"CGE Models Applied on New European Union Members, Case of Czech Republic"

Input-Output and General Equilibrium Modeling Conference.

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Introduction.

This paper presents the contribution of the Department of National Accounts of the Czech Statistical Office to the process of CGE (Computing General Equilibrium) modeling in the Czech Republic being carried out by other government institutions and ministries. It will not provide any output in the form of Social Accounting Matrix (SAM) or CGE model equations, but will focus on the work of the Department of National Accounts in the field of providing and revising data later used for in SAM creation.

History of National Accounts in Czech Republic.

The tradition of macroeconomic modeling in Czech republic comes from the previous regime and the centrally planned economy. Ironically Leontief's models, created for the free-market economy, were widely used in centrally planned economies. Since the supply did not depend on demand and the prices did not play a key role in the process of supply and use balancing, it was necessary to substitute the role the market and the decision making process of producers by the calculations of the National Planning Committee.

The theoretical question whether the centrally planning is able to fully substitute the market was also a subject of many disputations between various economic theorists – especially members of Austrian economic school (Mises, Hayek) and Marxian economists. The first question was whether it is realistic to gather all necessary data and to compute models that are complex enough to cover all the subjects in the economy of the state and predict their behavior, and whether it is technically possible to calibrate all parameters of such a model.

Theoretical debate was definitely solved when the centrally planned economies collapsed. Collapse was caused by several reasons, such as shortage of consumer goods caused by unbalanced focus on heavy machinery manufacturing and steel and coal production. Since factory output was not determined demand and production costs there was no impulse to improve and modernize goods and equipment or to reduce production costs and make the production process more effective.

The practice showed that in the long run the centrally planned economies are unable to not only to compete with market-oriented economies, but also to exist. Whereas central-planning economies collapsed, their existence helped greatly to improve the techniques of macroeconomic modeling and had brought effect on theoretical and methodological levels. At present models are no longer being used for the structure of production determination but for other purposes, such as forecasts or calculations of impacts of government policy on the Czech economy.

After the regime change, when the transformation of economy began, there was a significant pause in the field of economic modeling. The first reason was the belief that everything that has something to do with economical modeling is more or less connected with the former regime and should not be allowed to exist in the free-market economy. The second reason was the lack of relevant data; rapid changes of the economic environment made all existing data series less and less reliable. Moreover macroeconomic modeling needs long-lasting stable economic environment, which definitely did not exist in Czech Republic in the first half of 90-ties. Finally the last reason was the unwillingness of companies and households to provide any kind of information to anyone, especially the government institutions. It is also important to know that the system of national accounts itself was undergoing a serious transformation to be accommodated with the European Standard (ESA 95).

Present State of Czech Republic National Accounts.

Presently the Czech national accounts are almost fully compatible with the other countries of European Union, although in some details harmonization is still being carried on. Although methodologically there is no serious imperfection in Czech national accounts, there is a problem of data quality. While other countries of European Union, which have a long time experience with the compiling of national accounts, have relatively stable economic environment and long time series at their disposal, Czech Republic has been missing both of them. Before the main revision of Czech national

accounts, which took place during the last few months, Czech Statistical Office had no comparable time series of the national account aggregates. After the revision we have time series of aggregates for 8 years from 1992 to 2002, which are methodologically harmonized with ESA 95 standard.

Having reliable time series is a crucial moment of our work. There are two opposing trends in our branch. On one hand there are greater requirements for the output quality imposed by users of our products, such as Eurostat, ministries, government institutions and others. On the other hand there is the tendency to burden the providers of our inputs – the respondents – less and less. This situation, where Czech Statistical Office is forced produce more from less, could be solved by two approaches that have to be applied simultaneously.

The first one is better usage of already existing data that was gathered by government institutions or private companies. In order to achieve this it is necessary to develop a whole new framework of communication and data sharing between different ministries, other government institutions, regional governments, cities and village councils. It is also necessary to transform existing documents into digital form. Not the last issue is the security of such database and the upholding of the laws, which protect and determine ways to use and store private information. Regarding this approach, the situation is slowly getting better in Czech Republic, however there is always space for further improvement.

The other approach is focused on modeling data instead of surveying them. In this respect there is a big deficit in Czech republic caused by the lack of reliable data, for the reasons mentioned above. The other reason is the staff shortage. In the past the national accounting was more about collecting the data and putting them together than about macroeconomic modeling, thus the requirements when hiring staff were not focused on experience or knowledge of statistical and econometrical methods and approaches, other requirement underestimated in the past was the ability to work with computers. With improvement in staff qualification the situation is slowly getting better and we believe that in near future Czech Statistical Office is going to be fully comparable with the statistically developed countries. It is necessary to note, that the Department of National Accounts is one of the "youngest" – regarding the age of employees – departments of CZSO.

CGE Modeling in Czech Republic.

Although Czech statistical Office itself does not have its own CGE model, it cooperates and provides data to institutions, which are creating CGE models for their or government purposes. Beside university models there are two main projects: the Czech National Bank (CNB) and the joint project of Ministry of Industry and Trade (MIT) and Ministry of Finance (MoF) with the help of Dutch advisors from Erasmus University in Rotterdam.

The CNB model is being computed only for the CNB itself and is being used for purposes of the monetary policy determination. So we will focus on the joint model of MIT and MoF.

The process of model creation started in June 2001 in order to gain more rigorous results in economic analysis. The model was developed for the needs of long run analysis and simulation of economic policies i.e. energy policy. Model was based on Czech national accounts from the year 1999, with supply and use table as a main source. Some aggregations in economic activities and commodities have been made. The model is basically neoclassical, factor values are determined on the factor markets, Cobb-Douglas production functions are used to determine the amount of goods produced in each branch of economic activity. Value-added is distributed by a fixed ratio between employees, the capital and the state. The purchasing power then defines the demand for consumption and investments. The main task was to model an opened small economy, so foreign trade could be modeled. The model had been programmed in GAMS, optimization software package.

The model did not showed itself well; so another version of the model is being currently developed in the project period 2004-2005. The model is going to be usable also for short-run and instead of Cobb-Douglas production functions uses CES and Leontief's production functions.

Contribution of Czech Statistical Office to SAM Construction.

This part briefly presents the work of Czech Statistical Office in the field of input-output tables and its contribution to the process of SAM construction. In the previous years the input-output tables were seen only as an appendix of the national accounts, mainly because there was a little demand for them among the users. The input-output tables were compiled in relatively detailed form, but with a significant delay and only for some selected years, usually with 5-year period. Last publication of input-output tables deals with year 1999.

The main impulse for the better input-output tables' utilization was the requirement to convert main aggregates into the constant prices. That's why the revision of input-output tables took place. The task of Department of National Accounts was to compile the supply and use tables for 8 years starting with year 1995 to year 2002. The time was limited by the May the 1st – the date when Czech Republic had joined the European Union. The detailed form used in the past was based on SKP3 (Czech equivalent of NACE), for example the above mentioned tables for year 1999 were balanced in SKP3, then aggregated and published in SKP2. Since it was not feasible to do it in such detailed form, as it should be desirable, due to time pressure we made the calculations in more aggregated form SKP2. Data quality slightly suffered due to aggregation.

The second important stimulus, for paying attention to input-output tables, was an increasing misbalance between sources and uses. After the grossing up method improvement the source side of the balance increased rapidly, but the use side increased much less. We had to analyze sources and uses of each commodity in order to remove existing misbalance, and it helped us to determine the level of particular aggregates such as production, intermediate and final consumption and the gross fixed capital formation.

The deflation and the sources and uses balancing are the main goals of the Input-Output Tables Department, which is a part of National Accounts Department of CZSO. There are of course some other important outputs of our work. We provide the supply and use tables and symmetric input-output tables to a many users such as government institutions and ministries (MoF and MIT mentioned above), Eurostat and also to universities, students etc. We provide data to our colleagues who calculate the average rate of value added tax, which is necessary for Eurostat in order to calculate th EU budget contributions. We started the cooperation with the Department of Tourism that is responsible for the tourism satellite account compilation. In the near future we would like to participate in the environment account compilation.

Input-output tables are not the only source for CGE models construction. Also data about employment, capital stock, incomes, savings, financial assets etc. are used to complete the model. The wider concept of the input-output tables containing additional and more detailed information is called Social Accounting Matrix (SAM).

There is no strict definition of SAM but it is usually based on input-output tables, which form its core. Basically SAM is a data-framework representing the economy of the particular state. SAM is presented by square matrix, where each row and each column

represent one particular account. Each cell chows the payments from account of its column to the account of its row. Czech Statistical Office did not created SAM in self-contained form for above-mentioned projects of MIT and MoF or CNB, but in principal all data required for its construction are brought out in some form

In the last year we made significant progress in the employment statistics. Data about employment were surveyed also formerly, but up to now they have not been comparable with the other national accounts aggregates (production, wages etc.) Data about the capital stock have been improved substantially as well. In the last months we finished the Eurostat project focused on the replacement costs capital consumption calculation. Now the capital stocks are expressed in the real value and can be used as variables for various econometric models (e.g. production functions).

Conclusions.

In general it is possible to imply that significant progress in all areas connected to SAM computations enables CZSO and partner organizations to develop and evaluate mode sophisticated CGE models. Better communication is an important issue in this process, so our department could accommodate it outputs to the needs of the information users.

The other issue we have to calculate with is an upcoming NACE revision, because of it CZSO would need to revise existing time series and accommodate them to the new standards. Since the revisions always bring some improvements to data quality due to improved methodology and issues not known in the time of creating the original national accounts, we can await better output from existing CGE models in the future.

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