it is urgently needed in general official statistics of the Slovak Republic. The paper discusses the organization, methodology, arrangement and estimation of data, which can be used for various types of macroeconomic analysis, e.g. I-O analysis, link analysis, CGE model construction, etc. Sound economic development decisions require information about the impacts of economic growth and/or decline and the relative benefits and costs of alternative development strategies (Otto and Johnson, pp. 1-2). In communities experiencing economic growth, the problem is one of managing the growth, and answering questions, such as what impact will growth in the banking industry have on the housing industry or transportation system, or what impact will growth in the summer home market have on the agricultural sector. In communities facing stagnation or economic decline, the question is how to stimulate economic growth.
Attempts to answer these and many similar questions have led to the continued development and increased use of complex analytic models to assess economic impacts; computerized CGE, input-output, industrial location, demographic and fiscal impact models are readily available to the economic analyst. The potential uses, underlying assumptions, data requirements, weaknesses and strengths of these models must be understood if they are to be used for analysis and interpretation. Without this familiarity many analytic models and the information they provide will be unused, underused, or misunderstood.

The SAM provides a framework for transparent economy-wide presentation of linkages between activities, commodities, factors, households, domestic institutions and foreign institutions in a tabular format that is suitable for multiplier analysis. In this paper, stress is put on construction of SAM for SR for year 2000. This matrix presents a consistent and comprehensive data set concerning all mutual transactions among productive and institutional sectors of the economy (Hajnovičová, and Lapišáková, 2002, pp. 1-2). SAM for SR is based on adjusted National Accounts data as well as on Supply and Use tables for 2000. The Supply and Use tables are compiled by 57 groups of commodities and 57 groups of activities, and are presented in Table 2, and in Table 3 respectively, of the Appendix Section. For analytical purposes, the Supply and Use tables are partly adjusted and modified. The adjustments refer to the imports for further processing and distribution of subsidies. The adjusted Supply and Use tables in basic prices are transformed into symmetric product-by-product I-O table. Taking into account the great heterogeneity of Supply and Use tables, the industry technology assumption is applied, although it is not an optimal approach. For details on construction of the Slovak symmetric I-O table, see Koronczi (2003), and/or Koronczi (2004), where the author in detail discusses an example based on 1996 data.

The SAM consists of 132 by 132 accounts (135 by 135 including totals), of which productive sphere in the intermediate consumption part is represented by 57 accounts of commodities and 57 accounts of industries (or activities). The commodity and activity (or industry) accounts are consolidated from the 57 by 57 symmetric I-O table. Classification of commodities and activities is based on the European System of Accounts (ESA) 1995. The individual groups are presented in Table 1 of the Appendix Section.

The factors are represented by 6 accounts, in which the generation of income within the economy and the rest of the world, respectively, are recorded: Net operating surplus (3a), Net mixed income (3b), Gross wages (4a), Social contributions (4b), Other taxes on production (5a), and Other subsidies on production (5b).
In the SAM, 4 domestic institutional sectors that income is allocated to are distinguished: Corporations (non-financial and financial) (6), Government (7), Households (including self-employed) (8), and Non-profit institutions serving households (9).

Taxes on products connected with intermediate consumption (value added tax) and taxes connected with final consumption (excise tax, consumption tax) are recorded in 5 separate accounts: Value added tax (VAT) (10a), Taxes on imports (consumption) (10b), Taxes on imports (tariffs) (10c), and Consumption and other taxes (10d), Subsidies on production (10e).

Accounts of Gross fixed capital formation (11), and Changes in stocks (12), represent possible economic funds created by savings, by net capital transfers receivable from abroad, and by lending/borrowing from abroad.

The Rest of the world (ROW) (13) account records transactions of the rest of the world with the national economy. It aggregates goods and service transactions with ROW, and current and capital transfers with ROW. Imports include imports of goods and services for intermediate consumption and for final use.

The final 135 by 135 SAM of SR for 2000 is presented (including accounts for totals) in Table 4, and in an aggregated form in Table 5 of the Appendix Section.
2. Supply and use

The National Accounts of SR provide a comprehensive, sectional and industrial view on the conditions of the Slovak economy and society by means of macroeconomic indicators (SO SR, 2003, p. 6). The compilation of the National Accounts of SR form 1992 to 1995 was based on the methodology of the European System of Integrated Economic Accounts 1979. The Annual National Accounts of SR for 1996 and the following years are based on the new methodology of ESA 1995. Data are compatible with national accounts of EU member states and associated EU countries.

Compilation of I-O tables in SR (as a part of the former Czechoslovakia) has quite a long history. The first I-O table was compiled for the year 1962, further I-O tables were published regularly every 5 years but they corresponded to the Material Product System which was valid in centrally planned economies. These tables were symmetric I-O tables and were used for analytical and modeling purposes. They were compiled for the whole Czechoslovakia as well as separately for the Czech and the Slovak Republics. These tables were based on special statistical structural surveys organized for this purpose only.

Since 1989 when the whole statistical system in transition countries changed, Supply and Use tables form an integral part of the System of National Accounts (SNA). They are based on the same definitions, concepts, and data sources as the SNA. Though the role of Supply and Use tables during the transition period changed, now they are compiled simultaneously with Annual National Accounts (National Accounts of the Slovak economy). As they are published later, Annual National Accounts must be revised according to published version of Supply and Use tables.

The first (experimental) Supply and Use tables based on the standard SNA/ESA principles were compiled for the year 1992, the last year of the existence of the former Czechoslovak Republic. Because of the lack of adequate data (mainly on foreign trade activities, which were not recorded separately for the Czech and the Slovak Republics), these tables were not published but served for verification of existing statistical sources and proposed methodology.
2.1 Current state of Supply and Use tables in the Slovak Republic

There are three groups of Supply and Use tables, depending on the methodology of their construction:

2.1.1 Finished Supply and Use tables

1. Supply and Use tables based on statistical surveys:

   Supply and Use tables for 1993 and 1994. The working version of the Supply and Use tables for 1993 and 1994 consisted of 60 commodity groups in rows and 60 groups of industries in columns. Supply and Use tables were based on ESA 1979 methodology.

   Supply and Use tables for 1996 and 1998. They are based on ESA 1995 methodology. The working version of these tables is more detailed. As original data sources provided data (mainly from the exhaustive statistical survey in the sector of non-financial corporations and from the statistical survey for the general government sector) at the level of 4-digit of Classification of Products by Activity (CPA), working version contained more than 500 commodities corresponding to CPA and 60 groups of industries corresponding to General Industrial Classification of Economic Activities within the European Communities (NACE), 1st Revision. Because of the individual data protection, for publication purposes some industries and commodities are aggregated. The published version of Supply and Use tables for 1993, 1994, 1996 and 1998 consist of 49 groups of commodities and 49 groups of industries. Overview of CPA and NACE classification is in Table 1 of the Appendix Section.

2. Supply and Use tables based on projections:

   Besides the above-mentioned Supply and Use tables, for the years when these tables had not been compiled, the Statistical Office of the Slovak Republic (SO SR) made projections of Supply and Use tables for the years 1995, 1997 and 1999. These projections are based on the main indicators from the Annual National Accounts broken down by industries. The commodity breakdown of individual indicators is derived from the structures of relevant indicators from existing Supply and Use tables (for example the
Supply and Use tables for the year 1997 is based on the average coefficients calculated from the Supply and Use tables for the years 1996 and 1998).

3. Supply and Use tables in compilation:

Just now, the official Supply and Use tables for the year 2000 is being compiled. Compared to previous Supply and Use tables, significant improvements in many areas occurred, mainly a new structural survey, which is fully harmonized with the European standards, is introduced. Also the statistical verification, imputations and grossing-ups have been proposed in compliance with the similar approaches used in the EU member countries. Thus, the year 2000 is to be considered as a benchmark year that will serve as basis for the backward revisions of the SNA. The Supply and Use tables for year 2000, based on preliminary data is in Table 2, and Table 3 respectively, of the Appendix Section.

2.1.2 Shape and size of Supply and Use tables

The working version of Supply and Use tables for the years 1993 and 1994 corresponds to the 2-digit CPA and the 2-digit NACE levels. Supply and Use tables for the years 1996, 1998, and 2000 correspond to the 4-digit CPA and the 2-digit NACE levels.

Until the year 2000 balanced version of all Supply and Use tables is 60 groups of commodities by 60 groups of industries is present. Balanced version of Supply and Use tables 2000 is the same as working version (corresponding to the 4-digit CPA and to the 2-digit NACE classifications).

Published versions of all Supply and Use tables consist 49 groups or commodities by 49 groups of industries (because of the individual data protection).

The Supply tables (for 1993-1999) contain of a matrix of domestic production broken down by commodities and industries in basic prices and a vector of imported goods and services in Cost, Insurance, and Freight (CIF) prices. Supply table includes also columns enabling transformation of supplies from basic into purchasers’ prices, such as non-deductible Value Added Tax (VAT), other taxes on products (taxes on imports and taxes on domestic products are shown separately), subsidies on products, trade margins (separately for the wholesale and the retail trade) and transport margins.
Since the year 2000 onwards these items are estimated as matrices from the use side (this change cohere with introduction of the Danish commodity balancing system into the SO SR practice).

The Use table in purchasers’ prices includes a matrix of intermediate consumption of domestic and imported goods and services by commodities and industries. Separate import matrices are constructed from the supply and use sides only experimentally for the year 1998. The following columns contain final consumption of households, general government and Non-Profit Institutions Supporting Households (NPISHs), gross fixed capital formation, changes in inventories (material, work in progress, finished products and goods for resale are shown separately), valuables and exports of goods and services in Freight-On-Board (FOB) prices.

Value added includes the following rows (in industrial breakdown): compensation of employees, of which wages and salaries and social contributions of employers (actual and imputed), other taxes on production, other subsidies on production, gross operating surplus (including mixed incomes), consumption of fixed capital, and net operating surplus.

2.1.3 Transformation into purchasers’/basic prices

Regarding this problem it is important to stress out that during the whole period two different approaches are applied in the SR:

- transformation of Supplies from basic into purchasers’ prices (this approach is applied in case of Supply and Use tables for the years 1993-1999);
- transformation of uses from purchasers’ into basic prices (this approach is being introduced at present. It should be applied since the year 2000 onwards).

As it has been already mentioned, this change cohere with introduction of the Danish commodity flow balancing system enabling simultaneous balancing of all sub-matrices for basic price values, trade and transport margins, net taxes on products, non-deductible VAT and purchasers’ values to visualize this transformation for each cell of the system separately. As at the moment, the Slovak side does not have any experience with the new system, the old system is described here (applied on Supply and Use tables for 1993-1999).

Until the year 2000, for balancing purposes the supply side of Supply and Use tables is transformed into purchasers’ prices by means of separate columns containing estimate of
VAT, other taxes on products (taxes on imports, taxes on domestic products are shown separately), subsidies on products, trade margins (separately for the wholesale and retail trade) and transport margins. Transformation from the supply side is made both in current as well as in constant prices. The columns for transformation of supplies into purchasers’ prices are estimated as follows:

**Non-deductible VAT:** Until the year 2000, VAT is estimated as multiplication of VAT rates and volumes taxed by VAT. VAT rates at the 4-digit CPA correspond to the Slovak legislation, at the 2-digit level the average VAT rates are calculated. Volumes taxed by VAT (in commodity breakdown) are estimated as follows: final consumption of households (excluding consumption of own account agricultural products and imputed rent), plus purchases of cars, plus intermediate consumption of general government and NPISH sectors, plus 10% of intermediate consumption of the sector 14 (assumption that only 10% of sole entrepreneurs are non-payers of VAT).

**Other taxes on products:** From the Ministry of Finance, information about excise taxes are collected by the Customs and Tax offices, separately for particular commodities (taxes on petroleum products and fuel, alcohol, beer, wine and tobacco products). These taxes are assigned to relevant rows.

**Taxes on imports:** include collected import duties (broken down according to collected duties from the Customs offices), and import surcharges (that are assigned to rows 15-36 according to volumes of imported goods multiplied by corresponding surcharge rates).

**Subsidies on products:** Information about subsidies on products as well as subsidies on production is obtained from the Ministry of Finance (as the main data source The State Closing Account should be mentioned). The main problem is with separating subsidies on products (enabling transformation from basic into purchasers’ prices or vice versa) and subsidies on production (shown in industrial breakdown in the Value added quadrant). Subsidies on products include subsidies on agricultural products, food and beverages, electricity, gas and hot water (for households only) and subsidies on railway, bus and municipal transport. Identified subsidies are assigned to the particular rows.
Estimates on trade margins: As a starting point the value of total output (excluding maintenance and repair of motor vehicles (in the row 50), commission trade (in the row 51) and repairs of personal and household goods (in the row 52) are used.

The commodity structure of the wholesale trade margins is estimated as multiplication of the average product-specific wholesale trade margin ratios (derived from the supply side estimate of trade margins, based on information from the annual statistical survey in big trade organizations), and the assumed volumes distributed via the wholesale trade. These values are calculated as follows: domestic production plus imported goods, minus diagonal cells in the intermediate consumption matrix (own account production and direct deliveries by producers), minus consumption of petrol products in all sectors (they refer to the NACE 50), minus consumption of own account agricultural products from final consumption of households minus purchases of cars by all sectors (it refers to the NACE 50), minus intermediate consumption of sectors 13, 14, and 15 (assumption that these sectors purchase their inputs predominantly in the retail trade).

The commodity structure of the retail trade margins is determined similarly (as multiplication of the average product-specific retail trade ratios, and the assumed volumes distributed via the retail trade). These values are estimated as follows: final consumption of households excluding consumption of own account agricultural products and imputed rent, consumption of petrol products and purchases of cars by households (the last two mentioned items are shown in separate column which refers to the NACE 50), plus intermediate consumption of sectors 13, 14, and 15.

The estimate of transport margins is not in compliance with ESA 1995 recommendations. As the value of transport margins is not very important, many member states of EU do not estimate this indicator at all. Nevertheless, in the Slovak statistics conditions differences between supply and use sides in the rows corresponding to the NACE 60 and 61 are calculated, and declared as transport margins. These values are divided into commodities proportionally to the commodity structure of the wholesale trade margins.

Estimates of VAT, other taxes on products, trade and transport margins should be considered as an iterative process. The commodity structure of the main aggregates is permanently changing during balancing of Supply and Use tables, and indicators are more accurate. It is evident that these corrections will have an important impact on the estimates of transformation columns.
2.2 The role of Supply and Use tables in the Annual National Accounts, their compilation, and data sources

Supply and Use tables are based on the same definitions and concepts of ESA 1995 that are applied in SNA of the SR. As ESA 1995 has been introduced into SNA in several steps, calculations of GDP for the year 2000 based on the output approach took into account some new items (such as enlargement of forest production by quantification of stump wood and forest fruits picking, an increase of imputed production of dwelling services by opportunity profits).

Although Supply and Use tables are compiled simultaneously with the Annual National Accounts, they are published later. Compared to national accounts, the total indicators from the Supply and Use tables as well as their industrial breakdowns are open to changes. It follows that figures from the Annual National Accounts must be revised when balancing the Supply and Use tables is finished, and they are to be officially published.

2.2.1 General data sources

For compilation of Supply and Use tables, the same data sources as for compilation of the Annual National Accounts are used:

1. Statistical surveys (since 2000, new structural business surveys harmonized with European standards were introduced):
   - exhaustive survey in non-financial enterprises with more than 20 employees,
   - sample survey in non-financial enterprises with 0-19 employees,
   - sample survey in self-employed not registered in the Business registry,
   - two annual exhaustive enterprise surveys collect data for financial corporations irrespective of size, one for units belonging to sub-sectors 121, 122, 123 (except insurance corporations and pension funds), and 124, and the other for the sub-sector 125,
   - statistical survey in NPISHs - in 2000, as a stratified sample survey,
   - statistical survey in Social security funds (5 units operating in the sphere of compulsory health insurance, Social insurance and National Labor Office were covered by an exhaustive survey).
2. Administrative data sources:

Administrative data sources refer mainly to the State Budget and State Final Account of the SR as well as accounting statements of economic units of general government and non-profit institution sectors. Accounting statements of economic units in non-financial and financial sectors are also available. Other administrative data comes from the Tax Office (tax returns with accounting statement annex of self-employed), and from the Customs Office. National accounts are also utilizing the accounting statements of NPISHs, which are obliged to submit these statements to the Ministry of Finance (there are units with double-entry accounting and turnover exceeding the given limit).

3. Other data sources, which include:
- balance of payment of the SR from the National Bank of Slovakia (NBS),
- foreign trade statistics,
- other statistics, such as branch and business tendency statistics, banking, financial, monetary and labor statistics as well as Household Budget Statistics (HBS), and polls.

2.2.2 Data sources for compilation of Supply and Use tables

As data sources are being permanently improved, description is focused on the situation in the year 2000.

The Supply table contains the matrix of domestic production broken down by commodities and industries in basic prices and vector of imported goods and services.

Gross output:
- statistical surveys in big (an exhaustive survey) and small enterprises (till 1996 as an exhaustive, since 1997 as a sample survey) provide information for gross output estimates in commodity and industrial breakdown,
- almost the whole production of financial institutions (from an exhaustive survey in industrial breakdown) is assigned to the diagonal cells (as it is considered for the main production),
- production of general government (in industrial breakdown) which is estimated as the sum of costs, includes the market and non-market output. The commodity breakdown of non-market production is derived from the statistical exhaustive survey in non-market services and assigned as the main production to the diagonal cells. The commodity breakdown of the market production (including fees paid mainly by households or enterprises for services of general government) is also obtained from the statistical exhaustive survey,
- gross output of sector 14 in industrial breakdown is based on data from tax declarations and accounting statements supplementing tax declarations. They are considered for the main production and recorded in the diagonal cells. The gross output indicator contains also the own account agricultural production (shown in NACE 01), imputed rent (NACE 70), own account building of houses, recreation houses and garages (NACE 45), production of drugs (NACE 24), prostitution (NACE 93) and other estimates for informal economy. These estimates are recorded in the relevant diagonal cells,
- according to ESA 1995, the whole production of NPISHs is considered for the non-market one and shown in the diagonal cells. Information for this sector is based on the accounting statements provided by big NPISHs (exhaustive survey) and on a sample statistical survey.

Imports of goods and services:
Import of goods is based on information from the Foreign trade statistics (until 1997 in prices corresponding to CIF as well as FOB, since 1998 only in FOB prices). Because FOB prices do not express the real prices (as they do not include transport, storage and insurance costs paid for delivery of imported goods from the frontiers of exporting countries to the Slovak territory), in order to be in line with ESA 1995, the SO SR had to extend imports by the other column containing CIF/FOB adjustments (assigning the relevant part of transport, storage and insurance costs to particular commodities on the one hand and on the other hand excluding these costs from the total volume of imported transport, insurance and storage services). The commodity breakdown of the column “CIF/FOB adjustments” is based on information from the year 1996 when imports of goods in CIF as well as in FOB prices are available. Data on Imports of services is obtained from the Balance of Payments, from the NBS. For the commodity breakdown of imported services, information from a special statement DEV from the NBS (about all payments received and paid from/to abroad) is used.

The Use table includes a matrix of intermediate consumption of domestic and imported goods and services by commodities and industries. (Separate import matrices were
constructed from the supply and use sides only experimentally for 1998.) The following columns show final consumption of households, general government and NPISHs, gross fixed capital formation, changes in inventories (material, work in progress, finished products and goods for resale are shown separately), including valuables, exports of goods, and services in FOB prices.

Intermediate Consumption:
- the commodity structure of intermediate consumption is based on the exhaustive statistical survey in big enterprises and on a sample survey in small enterprises,
- the commodity structure for the financial institutions sector is based on the statistical exhaustive survey in financial and insurance companies,
- the commodity structure of intermediate consumption in the general government sector is based on the statistical exhaustive survey of non-market services,
- intermediate consumption of sole entrepreneurs (sector 14) by industries is broken down according to information from tax declarations and accounting statements supplementing tax declarations. The commodity structure of intermediate consumption is based on statistical survey of small enterprises. Intermediate consumption also includes intermediate consumption corresponding to own account agricultural production (split up according to the structure of intermediate consumption in NACE 01), intermediate consumption corresponding to imputed rent (the commodity structure of which is based on the structure of inputs in industry NACE 70), intermediate consumption related to own account building of houses, recreational houses and garages (here the structure of intermediate consumption in NACE 45 is applied), as well as intermediate consumption corresponding to production in informal economy (which is assigned proportionally to intermediate consumption in particular industries, surveyed in small enterprises).
- the commodity structure of intermediate consumption in NPISH sector is based on a sample statistical survey in NPISHs.

Final consumption of households:
In accordance with a project on final consumption of households, this indicator is estimated by the following approaches:
1. The first approach is based on information about sales in the retail trade by Classification of Individual Consumption by Purpose (COICOP), which is transformed into CPA - purchases of particular sectors for other purposes than for the final consumption (expert
estimates in selected banks, insurance companies, etc.), plus purchases outside the retail trade (i.e. market services), plus/minus adjustments to ESA 1995 definitions and concepts (own account production of households, goods and services provided to households as incomes in kind, imputed rent, financial and insurance services, meals and drinks as well as uniforms of soldiers, drugs, prostitution), plus consumption of illegally produced and imported goods (purchases without receipts, services of moonlighters) = final consumption of households (domestic concept), plus purchases of resident households abroad, minus purchases of non-resident in the Slovak territory = final consumption of households (national concept).

2. The second approach is based on Household Budget Surveys by COICOP, so the transformation to CPA must have been done. Final consumption of households (excluding rich and poor households), plus estimate of final consumption of households for the rich ones, plus consumption of collective households (students living in dormitories, children in homes of social care, prisoners, people living in religious orders, pensioners in senior houses), plus adjustments to ESA 1995 definitions and concepts (consumption of own account production, wages and salaries in kind, imputed rent, banking and insurance services, meals, drinks and uniforms of soldiers, tips, direct payments of insurance companies for repairs of cars, final consumption of households declared as intermediate consumption), plus consumption of illegally produced goods and services = final consumption of households (national concept), minus consumption of resident households abroad, plus consumption of non-resident households in the Slovak territory = final consumption of households (domestic concept).

Final consumption of government and NPISHs:

Final consumption of general government is estimated as follows: gross output of the general government, minus all revenues of this sector, plus expenditures on purchases of goods and services from market producers flowing into households (i.e. transfers to private doctors and private pharmacists from the Health insurance companies).

Final consumption of NPISHs: the whole production of NPISHs is considered as non-market production and recorded in relevant rows.

Gross fixed capital formation:

Matrix of gross fixed capital formation by commodities and industries is based on information from statistical surveys of non-financial big and small enterprises. It is built up
from three components (acquisitions less disposals of tangible fixed assets, acquisitions less disposals of intangible fixed assets and additions to the value of non-produced non-financial assets, such as land and subsoil assets). The commodity breakdown of gross fixed capital formation for financial and insurance companies and for general government is based on statistical surveys. The industrial breakdown of gross fixed capital formation in the sector 14 is taken from accounting statements and adjusted by individual construction of private houses, recreation houses, and garages. The industrial breakdown of sector 15 is based on statistical surveys, while the commodity structure on a sample survey in NPISHs.

Changes in inventories:
This account covers changes in the value of inventories over the accounting period, adjusted by holding gains. Inventories cover the following groups:
- material,
- work in progress,
- finished products,
- goods for resale.

Changes in inventories in industrial breakdown are estimated from statistical surveys for each sector and in commodity structure from the statistical survey in big enterprises.

Exports of goods and services:
Exports of goods are estimated from the Foreign trade statistics (at the 4-digit CPA level), exports of services is taken over from the Balance of payments (there are problems to divide several groups of exported services).

All final use categories (except of exports of goods and services with prices corresponding to FOB) are expressed in purchasers’ prices.

Value added contains the following rows (in industrial breakdown): compensation of employees, which consist of wages and salaries, and social contributions of employers (actual and imputed), other taxes on production, other subsidies on production, gross operating surplus (including mixed income), consumption of fixed capital, and net operating surplus. The industrial breakdown of all above-mentioned indicators is estimated on the base of statistical surveys for each sector.
2.2.3 Estimates of hidden economy

Estimates of hidden economy are first made in accordance to the framework of Annual National Accounts and then included in the Supply and Use tables. These estimates are carried out in three steps:
- estimates of non-observed economy in the formal sector,
- estimates of non-observed economy in the informal sector,
- estimates for illegal activities.

Estimates of non-observed economy in the formal sector (this sector covers all units registered in the Business registry) include:
- grossing-ups for non-response in big and small enterprises for units not answering in statistical surveys. In Annual National Accounts, estimates for the non-financial sector are based on numbers of active units registered in the Business registry, information on employment and on the average values surveyed per employee. Estimates for underreporting in small enterprises are made, too,
- in the general government and financial sectors, no estimates are done, because of an assumption that these sectors are covered exhaustively by statistical surveys and accounting statements, and their response was close to 100 %, for NPISHs, not submitting accounting statements: results from the sample survey covering small NPISHs were grossed-up according to the all active Registered units.

The informal sector covers sole entrepreneurs not registered in the Business registry, but that are included in the Statistical registry, as well as other market activities of households not registered. Data on non-observed economy for the household sector include the following estimates:
- because of the main data sources on sole entrepreneurs that are based on tax declarations, as well as on a sample survey (Roc3-01), results were grossed-up against the total numbers of active sole entrepreneurs registered in the Statistical registry,
- because the value added produced by sole entrepreneurs is usually underestimated (as their intermediate consumption is usually overestimated and revenues are underestimated), some adjustments of value added have to be done,
- because some other market non-observed activities were found in the household sector, which were not included in tax returns, estimates of these activities were based on Public opinion survey (poll), where expenditures of households for purchases of goods and services without receipts were surveyed,
- an estimate of household own-account production was made. It includes estimates of agricultural and food products, imputed rent, as well as individual construction of private houses.

Since 1996, values of illegal activities have been estimated. These include the estimates on drugs and prostitution, which are based on information from the National narcotics squad, from the Police and the Public opinion survey on using drugs.

2.2.4 Balancing process (until 2000)

Before balancing the supplies with uses, it is necessary to record explicitly the following items:

- individual building of private houses, houses for recreation and garages: at the supply side this value is recorded as output of the industry 45, in the diagonal cell, and at side of uses as gross fixed capital formation in the row for buildings,
- imputed rent: at the supply side this is recorded as output of the industry 70, in the diagonal cell, and at the use side as final consumption of households, in a particular row corresponding to real estate services,
- consumption of own account agricultural products: at the supply side this is recorded as output of NACE 01, in the diagonal cell, and at the use side as final consumption of households, in the relevant row corresponding to agricultural products,
- banking and insurance services: expenditures of households on banking and insurance must be recorded as final consumption of households, in the relevant rows.

As a next step, it is necessary to recalculate the supply side of Supply and Use tables from basic into purchasers’ prices, as balancing is performed in purchasers’ prices. Because the SO SR did not have any special software for balancing, it is done manually at the level corresponding to the 2-digit CPA and the 2-digit NACE classifications. Balancing is performed in rows as well as in columns. Some groups of commodities are balanced separately. These groups are selected according to special relations that exist among
producers and consumers, or some use-categories, e.g. agriculture, fishing versus food industry, restaurants and final consumption of households. Material versus intermediate consumption; energy, water and petroleum products versus intermediate consumption or final consumption of households; specific goods for final consumption of households or exports (textiles, ready made cloths, shoes and leather products, etc.); wood, other mining and quarrying products, metal products versus construction, final consumption of households or exports; chemical industry, rubber and plastic products versus final consumption of households; rows 29-36, where specific commodities for gross fixed capital formation, final consumption of households, or exports are produced; services.

Available data sources have different levels of reliability. Indicators at the supply side, such as output and imports of goods, also exports of goods, intermediate consumption in big enterprises, are considered more reliable. Changes in inventories, imports and exports of services, intermediate consumption of some sectors, mainly sector 14, etc., are less reliable. Special attention is paid to commodities as crude oil and natural gas, production and distribution of electricity, gas and hot water, banking and insurance services. Data for the reference year is compared with data from preceding years, growth rates taken from other statistics, and inflation is taken into account. Finally, the input and output coefficients for several years are compared.
3. Symmetric Input-Output tables

While some users might find that in many instances the Supply and Use tables could serve analytical as well as statistical purposes, others traditionally may want to prepare more analytical tables to meet their needs (UN, 1993, p. 361), as it is in our case. Supply and Use tables certainly can provide the framework for I-O analysis, including the construction of economic models needed for economic analysis. Indeed, analysts increasingly find that there are advantages in starting off directly from the rectangular I-O tables instead of basing the analysis on symmetric I-O tables. It should also be noted that the Supply and Use tables in fact represent an intermediate stage between the basic statistics and the symmetric tables. The following considerations might be taken into account, starting from Supply and Use tables, in order to arrive at useful analytical I-O tables:

- decompose purchasers’ prices of uses into basic prices, taxes, subsidies, and trade and transport margins, and separately analyze these components (estimations of all these data, arranged in a matrix form are available from the author);
- distinguish use of imported products from use of products from resident producers;
- express rows and columns in the same classification, i.e., direct links (products to products or industries to industries) rather than indirect (products to industries).

There is a change in format to be made in converting the Supply and Use tables into symmetric tables. The conversion, or transformation to product-by-product table, in which the columns of the table refer to inputs into the production of a CPA group, can be divided into three steps to the Supply and Use tables:

1. Allocation of all products in the Supply table to the productive activity in which they are principally produced. This involves transfers of outputs in the form of secondary products in the Supply table. Since secondary products appear as “off diagonal” entries in the Supply table, this kind of transfer is a comparatively simple matter.

2. Rearranging the columns of the Use table from inputs into industries to inputs into homogeneous activities (without aggregation of the rows). This step is more complicated as the basic data on inputs relate to industries and not to particular products produced in those industries. This can be done by means of supplementary statistical information or by means of mechanical methods.

3. Aggregation of the detailed products (rows) of the new Use table to the homogeneous activities recognized in the columns, if appropriate. This involves the aggregation of the
products of the new Use table to the activities that generate them according to step 1, and this results in a symmetric I-O table with dimensions product-by-product. While these amendments start from data based on establishment units, the resulting entries are brought into conformity with those of units of homogeneous production.

The mathematical methods used when transferring outputs and associated inputs hinge on two types of technology assumptions:
- industry (producer) technology, assuming that all products produced by an industry are produced with the same input structure;
- product (commodity) technology, assuming that a product has the same input structure in whichever industry it is produced.

The product-by-product table shows which products are used in the production of which other products, the industry-by-industry table shows which industry uses the output of which other industry. Since the product-by-product table will often prove most useful, only this table is actually described in detail in the SNA 1993 manual. The format of the product-by-product table is the familiar one consisting of three quadrants:
- the upper-left part, quadrant I on intermediate use, gives the name to the table, as it is shown in the form of product-by-product (i.e., rows were products already, while columns change, actually referring to homogeneous activities);
- the upper-right part, quadrant II on final use, has a format close to the corresponding Use table, except for imports;
- the lower-left part, quadrant III on uses of value added, also has a format close to that of the Use table in that the rows are the same, but the columns reflect homogeneous activities.

3.1 The official symmetric Input-Output table

Until present, the SO SR has not published symmetric I-O tables. Although the author of this paper has suggested a methodology for and has constructed an I-O table for the Slovak economy for the year 1996 (see section 3.2), official transformation of Supply and Use tables into symmetric I-O tables has been done only experimentally for 1998 by Infostat - the research center of the SO SR. Supply and Use tables by 60 groups of commodities and 60 groups of industries were transformed into a product-by-product symmetric I-O table. Both approaches of transformation, product technology, as well as industry technology assumptions
have been used. Although the SO SR tried to eliminate negatives resulting from the application of the product technology assumption, the workshop in Luxembourg showed that this approach was not fully in compliance with ESA 1995. In principle, treating negatives in the symmetric I-O table based on Supply and Use tables with 60 commodities by 60 industries is quite objectionable, as these sectors are quite heterogeneous.

3.2 Construction of a symmetric Input-Output table for Slovakia

An I-O table can be compiled by converting the Supply and Use tables, both at basic prices. As the base for all estimations of this research, the adjusted Supply (Table 2) and Use (Table 3) tables are used, which were obtained by making some adjustments to the original Supply and the original Use tables (in SO SR, 2000).

In contrast to the ideal situation, the SNA Supply and Use tables, as an integrated framework for production statistics, are designed to serve as the best statistical tool to compile national accounts aggregates and provide information for the compilation of the symmetric I-O table (UN, 1999, p. 76). However, Supply and Use tables, if taken only as a tool for balancing Supply and uses of products in the compilation of national account aggregates or institutional sector accounts, would not need to apply rigorously the homogeneity assumption, which certainly would require the identification of product production technologies. To extend this argument even further, Supply and Use tables as a tool for balancing supply and use products may even be based on enterprises as statistical units. In this case, the derivation of the symmetric I-O table from Supply and Use tables is purely a mathematical approximation. Even if an establishment is used as the statistical unit, the resulting supply matrix still contains many secondary products, though the derivation of the symmetric table is less an exercise in pure mathematical approximation. In order to eliminate the need to either carry out supplementary surveys or live with the problems of secondary products and resolve them by mechanical methods, I-O statisticians should engage in the planning of data collection by censuses. The strategy is, as much as possible, to define operationally a purer establishment, linking each product produced to an establishment. It is possible to design production censuses by asking business accountants using the cost accounting approach to allocate costs to a specific type of product produced by an establishment. Cost accounting is a common practice used by large enterprises in their pricing and general management policy.
Allocation keys are work hours (for example, those spent by the personnel of the maintenance department in other departments are used to allocate maintenance costs), surface area for allocating rental, kilometers driven, percentage of administrative work done in each establishment to allocate central administration costs, etc. In doing this, most secondary products will be eliminated from Supply and Use tables. Mathematical methods that are basically mechanical will be used only as a last resort. The approach proposed above is feasible given the availability of inexpensive means of data processing at present. The database should make it possible to link a product technology to a specific establishment, which, in turn, is identified with a specific enterprise.

The Supply table (Table 2) is originally shown in basic prices, with transformation into purchasers’ prices shown in a separate part. Therefore, there is no need for adjustments.

The derivation of the Use table at basic prices has been done as follows. The value of every use at purchasers’ prices must be divided into three parts: value at basic prices, trade and transport margins and taxes less subsidies on products. For this purpose, separate tables with wholesale trade margins, retail trade margins, transport margins, and taxes less subsidies have been estimated. Their dimensional structure is exactly the same as the Use table at purchasers’ prices (Table 3). Generally, they should be available from official sources, because they are used when compiling the Use table at purchasers’ prices. However, since their availability from official sources is limited, they have been estimated for purposes of the research. A proportional distribution of wholesale trade margins, retail trade margins, transport margins and taxes less subsidies between the intermediate uses, final uses of households, gross fixed capital formation, and exports is applied. After estimation of these values, wholesale trade margins, retail trade margins and transport margins were subtracted from use at purchasers’ prices. Additionally, taxes less subsidies were subtracted from use at producers’ prices to derive use at basic prices.

The final Supply and Use tables in basic prices can be combined to produce the symmetric I-O table. Practically, there are four possible situations when converting the Supply and Use tables into symmetric I-O tables:
- industry-by-industry I-O table, with application of product technology assumption,
- industry-by-industry I-O table, with application of industry technology assumption,
- product-by-product I-O table, with application of product technology assumption,
- product-by-product I-O table, with application of industry technology assumption.

The choice of the best technology assumption to apply in each case is not an easy one. It must, in fact, depend on the structure of national industries, e.g. the degree of specialization,
and on the homogeneity of the national technologies used to produce products within the same product group (Eurostat, 1996, p. 228). For example, boots may be made from leather and from plastic. Assuming the same product technology for all boots (or a higher level of aggregation, e.g. footwear) can thus be problematic. Assuming industry technology can then be a better alternative. Simple application of the product technology assumption has often shown results that are unacceptable, insofar as the I-O coefficients generated are sometimes improbable or even impossible, for example, negative coefficients. Improbable coefficients may be due to errors in measurement and to heterogeneity (product-mix) in the industry of which the transferred product is the principal product. This might be overcome by making adjustments based on supplementary information or exploiting informed judgment to the fullest extent possible. Of course, another solution is to apply the alternative assumption of industry technology, as is done in our case. In practice, employing mixed technology assumptions combined with supplementary information is the best strategy for compiling symmetric I-O tables, and therefore will be a target for further research.

A symmetric or square I-O matrix is required for I-O analysis, as only a square matrix can be inverted to obtain the Leontief inverse (UN, 1999, p. 86). A symmetric table can be a product-by-product or an industry-by-industry matrix. In the first version, a column in the intermediate matrix represents a product technology and a row represents the distribution of a product to intermediate inputs and as final use. In the industry-by-industry version, a column represents an industry technology containing all inputs required by that industry, and a row represents the distribution of the industry output (which also contains secondary products) to all industries and to final consumers. The second type of I-O table is much less useful than the first one because an industry might represent a group of establishments, part of which may be artificially created by mathematical methods, and therefore does not reflect any “realistic” picture of the economy. It would be more useful if each industry represented a group of enterprises instead. One should also be careful to use the inverse of the industry-by-industry matrix when a significant time lag is involved because linear and fixed technical assumptions cannot be applied here. The inversion of this matrix should be done indirectly through the inversion of the product-by-product matrix so that whenever there are changes in market shares, a different industry-by-industry matrix is obtained; however, the product-by-product matrix remains the same.

For details on construction, and for the complete final symmetric I-O table of the SR for 1996, see Koronczi (2003), and/or Koronczi (2004).
4. Social Accounting Matrix

A SAM is the presentation of SNA accounts in a matrix, which elaborates the linkages between a Supply and Use table and institutional sector accounts (UN, 1993, p. 461). In many instances, SAMs are applied to an analysis of interrelationships between structural features of an economy and the distribution of income and expenditure among household groups. SAMs are closely related to national accounts, whereby their typical focus on the role of people in the economy may be reflected by extra breakdowns of the household sector ad a disaggregated representation of labor markets. Although there are SAMs applied for analysis in several economies, their construction is not standardized.

Here, a description of the Slovak SAM for the year 2000 is presented.

4.1 Description of the individual SAM accounts

The SAM in this paper is constructed from the National Accounts of SR 2000. Estimations were applied only in case of disaggregating various current transfers. For a simpler overview while reading through this section, refer to Table 5 of the Appendix Section, showing the 2000 aggregated SAM for SR.

Goods and service account:

This account (row 1, column 1) records supply and use of goods and services. In row 1, the following use of goods and services (in market prices) is recorded: intermediate consumption (1,2), final use of government (1,7), final consumption of households (1,8), final consumption of NPISHs (1,9), gross fixed capital formation (1,11), changes in stocks including valuables (1,12), and total export (or ROW) in FOB prices (1,13).

Column 1 shows supply of goods and services that were produced by domestic producers (2,1), or imports (13,1). Domestic production is evaluated in basic and imports are in CIF prices. Taxes less subsidies on products are recorded on separate accounts: VAT on domestic and imported production (10a,1), consumption tax on imports (10b,1), import taxes (tariffs) (10c,1), consumption tax and other tax on domestic production (10d,1), subsidies on products as a negative item (10e,1). At the same time, taxes less subsidies on products are recorded as income of general government (row 7, columns 10a-10e).
Trade and transport margins may be recorded in cell (1,1). In sum for the whole economy, margins paid and received equal to zero, therefore values are displayed only in case of disaggregating this account. However, in order to make the SAM be usable as a basic database for a standard CGE model, Thomas and Bautista (1999) SAM is taken for reference, and trade and transport margins are not separated.

Row 1 and column 1 is disaggregated into production groups, based on the Supply and Use tables (Table 2, and Table 3 of the Appendix Section).

Production account:

Production is recorded in the second column of the second row. Second row shows production of domestic production units in basic prices (2,1). The second column shows intermediate consumption (1,2), and consumption of fixed capital (or investment) (11,2), which is directly recorded to the gross fixed capital formation account as an income. At last, net value added in basic prices (rows 3a-5b, column 2) is recorded as the balancing item, subtracting expenditures from receipts.

Production account is disaggregated into the separate sectors, based on the Supply and Use tables.

Generation of income account:

This account records income generation that is allocated to the particular institutional sectors. In this SAM, the following categories of primary inputs are distinguished: net operating surplus (3a,2), net mixed income(3b,2), gross wages (4a,2), social contributions of employers (4b,2), other taxes on production (5a,2), and other subsidies on production (5b,2). Cell (4a,13) shows gross wages originating from employers abroad. Cell (13,4a) shows the non-resident employee's wages employed at resident employers.

The net operating surplus is the income of corporation sector (financial and non-financial), mixed income is the income of households (self-employed persons, small entrepreneurs), gross wages are income of the households (employees), real social contributions create income of the government (so-called imputed social contributions are allocated to other sectors, if they create any from own sources), other taxes on production less subsidies are income of the government.

Net operating surplus produced by households for own consumption purposes is also included in the mixed income of households. Examples are agricultural production for own
consumption, construction of houses and cottages covered by household expenses, housing services provided for oneself, i.e. imputed house rent.

Allocation and use of income account:

In this SAM, allocation and use of income is consolidated into one account. This account records primary and secondary distribution of income between the sectors of domestic economy and with the ROW. At the same time, it also records use of this income.

The sub-matrix on rows and columns 6-9, shows flows of current transfers between institutional sectors in the economy. The sub-matrix on row 13, columns 6-9, shows current transfers flowing abroad; the sub-matrix on rows 6-9, column 13, records current transfers from abroad. Current transfers include mainly: general income tax, property tax, social transfers, income from ownership, such as interest, dividends, payments of insurance fees and paid non-life insurance claims, various general transfers.

Use of income for final consumption is recorded in (1,7) as the final consumption of government, in (1,8) as the final consumption of households, and in (1,9) as the final consumption of NPISHs.

Net savings (or investment) on row 11, as a balancing unit, is shown separately for the various institutional sectors: corporations (column 6), government (column 7), households (column 8), and sector of NPISHs (column 9).

This account can be disaggregated according to particular institutional sectors.

Capital account:

The capital account records gross fixed capital formation (1,11), and separately changes in stocks (12,11) that are financed from savings of individual sectors and from net borrowings from abroad (11,13). Net capital transfers with the ROW, including acquired less decrease in non-financial foreign assets are shown in (13,11).

Column 12 shows changes in stocks. This item often records non-identified balancing differences between supply and use of commodities, too.

ROW account:

The ROW account records current and capital transactions of foreign with the domestic (national) economy. Row 13 shows payments from domestic economy abroad, and column 13 shows payments from abroad into the local economy.
A balancing account of net foreign borrowing/lending is shown in cell (11,13).

4.2 Disaggregating the SAM matrix

Each input in the aggregated SAM may be considered as cross-aggregation of a more detailed matrix. The intermediate part of the disaggregated SAM is based on Supply and Use tables, explained in section 2 of this paper. Goods and service account is based on production classification (CPA), and the production account based on activity classification (NACE), both harmonized with a standard classification within the EU.

Income generation account is divided based on categories of primary inputs to: net operating surplus, net mixed income, gross wages, employer social contributions, other production taxes, and negative production subsidies.

The following institutional sectors are distinguished in the SAM: corporations (financial and non-financial), government (general and local), households, and NPISHs. Often, NPISHs are aggregated with the household sector.

The final disaggregated SAM of the Slovak Republic for year 2000 is shown in Table 4 of the Appendix Section.

4.3 Additional data on employment and stocks of fixed assets

Employment data:

Data on employment is supplementary to the I-O data, and create the base of labor input, i.e. stock of labor force. Some countries report data on labor stock as part of their I-O tables. As it is in the case of Slovak statistics not true, this paper shows the data as additional data to the SAM in Table 6 of the Appendix Section.

Gross wages and mixed income reported for the individual sectors, have been augmented by indicators of employment, separately for employees and employers (self-employed, small entrepreneurs, etc.). Three types of employment indicators are shown:
1. number of employed persons,
2. number of all jobs,
3. jobs recalculated to full time employment.
Employment indicators cover all domestic activities, including adjustments for employment activities not registered. Method of balancing labor supply and demand is applied for estimation of non-registered jobs. This method is based on supply side information (i.e. labor force surveys in households), compared with demand (employer) side information (i.e. company surveys, administrative data).

Data on fixed assets:
Another important category of data supplementary to the I-O and SAM data is stocks of fixed assets. From official sources, detailed data is unavailable, too. This paper therefore presents the latest available fixed asset data from year 1996 (Koronczi, 2004). The original data is classified almost exactly as the SAM, therefore only minor adjustments have been made. At the time when fixed asset data is discrete, the SAM records data as flows. Therefore it seems more reasonable to adjust the data by taking the average of fixed asset stock from the beginning and the end of the period under assumption, in order to get an average for the whole period under assumption. In this paper, the average of fixed asset stocks from the beginning of 1996 and the end of 1996 has been calculated.

Data on stocks of fixed assets in its structured classification is in Table 6 of the Appendix Section.

Aggregated SAM:
For those who wish to study this paper in detail, it might be helpful in the beginning to try calculations with tables of smaller scale. For this purpose, the SAM has been aggregated, and units changed to millions of SKK. The aggregated SAM of the Slovak Republic for year 2000 is shown in Table 5 of the Appendix Section.
5. Conclusion

Several basic conclusions can be reached already, just by looking at the data. However, rather than to draw direct conclusions, the aim of this paper is to prepare a basic database for economic research. This paper constructs a descriptive tool in form a SAM matrix, which can be used for various kinds of economic analyses. The data in Supply and Use tables, the symmetric I-O table, and in the SAM can be integrated into macro-economic models to provide the latter with a detailed meso-economic foundation. It may be found useful by economists in production analysis; analysis of structure of demand, export ratio, structure of capital formation, final consumption, etc.; cost structure and productivity; relationship between domestic production and the environment; imports of energy required; impact analysis of new technologies; sensitivity analysis of the effects of changes in tax rates and regulation; prices; employment; analysis of investment and capital; etc.

After constructing a CGE model for the Slovak economy, the author’s next attempt is to demonstrate, how to apply these data for sensitivity analysis and for analysis of foreign trade issues. The data from the SAM table are used as core data for the model.

The strong point of the data constructed in this article is, that they are consistent and very detailed. The weak point is, that this is just a first attempt to create this kind of data. Therefore estimation made would be more effective, if replaced by official data collected by the authorities. Also it would be more useful, if there were SAM and other data available for several years in sequence and in the same industry classification, to make comparison and growth analyses possible. In order to make comprehensive research, it will be necessary to collect consistent data in a table form in long term, for several years in a row. This would enable to make not only static analysis, but to also forecasting problems and make possible to apply dynamic approaches.
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Keywords: Supply, Use, Input-output, I-O, Leontief, Social Accounting Matrix, SAM, System of National Accounts, SNA, Slovak Republic, European System of Accounts, ESA.

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Appendix Section
<table>
<thead>
<tr>
<th>Code</th>
<th>Classification of products by activity (CPA)</th>
<th>General Industrial Classification of Economic Activities within the European Communities (NACE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Products of agriculture, hunting and related services</td>
<td>Agriculture, hunting and related service activities</td>
</tr>
<tr>
<td>02</td>
<td>Products of forestry, logging and related services</td>
<td>Forestry, logging and related service activities</td>
</tr>
<tr>
<td>05</td>
<td>Fish and other fishing products, services incidental to fishing</td>
<td>Fishing, operation of fish hatcheries and fish farms, services incidental to fishing</td>
</tr>
<tr>
<td>10</td>
<td>Coal and lignite, peat</td>
<td>Mining of coal and lignite, extraction of peat</td>
</tr>
<tr>
<td>11</td>
<td>Crude petroleum and natural gas, services incidental to oil and gas extraction excluding surveying</td>
<td>Extraction of crude petroleum and natural gas, service activities incidental to oil and gas extraction excluding surveying</td>
</tr>
<tr>
<td>12</td>
<td>Uranium and thorium ores</td>
<td>Mining of uranium and thorium ores</td>
</tr>
<tr>
<td>13</td>
<td>Metal ores</td>
<td>Mining of metal ores</td>
</tr>
<tr>
<td>14</td>
<td>Other mining and quarrying products</td>
<td>Other mining and quarrying</td>
</tr>
<tr>
<td>15</td>
<td>Food products and beverages</td>
<td>Manufacture of food products and beverages</td>
</tr>
<tr>
<td>16</td>
<td>Tobacco products</td>
<td>Manufacture of tobacco products</td>
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<td>17</td>
<td>Textiles</td>
<td>Manufacture of textiles</td>
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<td>18</td>
<td>Wearing apparel, furs</td>
<td>Manufacture of wearing apparel, dressing and dyeing of fur</td>
</tr>
<tr>
<td>19</td>
<td>Leather and leather products</td>
<td>Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear</td>
</tr>
<tr>
<td>20</td>
<td>Wood and products of wood and cork (except furniture), articles of straw and plaiting materials</td>
<td>Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials</td>
</tr>
<tr>
<td>21</td>
<td>Pulp, paper and paper products</td>
<td>Manufacture of pulp, paper and paper products</td>
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<td>22</td>
<td>Printed matter and recorded media</td>
<td>Publishing, printing and reproduction of recorded media</td>
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<tr>
<td>23</td>
<td>Coke, refined petroleum products and nuclear fuel</td>
<td>Manufacture of coke, refined petroleum products and nuclear fuel</td>
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<tr>
<td>24</td>
<td>Chemicals, chemical products and man-made fibres</td>
<td>Manufacture of chemicals and chemical products</td>
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<td>Rubber and plastic products</td>
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<td>Other non-metallic mineral products</td>
<td>Manufacture of other non-metallic mineral products</td>
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<td>Basic metals</td>
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<td>28</td>
<td>Fabricated metal products, except machinery and equipment</td>
<td>Manufacture of fabricated metal products, except machinery and equipment</td>
</tr>
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<td>29</td>
<td>Machinery and equipment n.e.c.</td>
<td>Manufacture of machinery and equipment n.e.c.</td>
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<td>30</td>
<td>Office machinery and computers</td>
<td>Manufacture of office machinery and computers</td>
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<td>31</td>
<td>Electrical machinery and apparatus n.e.c.</td>
<td>Manufacture of electrical machinery and apparatus n.e.c.</td>
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<tr>
<td>32</td>
<td>Radio, television and communication equipment and apparatus</td>
<td>Manufacture of radio, television and communication equipment and apparatus</td>
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<tr>
<td>33</td>
<td>Medical, precision and optical instruments, watches and clocks</td>
<td>Manufacture of medical, precision and optical instruments, watches and clocks</td>
</tr>
<tr>
<td>34</td>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>Manufacture of motor vehicles, trailers and semi-trailers</td>
</tr>
<tr>
<td>35</td>
<td>Other transport equipment</td>
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<td>Furniture, other manufactured goods n.e.c.</td>
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<td>Sale, maintenance and repair services of motor vehicles and motorcycles, retail sale of automobile fuel</td>
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<td>Retail trade services, except of motor vehicles and motorcycles, repair services of personal and household goods</td>
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<td>Insurance and pension funding services, except compulsory social security services</td>
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<td>Renting services of machinery and equipment without operator and of personal and household goods</td>
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<td>Other services</td>
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<td>Private households with employed persons</td>
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Table 2: Supply table (Slovak Republic, 2000, thous. SKK, basic prices)

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Total 82,785,630 12,760,425 86,585 3,343,560 5,401,200 0 867,489 4,026,236 94,599,042 3,846,000 10,524,726 17,423,134 5,638,758 2,203,529,482 684,402,000 2,887,931,482 71,961,000 23,587,002 19,141,000 -8,757,200 0 2,993,863,285
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Table 3: Use table (Slovak Republic, 2000, thous. SKK, purchasers' prices)
### Table 4: Social Accounting Matrix (SAM, Slovak Republic, 2000, full, nominal prices, thous. SKK)

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### Production (industries)

- Net operating surplus (3a): $0 -7,843,847 1,434,235 -8,041 569,476 924,147 -32,511 413,755 8,094,318 1,072,482 -297,447 ...
- Changes in stocks (12): $1,864,000 1,864,000
- Value added tax (VAT) (10a): $1,786,159 214,252 14,946 52,058 16,817 12 86,641 11,731,544 2,142,466 1,603,955 2,886,723 ...
- Taxes on imports (consumption) (10b): $289,463 10,248 4,062 31,917 148 1,501 45,162 3,545,756 3,338,337 257,014 129,137 ...
- Other subsidies on production (5b): $0 -8,868,200 -451,100 0 -1,067,300 0 0 0 -50 0 0 000000000 000 0000 0 -32,500 -6,586 0 ...

### Source
- Author's calculations, based on data from Statistical Office of the Slovak Republic, and Infostat.
Table 5: Social Accounting Matrix (SAM, Slovak Republic, 2000, aggregated, without FISIM, mill. SKK, nominal prices)

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Goods and services</th>
<th>Production</th>
<th>Generation of income</th>
<th>Allocation and use of income</th>
<th>Expenditures</th>
<th>Gross fixed capital formation</th>
<th>Changes in the rest of the world (ROW)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3a)</td>
<td>(3b)</td>
<td>(4a)</td>
<td>(4b)</td>
<td>(5a)</td>
<td>(5b)</td>
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<tr>
<td></td>
<td>1,375,382</td>
<td>2,203,529</td>
<td>62,361</td>
<td>166,327</td>
<td>293,767</td>
<td>96,273</td>
<td>6,850</td>
<td>-15,035</td>
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<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
<td>(10a)</td>
<td>(10b)</td>
<td>(10c)</td>
<td>(10d)</td>
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<tr>
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<td>71,961</td>
<td>19,141</td>
<td>3,683</td>
<td>-8,757</td>
<td>217,604</td>
<td>1,884</td>
<td>243,836</td>
<td>8,105,811</td>
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<td>(11)</td>
<td>(12)</td>
<td>(13)</td>
<td>(14)</td>
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</tbody>
</table>

**Notes:**
1) Basic prices.
3) Financial Intermediation Services Indirectly Measured (FISIM, 10,130 mill. SKK) are divided between intermediate consumption of financial and non-financial institutions, and households (entrepreneurs) by ratio of 70:30.

Source:
Author's calculations, based on data from Statistical Office of the Slovak Republic, and Infostat.

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| CPA/NACE | 01 | 02 | 05 | 10 | 11 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 40 | 41 | 45 | 50 | 51 | 52 | 55 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 70 | 71 | 72 | 73 | 74 | 75 | 80 | 85 | 90 | 91 | 92 | 93 | Total |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|
|         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |---|----|----|----|----|----|----|----|----|----|