

Gross Domestic Product of the Czech Republic in 1970 – 1990¹.

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Abstract

The paper shows the results of our research aimed at series of gross domestic product (GDP) of the Czech Republic in the socialist period using a current methodology that is consistent with the official statistics. The paper summarises obtained results with the transformation of data based on Material Product System (MPS) to the System of National Accounts (SNA). Our methodological approach is based on original input-output tables for 1973 and 1987 combined with annual balances of national income. The paper describes the transformation of original input-output tables and both current prices and volume indices estimation. This was done by several types of adjustments like imputed rent and non-productive services and non-market services. Finally, resulting development of GDP of the Czech Republic since 1970 is presented. This follows up the paper presented on the 19th Input-Output Conference in Alexandria.

Key Words: MPS, SNA, GDP, Input-output

1. Foreword

Gross domestic product (GDP) is one of the most important indicators within the economic statistics. Usually, developed countries with developed statistical systems offer long time series of GDP both at current prices and volume indices. Currently, post-communistic European countries cannot offer long time series of macroeconomic indicators and their data are published since 1995 onwards. A good example is the U.S. Bureau of Economic Analysis offering time series of GDP since 1930s and GDP for France which is available from 1949³. The situation of former Czechoslovakia was similar. Czechoslovakia had a good tradition of statistics and input-output tables were regularly compiled every five years since 1960s. The socialist statistical system of balances of national economy was replaced by national accounts after the change of the regime in 1989. After the years of turbulences, national accounts were adopted in 1995⁴ and fully in line with ESA in 2004 before the entrance to the EU. Currently, the Czech Statistical Office finished the revision of the national accounts and official time series start in 1990.

In 2010 we decided to start a three-year project aimed at the reconstruction of time series of gross domestic product. With respect to the availability of data sources, we decided to focus on the period 1970 to 1989. In the year 2012 which is the last year of the project we finished

¹ This paper is prepared under the support of the project Historical Time Series of Gross Domestic Product of the Czech Republic of the Czech Science Foundation, project No. P402/10/1275.

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³ See <http://www.bea.gov/> and <http://www.insee.fr>

⁴ It was sooner than the regulation of ESA 1995 was officially issued.

our estimates and we prepared them for being available for analysts. The key issue of our project is to provide compatible time series of sources and uses of GDP both at current prices and volume indices. Data on output, intermediate consumption, value added and employment are available in NACE rev.2.

As well as the current system of national accounts keeps the full consistency between core sector accounts and input-output tables, the socialist system of macroeconomic statistics relied on symmetric input-output tables. Due to the quality and availability of these tables we used them for the majority of the transformation processes.

2. Process of Transformation

The System of National Accounts (SNA) is aimed at detailed description of economy by the set of accounts (tables) and the Balances of National Income (BNI) had similar structure (Arvay, 1992). BNI were based on Material Product System (MPS) that served as alternative statistical system to national accounts. Even the purpose of both systems were similar, there were significant differences in the scope of the system. The basic idea of the production, generation and distribution and redistribution of income were the same (Methods of the Compilation of Sources and Uses of Global Product and National Income, 1984). But the key problem of MPS was that it did not count data on non-productive sphere into national income. Former Federal Statistical Office of Czechoslovakia was taking part the international comparison with the UN and some estimates of GDP were done during the socialist period. These estimates were based on SNA 1968 and there were done for total Czechoslovakia only.

When we prepared our estimates, we focused on the Czech Republic only and we tried to respect the current approach. It means that we estimated output at basic prices and intermediate consumption at purchasers' prices. Moreover, we did not keep an old approach when the non-productive sphere was considered as the non-market one. We also adjust our estimates to fit the official data of the Czech Statistical Office (CZSO).

The key role is played by the symmetric-input output tables that were compiled for the Czech Republic for 1973, 1978 and 1987. It was possible to find these tables for 1973 and 1987. Input-output tables were compiled for both purchasers' and basic prices. They covered both kind of activity units and enterprise approach. Moreover, they were constructed for total supply, use of domestic output and use of imported products. The availability of these tables allowed us to produce necessary methodical estimates for the shift from national income to gross domestic product (Sixta, Fischer, 2011a) and (Comparisons of the System of National Accounts and the System of Balances of the National Economy 1977 and 1981).

Measurement of value added

National income published within MPS was based on the net principle (without depreciation). There were two national incomes, created national income (resource side) and used national income (use side). The difference between created and used national income was the balance of foreign trade; including the trade with Slovakia under the Czechoslovak federation. The uncovered non-productive sphere contained both market and non-market producers from nowadays perspective. According to 50% criteria of ESA 1995, following non-productive producers were classified as market:

- a. Telecommunications
- b. Banking and insurance

- c. Services connected with housing and rents
- d. Recreational services

Remaining part of non-productive sphere was classified as non-market and other non-market output was estimated for:

- a. Public administration
- b. Education
- c. Health

It means that inclusion of very low profitable non-productive industries leads to the decrease in the value added. Contrary to it, inclusion of selected non-market produces increases value added. This is a slightly different approach to the original one. Previously all non-productive producers were regarded as non-market.

The most important issue of reconstruction is to identify the key differences between both concepts. The following lists of methodological topics were considered:

- 1. Non-market producers
- 2. Non-productive market producers
- 3. Financial services indirectly measured (FISIM)
- 4. Dwellings services (imputed rent)

Data sources

All computations were based on published macroeconomic data combined with specific adjustments. We have no access to individual data and therefore we had to fully rely on published macroeconomic data. We used published data on sources and uses of national income and available symmetric input-output tables at purchasers' prices. We estimated specific adjustment broken down by industries. Detailed information on the construction of adjustments can be found in (Sixta, Fischer 2011b). Table 1 shows the most important data sources and brief description of their availability.

Table 1 Main data sources for GDP reconstruction

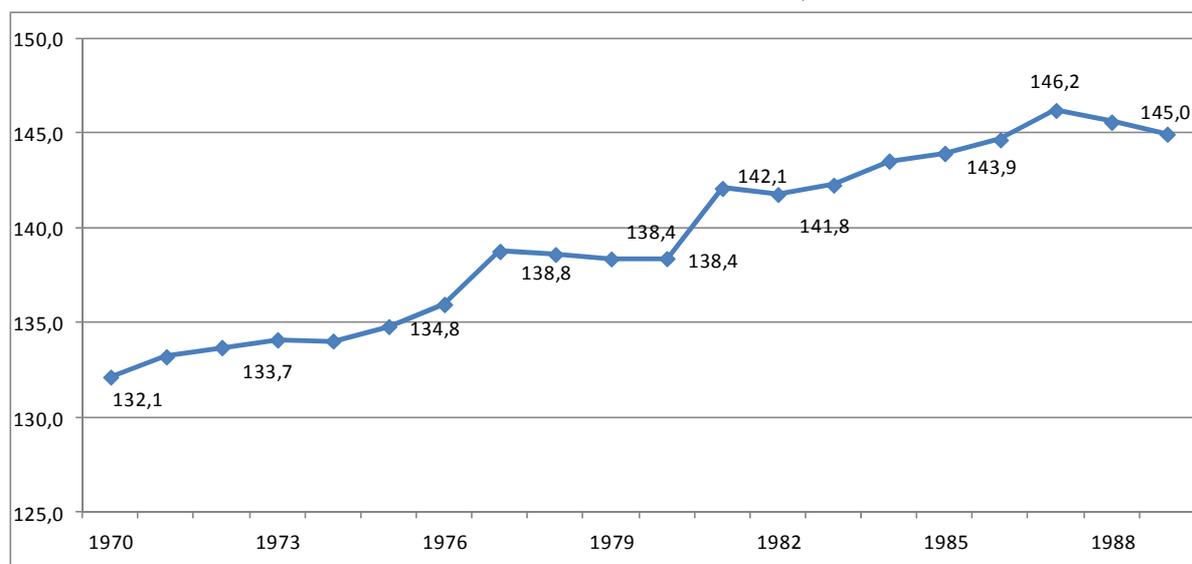
Nb.	Title	Description
1	Statistical Yearbooks covering period 1970 - 1991	A key data source for sources and uses of national income and other important indicators.
2	Symmetric Input-output Tables	Available for the Czech Republic (1973, 1987) Available for Czechoslovakia (1973, 1978, 1989)
3	Supply and use tables	Available for the Czech Republic (1992)
4	Selected Balances of Non-productive Sphere	Found for the Czech Republic for 1978, 1987, 1988
5	Balances of non-productive sphere	Covering revenues and costs of non-productive sphere
6	Methodological papers and publications of Federal Statistical Office of Czechoslovakia a UN methodological papers	This information was combined with experiences of experts who had been working with Balances of National Income. Methodological issues were solved before computations started but experiences of experts were very valuable.

3. Results

GDP at current prices

The first results of our project were presented on the Input-Output Conference in Alexandria, see (Sixta, Fischer, 2011a). Current results contain final estimates of gross domestic product, value added and employment according to national accounts concepts. The following charts and tables are based on our original calculations. Taking into account all adjustments to national accounts methodology, it is clear that GDP should be higher than national income based on MPS. The resulting share of GDP on national income is between 130 and 145. The share is still rising in the whole period, see chart 1.

Chart 1 Share of Gross Domestic Product on National Income,%



Source: own computations, Czech Statistical Office

The measurement is related to originally published national income. Therefore a significant part of the differences is caused by consumption of fixed capital. The development of this share is caused by increasing importance of services. The value of other non-market services (education and public administration) was about 13% of GDP in 1970. The share of other non-market services was still slowly rising because they count 15% in 1980 and 18% in 1989. A similar development was in non-productive “market” services like telecommunications, banking and personal transport services. The share of these services was about 8% in 1970, 10% in 1980 and 14% in 1989. Moreover, these services were very profitable. Even the telecommunication services were regarded as non-productive, they have high level of value added, about 1.2% of total gross value added in 1989.

Volumes

As well as we prepared the estimates of sources and uses of gross domestic product at current prices, we compiled composite price indices for volume measurement. The deflation of all parts of account of goods and services was based on following structure:

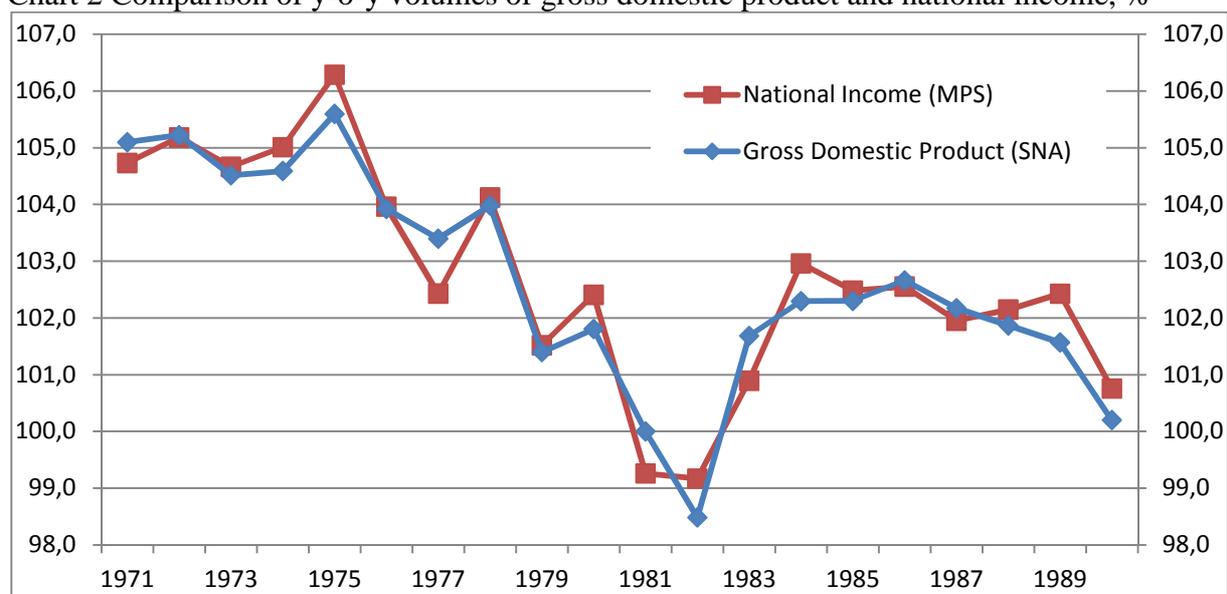
- a. Output and intermediate consumption were deflated by composite indices. These indices consist of implicit deflators of national income and specific indices for all types of methodical adjustments. Taxes and subsidies on products were deflated in line

with national accounts rules (based on $t-1$ rate applied on the base t at previous years' prices). These computations were done on the level of industries and since we used chain-linking, the weights of industries may change the totals even without other methodical adjustments. The deflation of non-market output was based on cost method and deflation of dwelling services was based on the development of the rents. Non-productive sphere was deflated in a similar way to productive sphere.

- b. Expenditure approach to GDP was based on deflation of government consumption expenditures deflated by non-market output, household consumption expenditures deflated by combination of published deflators and dwelling services' deflators and gross capital formation deflated by published deflators. Since we have no data on export and import, only the net export (including trade with Slovakia) is available, net export at previous years' prices was computed as a resulting difference between output approach and expenditure.

Even there are methodical adjustments that can influence both nominal GDP and volume indices; the influence of chain-linking is also not negligible. It means the totals of all aggregates were obtained as a sum of separately deflated components (output and intermediate consumption of industries or components of household consumption expenditures). The following chart shows the comparison of the development of gross domestic product and national income. It is clear that the development of GDP should be partly similar to national income because the productive sphere counts the majority of economy but in some years the difference is significant. Generally, national income has higher growth rates than GDP and in 1975 the difference between national income and GDP is 0.7 p.p.; it is due to non-market services because the growth rate of non-market services was of 1.5 p.p. lower than productive sphere. Contrary to it, the decrease in growth rate of productive sphere was partly compensated by non-market services and therefore GDP has a higher growth rate than national income in 1977. Differences between GDP and national income in 1982, 1984 and 1989 were caused by combination of both effects of deflation method (chain linking) and non-market services.

Chart 2 Comparison of y-o-y volumes of gross domestic product and national income, %

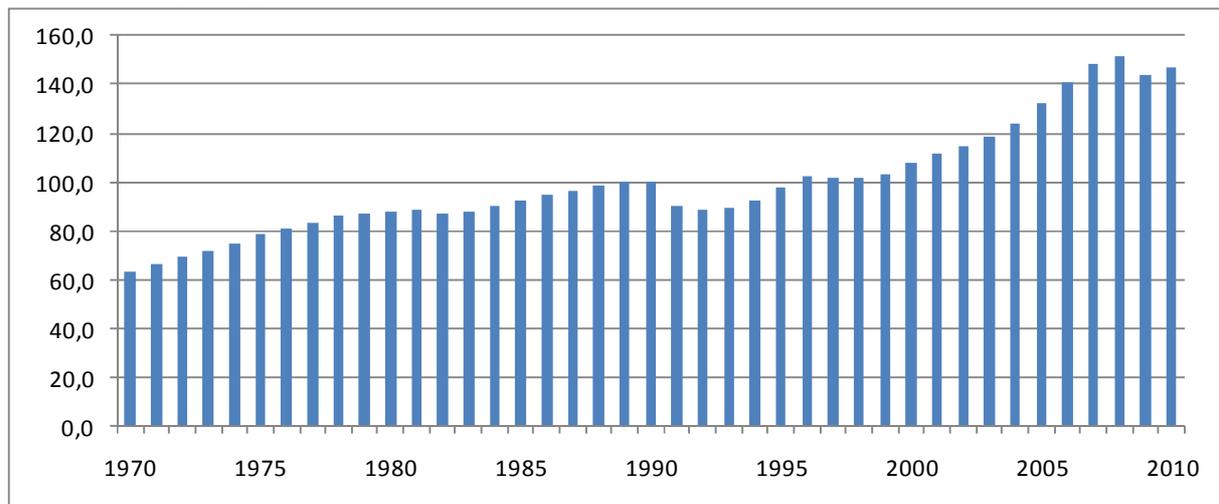


Source: own computations, Czech Statistical Office

Per capita figures

The key issue is the development of gross domestic product per capita at constant prices. In this case constant prices are obtained as chain-linked volumes with the reference year of 1990. The following chart 3 shows the development of GDP per capita at prices of 1990. It shows the strong increase of living standard in 1970s and economic stagnation in the first half of 1980s. The increase of GDP per capita in the late 1980s was stopped and after the revolution (1989) the decline of living standard started. The level of 1990 was again reached between 1995 and 1996. Since 2000 and more after 2004 the fast increase went on until the start of the economic crisis in 2008. If we very simplify it, it means that current living standard (based only on GDP per capita) in the Czech Republic (2010) increased of more than 130% in relation to 1970 and 47% in relation with 1990.

Chart 3 GDP per capita, 1990 = 100



Source: own computations, Czech Statistical Office

4. Conclusion

The availability of main macroeconomic data on sources and uses of gross domestic product was significantly increased. Nowadays, the time series for the Czech Republic start in 1970 and it classifies our statistics in the group of developed countries. It took about two and half years to get the results and we closely cooperated with many senior experts, mainly from the Czech Statistical Office. At first, we faced to the unavailability of data and we asked senior experts for publications from their own collections. Subsequently, we had to digitalised data that were usually found in a very bad condition. Finally, we faced the changes of methodology connected with the change of the regime and later to the disintegration of Czechoslovakia. All these factors caused that the process of estimate was going slower that expected.

The estimate of the Czech gross domestic product was prepared in line with current standards SNA 1993 and ESA 1995. The process of computation is based on some simplifying procedures because only the most important methodological adjustments can be fully taken into account. Finally, all the figures are fully consistent with officially published data on sources and uses of gross domestic product by the Czech Statistical Office. All time series of data covering 1970 – 1989 at current prices and volume indices for 1971 – 1990 will be available for download on the web page of our department: <http://kest.vse.cz/english/> by the end of July 2012.

References

Arvay, J.: The Material Product System (MPS): A Retrospective. Twenty-second General Conference of the International Association for Research of Income and Wealth (IARIW), Switzerland 1992.

Comparisons of the System of National Accounts and the System of Balances of the National Economy, Part One. United Nations 1977.

Comparisons of the System of National Accounts and the System of Balances of the National Economy, Part Two. United Nations 1981.

European System of Accounts (ESA 1995). Eurostat, Luxembourg 1996.

Methods of the Compilation of Sources and Uses of Global Product and National Income. Federal Statistical Office of Czechoslovakia, Prague 1984.

Selected Indicators of the Balance of Sources and Uses of Global Product and National Income 1980 - 1985. Czech Statistical Office, Prague 1987.

SIXTA, Jaroslav, FISCHER, Jakub. Retrospective Measures of GDP Using Input-output Tables for Former Czechoslovak. Alexandria 13.06.2011 – 17.06.2011. In: *19th International Input-Output Conference*. [online] Alexandria : School of New Input-Output Analysis, 2011, s. 1–12. URL: <http://www.iioa.org/files/conference-2/279.pdf>.

SIXTA, Jaroslav, FISCHER, Jakub. Estimates of the historical GDP series for the Czech Republic (1970-2008): Methodological issues. Radenci 07.11.2010 – 10.11.2010. In: *Statistical Days*. Ljubljana : CIP, 2010, s. 92–93. ISBN 978-961-239-213-0.

Statistical Yearbook 1990, Federal Statistical Office of Czechoslovakia, Prague 1990.

System of National Accounts 1993 (SNA 1993). United Nations, New York 1993.

Yearbook of Historical Series, Federal Statistical Office of Czechoslovakia 1984.

<http://www.bea.gov/national/index.htm#gdp>

<http://www.czso.cz>

<http://www.insee.fr>