The Development of Gross Domestic Product in the Czech Republic and Slovakia between 1970 and 1989[1]

*Jaroslav SIXTA – Kristýna VLTAVSKÁ – Jakub FISCHER**

Abstract

The paper deals with economic development of both the Czech and Slovak Republics between the years 1970 and 1989. It focuses on the description of economy from nowadays perspective by the commonly used gross domestic product. The estimates were prepared by experts from the Department of Economic Statistics of the University of Economics in Prague. The paper describes the main conceptual differences between the previously used System of Material Product and the currently used System of National Accounts. The most important difference was in the coverage of economic activities that were considered productive for the value added estimation. The paper shows the comparison of previously published figures for Czechoslovakia with figures newly estimated for the Czech Republic and Slovakia. The key data sources consist of officially published figures on global product, national income and symmetric input-output tables.

Keywords: *material product system, system of national accounts, national income, gross domestic product*

JEL Classification: E01, C02, N01

Introduction

The possibilities of deep economic analyses are very often limited by the length of time series of main aggregates. This situation is very common for the countries of Central and Eastern Europe (CEE) that changed their socio-economic systems

* Jaroslav SIXTA – Kristýna VLTAVSKÁ – Jakub FISCHER, Vysoká škola ekonomická v Praze, Fakulta informatiky a statistiky, Katedra ekonomické statistiky, Nám. W. Churchilla 4, 130 67 Praha 3, Czech Republic; e-mail: sixta@vse.cz; kristyna.vltavska@vse.cz; fischerj@vse.cz; Author J. Sixta is also working at the Czech Statistical Office.

[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. Authors would like to thank senior experts of the Czech Statistical Office for their excellent support, mainly to Mr. Vitezslav Ondrus, Mrs. Dana Maresova and Mr. Jiri Pelej.

from socialism to market economy. Moreover, Eurostat usually requires data since 1995 onwards (EC, 2007). This situation usually worries the users who asked for longer time series pointing out that e.g. the United States offer data since the 1930s.[2] Within this context we decided to compile estimates of the sources and uses of gross domestic product (GDP) of the Czech Republic for the period between the years 1970 and 1989[3] and we compare our estimates with and Czechoslovak estimates done in the 1980s. Clearly, this is not the first time when historical GDP estimates are done but all the previous figures are currently inconsistent with nowadays methodology. During socialism, GDP for Czechoslovakia was estimated but according to slightly different standard (FSO, 1984). We now offer the data prepared according to the European standard methodology (ESA, 1995).[4] These data are fully consistent with the estimates prepared by the Czech Statistical Office and Slovak Statistical Office published in the Historical Yearbook of National Accounts 1990 – 2010 (CZSO, 2012). In the current situation we do not expect that such estimates will be provided by official statistical authorities. Firstly, official statistics has its own internal compilation procedures that are based on source data, standardized models and all of this information was inevitably lost. Secondly, current Eurostat increasing requirements fully exhaust their capacities and financial possibilities. After a long discussion with potential users and checking data availability we decided to concentrate on the goods and services account covering both output approach and expenditure approach at current prices and volume terms.

Our project is focused mainly on GDP even though other indicators from SNA such as national income or disposable income can enable us to prepare a deeper analysis of economic development (Sixta and Fischer, 2010). On the other hand, in the period of socialism, the differences between GDP and national or disposable income were low because of few international transfers of primary or secondary incomes except primary and secondary incomes between the Czech Republic and the Slovak Republic, of course. All the estimated aggregates are freely available for economic analysts and own research at the website of the Department of Economic Statistics (kest.vse.cz).

Methodology

Indicators that were originally used in the countries of the Soviet bloc for the description of economy were based on different methodology (Arvay, 1992) and therefore a direct comparison between socialist and capitalist countries was

[2] For more information see Bureau of Economic Analysis <http://www.bea.gov/>.

[3] The calculations of the Czechoslovakia GDP were published in Nachtigal (1991).

impossible. Macroeconomic indicators compiled in socialist countries were published within the framework of Balances of National Economy (BNE) and its core part called Material Product System (MPS). Material Product System had theoretical background in Marxist economic theory while the System of National Accounts (SNA) used in the West had its origin in Keynesian theory. Therefore the key indicators – national income in BNE and gross domestic product[5] (GDP) from SNA – cannot be directly compared (UN, 1977).

We developed methodology that is partly based on studies carried out by Arvay (1992) and United Nations (UN, 1977; 1981). The methodology is designed to keep the current ESA 1995 rules. Originally, official estimates of Czechoslovak GDP were published by Federal Statistical Office (FSO, 1990) and the used methodology referred to SNA 1968 (UN, 1968). The Czechoslovak application of the BNE methodology was described in FSO (FSO, 1984) and allowed us to study all parts of the system and the way of its transformation into SNA. Before developing the methodology itself, we were looking for available data set. This issue became very demanding because after the fall of the socialist regime in Czechoslovakia, a lot of experts left the statistical office and the information they recorded got lost along with them. At the same time, the Federal Statistical Office of Czechoslovakia decided to switch from the Balances of National Economy to the System of National Accounts (SNA 1993 and ESA 1995) and time series of BNE indicators were broken. Finally, lots of data that survived these changes were destroyed during the floods in Prague in 2002.[6] The developed methodology was fully applied to the case of the Czech Socialist Republic, which was the main target of the project. Since we compared our estimates with the original one we decided to prepare provisional estimates of Slovak[7] aggregates based on simplified procedures (derived from the Czech data).

The key difference between SNA and BNE is in the coverage of activities. Material Product System was aimed at material products and services that followed material goods like transport. On the other hand, SNA covers a very broad category of goods and services and a lot of imputed activities like non-market output, imputed rent etc. System of National Accounts also offers a consistent and systematic approach to the description of the economy. Both BNE and SNA have similar structure of sources and uses of product that differ in the concept.

[4] ESA 1995 is the used methodology since it has some small deviation from general standard System of National Accounts 1993 (SNA 93). We use abbreviation SNA for the System of National Accounts (based on ESA 95 or SNA 93).

[5] Gross domestic product and its structure are thoroughly described in (Hronova et al., 2009).

[6] Statistical library was one of the most destroyed parts of the Czech Statistical Office.

[7] For more information about the current economic development of Slovakia see (Morvay et al., 2010).

As gross domestic product is the main indicator of SNA, national income was its equivalent in BNE. Contrary to the present, national income represented the produced value added and it was preferred in a net concept.[8] In a simplified way, we can state that if the economy was based on material goods only, national income in the BNE concept would not differ to net national product[9] in SNA. The main differences of macro-aggregates between the BNE and SNA concepts are briefly described in Table 1.

T a b l e 1

Main Indicators of Both Systems

System	BNE	SNA
Production	Global product covering material goods and services for material sphere	Output covering both market and non-market products. Products are broadly defined
Intermediate consumption	Current costs covering consumption of material sphere including depreciation	Intermediate consumption of market and non-market producers
Domestic product (value added)	National income (net)	Gross value added / gross domestic product
Private consumers	Personal consumption of material goods	Household consumption of products
Collective consumers costs	Social consumption of material goods	Intermediate consumption of non--market producers
Collective consumers consumption	None	Government and non-profit organizations' consumption expenditures
Investments	Investments	Capital formation
Foreign trade	Export/import	Export/import

Source: Sixta and Fischer (2011).

When transforming original data from BNE to SNA several adjustments have to be made. These adjustments should represent the most important differences between both methodologies; the differences in question are the non-productive sphere, non-market output, dwelling services (imputed rent) and other adjustments (e.g. financial services, consumption of fixed capital, drugs, prostitution, etc.). For better understanding of the adjustment used we present brief descriptions.

a) ***Non-productive services*** cover services offered on the market but due to the methodology they were not classified as product creating. Some of them contain services usually subsidized like public transport but some of them like communication were very profitable. We consider this issue as the weakest part of BNE because the borderline was based on the ideology. From a contemporary perspective, these services were handled incorrectly in previous transformations

[8] Net concept means that national income was presented without depreciation.

[9] Net national product is gross domestic product less consumption of fixed capital. Consumption of fixed capital is an equivalent of depreciation in SNA. Contrary to depreciation, it is valued at current prices instead of historical prices. For details see (Sixta and Fischer, 2008). General approach to consumption of fixed capital is described in (OECD, 2009).

carried out by Federal Statistical Office of Czechoslovakia, see FSO (1990) and United Nations (1977). Originally, they were considered as entirely non-market but according to ESA 1995, it is strictly defined what is market and other non--market output, see below. To ensure consistency with current figures, we used original input-output tables and published balances of national income.

b) ***Non-market services*** are estimated in line with ESA 1995 and they cover mainly units in industries of public administration and defense, education and health and social protection.[10] Their output is given by the sum of their current costs (intermediate consumption, compensation of employees and consumption of fixed capital and other net taxes on production). Beside these industries, the provision of services of public infrastructure is within the transport industry and it comprises the consumption of fixed capital of roads and railways. The non-market output is by definition included within government consumption; we do not take into account any non-government non-profit organizations. This issue was deeply elaborated for 1973 and 1987 where we obtained symmetric input-output tables.

c) ***Dwelling services*** are estimated for paid services (rents) and imputed rents separately. Rents actually paid were used as a basis for imputation. We split flats into these groups: owned, cooperative and state and companies' flats; the individual categories had different monthly rates of rent due to very low rents paid "on the market".[11] Since data on market rents were far from economic reality, a standard method called User Cost Method (UCM) is used. User Cost Methods lead to significantly higher rents than observed on the market. Finally, we adjusted the estimates to fit the time series published by the Czech Statistical Office that uses UCM for 1990 – 2005.

d) ***Other adjustments*** contain mainly consumption of fixed capital (this is one of the most important differences between both systems) and financial intermediation services indirectly measured (FISIM). The original input-output tables were compiled on the gross principle[12] and the original depreciation was available. Depreciation was expressed on the basis of companies' figures (historic prices) and therefore it cannot replace the consumption of fixed capital. Since the main target is gross domestic product, it was important to add the originally subtracted depreciation from value added. Consumption of fixed capital (CFC) was estimated only for non-market producers where it forms a part of output; it covers all types of government property (buildings, structures, machinery). This

[10] Producers are divided into market and non-market producers on the basis of so-called 50% criteria. Non-market producer is a producer whose sales are lower than 50% of current costs.

[11] The market means that the flats were rented. It is obvious that if rents did not cover the cost of dwelling maintenance it is unthinkable to speak of a market.

[12] Gross principle means that depreciation is not deducted from value added; more information can be found in FSO (1984) and CZSO (1987).

estimate was done in cooperation with the Czech Statistical Office.[13] The banking sector was organized differently in socialist times and the value added created by financial institutions was less significant than today. The simplest estimates of FISIM based on the difference between received and paid interests were used. Since the data on interest were regarded as secret, we had to rely on existing data on FISIM and its backward extrapolation of the data from 1990. Some other methodological differences can be identified, such as non-observed economy (drugs, prostitution, and smuggling) but these activities were significantly less important than nowadays.

Finally, we faced the issue of industrial classification. Since 2011 the Czech Statistical Office has compiled national accounts in NACE rev. 2. We carried out a rough transformation based on the similarity and derived the shares for some specific issues.

Generally, the transformation procedures were done in line with Arvay (1992)[14] and the first transformation of BNE aggregates was carried out on the basis of the original input-output tables for the Czech Socialist Republic (1973, 1978), for Czechoslovakia (1973, 1978, 1989) and of a combination of a large number of other data sources. The next step consists in allocation of data for non-productive sphere between market and non-market industries, followed by an estimation of methodological adjustments given by national accounts rules and comparison of estimates for the Czech Republic with previous Czechoslovak estimates. Finally, the estimates of nominal GDP for time series 1970 – 1989 and volume estimates for 1971 – 1990 were carried out. Beside the written methodological documents, one of the most important sources of methodology was the experience of senior experts from the Czech Statistical Office.

Published deflators (e.g. Yearbook of Historical Series, 1984) were used for revaluation of nominal estimates. Gross value added is based on the double deflation (separately deflated output an intermediate consumption). Originally, the deflation was based on the revaluation into constant prices of a base year but current methods prefer previous years' prices (see Fischer et al., 2013, p. 15). It means the weights are actual and aggregated figures (e.g. total output obtained by aggregation of output in all industries) provide more precise results. For these purposes we used published industrial deflators and revaluated all figures into previous years' prices. It means that our total aggregates differ from published ones. After that we added separately deflated methodical adjustments, details can be found in Fischer et al. (2013).

[13] The Czech approach to consumption of fixed capital is described by Sixta (2007) and Krejci (2010).

[14] For more details see Comparisons of the System of National Accounts and the System of Balances of the National Economy, part I and II (UN, 1977; 1981).

When preparing estimates for Slovakia, we used figures published for 1990[15] derived by the coefficients based on the case of the Czech Republic. Initially, we used the officially published data on GDP and national income of Slovakia in 1990. The ratio of GDP to national income (BNE) equals about 167%. Consequently, we estimated ratios for the whole period between the years 1970 and 1989 using the ratios of the development of GDP on national income in the Czech Republic and the last ratio for Slovakia (the ratio for Slovakia in t minus difference in ratios for the Czech Republic in t and $t - 1$). We assumed that the development of national income and gross domestic product in Slovakia follow the same pattern as the development of macro aggregates in the Czech Republic. However, the share of GDP on national income is higher for Slovakia and our estimates respect both this share and the development in time on the basis of the Czech example.

Results

The compilation of Czech GDP was based on the hierarchical system built up from aggregates of goods and services account. It covers both output and expenditure approach which had to be balanced. Finally, the data were revaluated into previous years' prices to develop a modern method of statistical deflation. Estimates for Czechoslovakia were acquired as a sum of Czech and Slovak figures. Resulting figures on gross domestic product in the Czech Republic and its relation to national income based on BNE are presented in Figure 1. It is clear that due to methodological reasons, GDP should be higher than BNE national income because it covers more activities. Resulting gross domestic product varies between 116% and 130% of BNE national income. The difference between GDP and national income after 1980s was rising due to the increasing role of services in the economy. It shows that the growing importance of services cannot be correctly recorded by the BNE methodology and BNE cannot be used for measurements in modern economy. Data on GDP are shown in Table 2.

T a b l e 2

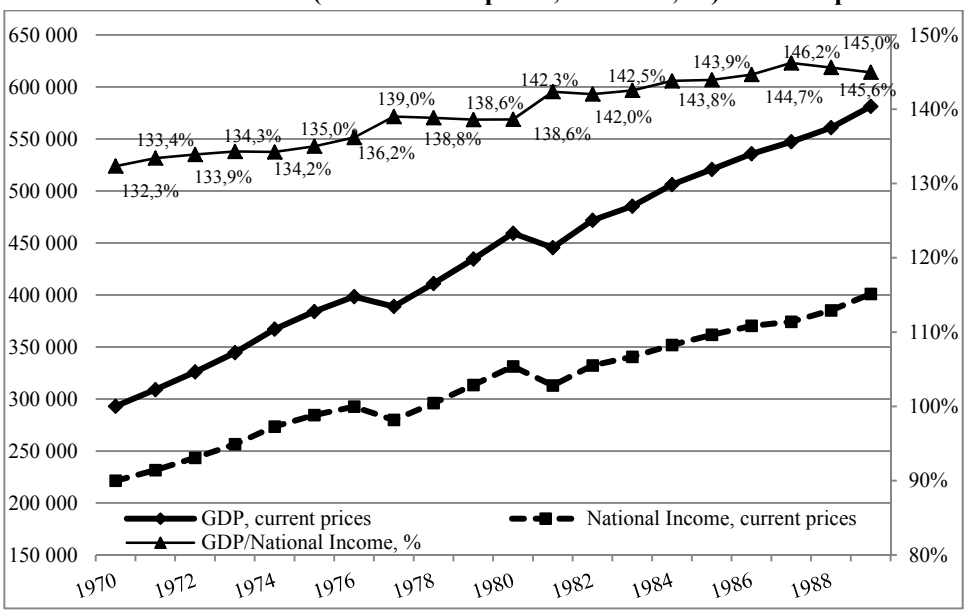
Year on Year Volume Indices of Czech Gross Domestic Product (in %)

Year	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**
GDP	104.9	105.1	104.4	104.4	105.4	103.8	103.2	103.8	101.2	101.6
Year	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**
GDP	99.8	98.3	101.5	102.1	102.1	102.7	102.2	101.9	101.6	100.2

Source: Computations of authors.

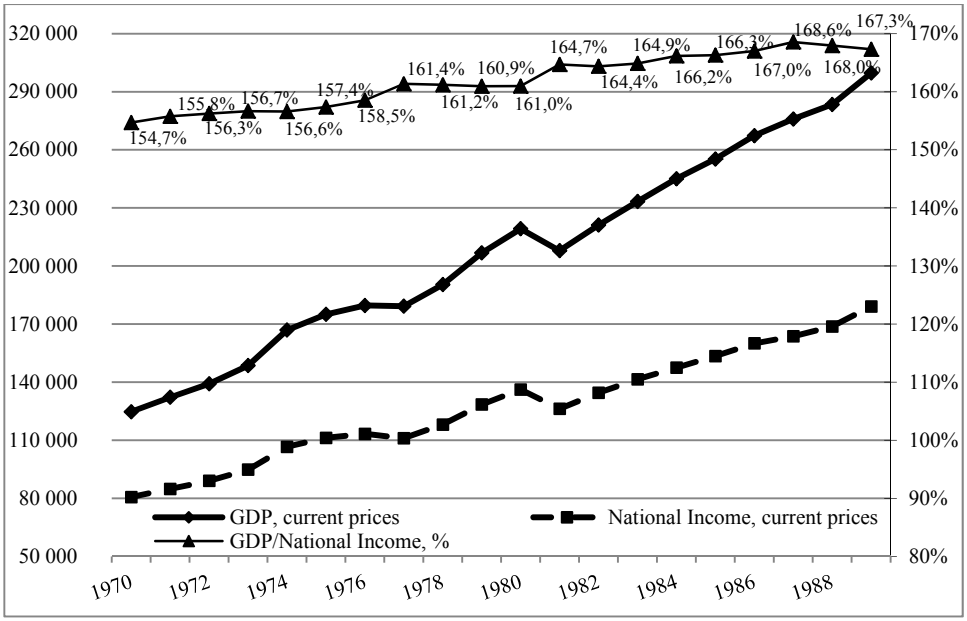
[15] See Historical Year Book of National Accounts 1990 – 2010 (CZSO, 2012).

F i g u r e 1
GDP and National Income (in the current prices, mil. CSK, %) Czech Republic



Note: The ratio GDP/National Income is presented on the right axis.
Source: Czech Statistical Office; computations of authors.

F i g u r e 2
GDP and National Income (in the current prices, mil. CSK, %) Slovakia

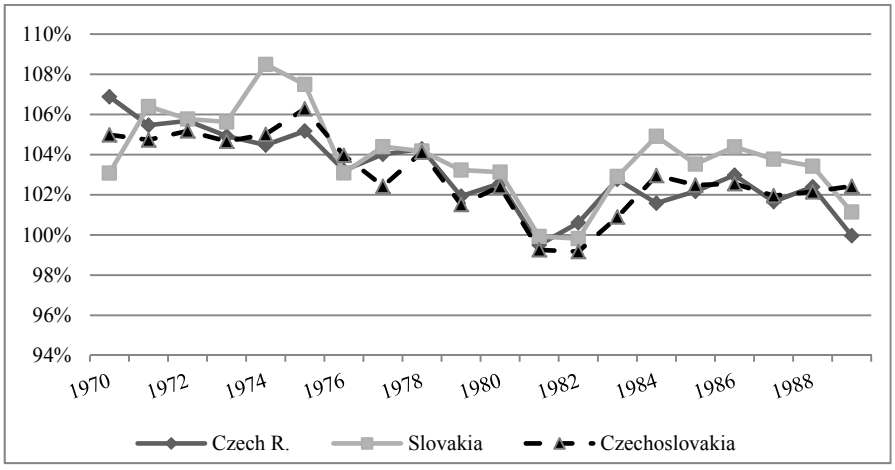


Note: The ratio GDP/National Income is presented on the right axis.
Source: Czech Statistical Office, computations of authors.

An on-going economic convergence between the Czech Republic and Slovakia was taking place during socialism. In 1970 the national income of the Czech Republic represented more than 70% of the Czechoslovak national income. The share of the Czech Republic stayed approximately the same during the 1970s. Since 1981 the share of the Czech Republic had represented approximately 2/3 of the Czechoslovak national income. The share of Czech GDP on Czechoslovakia in 1990 was approximately 70%. Regarding to the development of material sphere, original volume indices for national income (BNE) are shown on Figure 3. In average, the growth rate of Slovakia was about 4% in comparison with 3% of Czech national income. Even the crisis in 1982 affected more Czech economy and since then the rise of Slovak economy was always stronger.

F i g u r e 3

Volume Indices, National Income (in %)

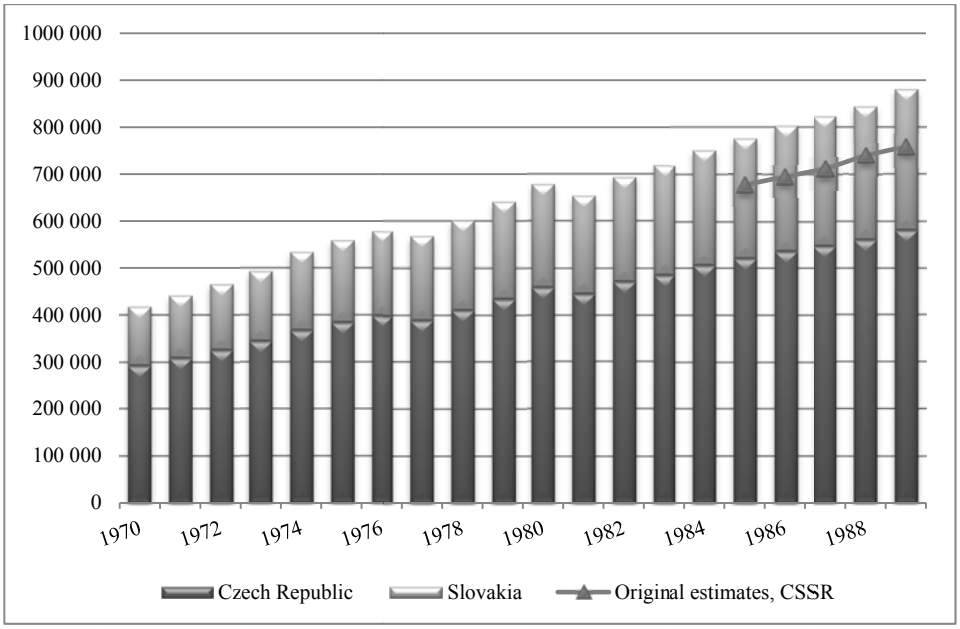


Source: Czech Statistical Office.

The estimated GDP for Czechoslovakia (as a sum of Czech and Slovak GDP) is shown in Figure 4. The current estimates for the Czech Republic are in line with ESA 1995 and they are comparable with officially published figures. It means that the treatment of imputed rent, non-market services, etc. is currently very different than it was in 1980s. For example, imputed rents represent one of the most important issues and they were estimated on the basis of depreciations in 1980s. The currently used UCM method covering all types of costs associated with owner-occupied dwelling inevitably leads to higher figures. Estimates of Slovak economy are compiled in a simplified way, see above. From current perspective, during the period between 1970 and 1973 GDP of Slovakia represents 30% of the Czechoslovak GDP. Since 1974, the share of Slovak GDP was rising from 31% to 34% of total GDP.

Figure 4

Gross Domestic Product (mil. CSK)



Source: Czech Statistical Office; computations of authors.

One of the most interesting results is a long-term development of GDP per capita.[16] We were able to construct this indicator at constant prices for the Czech Republic since 1970, see Figure 5. Due to the difficult issue of deflation, we can add Slovak figures since 1990 onwards only.[17] Both lines describe the development at constant prices but they can only be used for a rough comparison because these figures are not converted to purchasing parity power. This is the reason why Slovak figures in this comparison are higher than Czech in 2008. If we take current Eurostat data in purchasing power standard[18] (PPS), in 2010 the Czech Republic has GDP per capita 80% and Slovakia 74% of the EU average. These figures can easily answer the development in time but for the country to country comparison these estimates have to be adjusted for different price levels (parities). In the development of GDP per capita we identified three important drops in the time series; the first occurred in 1982 (figures for the Czech Republic only), the second after 1989 and the third is connected with the financial crisis in 2008. Anyway, both countries had similar trends of GDP. The reason for the drop in 1982 was probably the oil crisis that came later to socialist countries

[16] GDP per capita is very often used as a simple indicator of living standard.

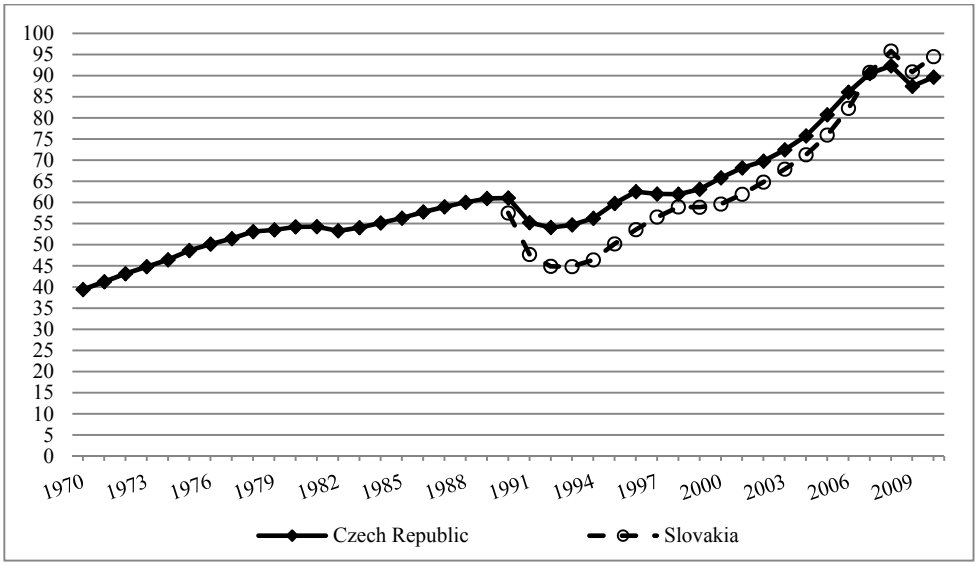
[17] These figures were presented by the Czech Statistical Office in May 2012, (see CZSO, 2012).

[18] See Eurostat (1996).

than to the capitalist countries. The increase of prices of inputs significantly influenced the economy. Although GDP at current prices was rising, GDP at constant prices was falling.

F i g u r e 5

GDP per capita (constant prices) the Czech Republic and Slovakia, 1970 – 2010 (thousands of CSK/CZK/SKK)



Source: Czech Statistical Office; computations of authors.

During the whole period 1970 – 2010, the structure of Czech economy significantly changed. The description of the economy is based on currently used industrial classification NACE rev. 2. This breakdown is used for estimates of output, intermediate consumption, gross value added and employment. The structure of Czech gross value added is described in Figure 6. Gross value added of the industries in mil. CZK is shown in Table 3.

T a b l e 3

Structure of Gross Value Added, Czech Republic (in the current prices, mil. CZK)

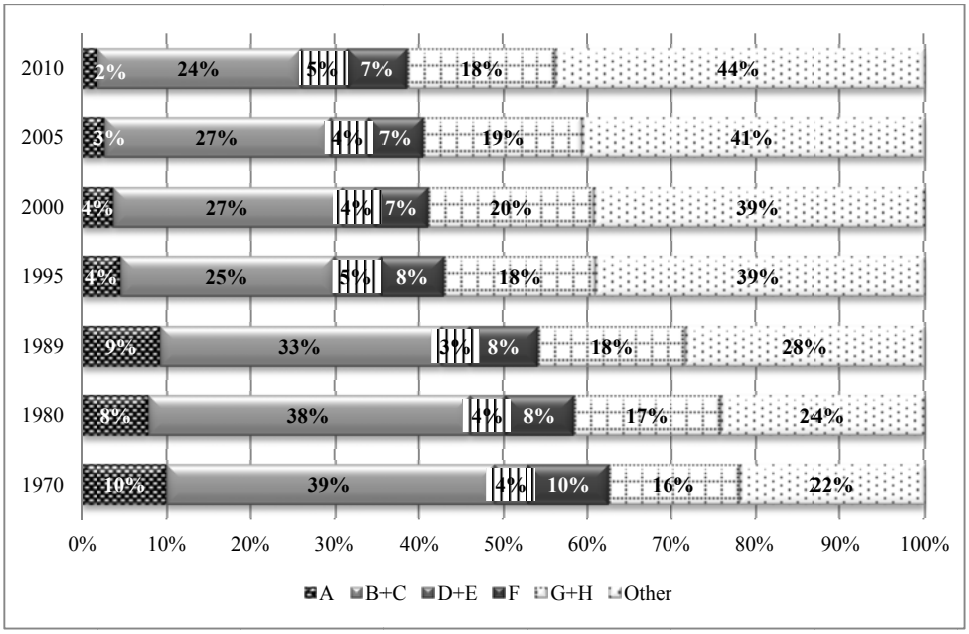
	1970	1980	1989	1995	2000	2005	2010
A	25 619	32 440	48 664	62 219	74 301	71 691	56 659
B + C	100 826	159 447	178 165	353 142	560 959	752 660	829 481
D + E	10 533	17 284	17 400	76 282	77 933	124 791	185 974
F	24 755	34 394	43 823	107 128	135 607	189 292	250 786
G + H	40 270	72 796	93 513	250 058	405 659	528 136	598 898
Other	56 727	100 737	150 399	544 551	810 542	1 141 251	1 498 500

Source: Czech Statistical Office; computations of authors.

It is obvious that the changes were fundamental and current economy is based on totally different activities than 40 years ago. These issues are solved by the pure statistical approach.[19] The most significant is the decrease of share of agriculture (A) from about 10% in 1970 to 2% in 2010. Similar development is found for manufacturing and mining, where the share of these industries (B and C) has decreased of 14 p. p. between the years 1970 and 2010. On the other hand, the share of industries energy (D), water and waste (E), construction (F), trade (G) and hotels (H) has changed approximately by 1 to 2 p. p. only. Contrary to this, enormous increase is found for services that rose from 22% to 43%. All these results are in line with our and experts' expectations but it is the first time we could offer an evidence.

F i g u r e 6

Gross Value Added, Czech Republic (in %)



Note: A – Agriculture, forestry and fishing, B – Mining and quarrying, C – Manufacturing, D – Electricity, gas, steam and air conditioning supply, E – Water supply; sewerage, waste management and remediation activities, F – Construction, G – Wholesale and retail trade; repair of motor vehicles and motorcycles, H – Transportation and storage, Other: I – Accommodation and food service activities, J - Information and communication, K – Financial and insurance activities, L – Real estate activities, M – Professional, scientific and technical activities, N – Administrative and support service activities, O – Public administration and defence; compulsory social security, P – Education, Q – Human health and social work activities, R – Arts, entertainment and recreation, S – Other service activities, T – Activities of households as employers and producers for own use.

Source: Czech Statistical Office; computations of authors.

[19] It is clear that some changes cannot be fully statistically measured, e.g. the change in quality of personal cars produced in the Czech Republic.

Conclusion

Macroeconomic statistics is currently a very popular area with an increasing number of users. The users' knowledge of the difficult area of macroeconomic statistics (mainly national accounts) is constantly rising. While users are getting more skilled, they demand more data (the length of time series and detailed breakdown). Even though the focus is put on the quarterly development of gross domestic product, more and more users ask for long and comparable time series. Former Czechoslovakia and both the Czech Republic and Slovakia had a very good tradition of quality and reliability of their statistical indicators but the socio-economic changes prevented official statistics from producing time series of at least key macroeconomic indicators starting before 1990.[20] Therefore we now offer to economic analysts' the data on sources and uses of Czech gross domestic product starting in 1970. These data cover both current and constant prices and they are fully comparable to official statistical data.

The data on historical time series are available for free download at the website of the Department of Economic Statistics, University of Economics in Prague (kest.vse.cz).

References

ARVAY, J. (1992): The Material Product System (MPS): A Retrospective. In: [Twenty-second General Conference of the International Association for Research of Income and Wealth (IARIW).] Flims, Switzerland, August 30 – September 5, 1992.

CZSO (1987): Selected Indicators of the Balance of Sources and Uses of Global Product and National Income 1980 – 1985. Prague: Czech Statistical Office.

CZSO (2012): Historical Yearbook of National Accounts 1990 – 2010. Available at: <http://www.czso.cz/csu/2012edicniplan.nsf/p/5013-12>. Cit. 8th May 2012.

EC (2007): Regulation (EC) No. 1392/2007 of the EP and of the Council of 13 November 2007 Amending Council Regulation (EC) No. 2223/96 with Respect to the Transmission of National Accounts Data. Strasbourg: Official Journal of the European Communities.

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

FISCHER, J. – SIXTA J. – HRONOVÁ, S. – HINDLS, R. – VLTAVSKÁ, K. (2013): Odhady zdrojů a užití hrubého domácího produktu ČR pro roky 1970 – 1989 v metodice ESA 1995 [The Estimates of the Czech Gross Domestic Product for the Years 1970 – 1989 Based on ESA 1995.] Politická ekonomie, *61*, No. 1, pp. 3 – 23.

FSO (1984): Methods of the Compilation of Sources and Uses of Global Product and National Income. Prague: Federal Statistical Office of Czechoslovakia.

FSO (1990): Statistical Yearbook 1990. Prague: Federal Statistical Office of Czechoslovakia.

FSO (1984): Yearbook of Historical Series. Prague: Federal Statistical Office of Czechoslovakia.

HRONOVÁ, S. – FISCHER, J. – HINDLS, R. – SIXTA, J. (2009): Národní účetnictví. Nástroj popisu globální ekonomiky. [National Accounts: As a Tool for Describing the Global Economy.] 1. vydání. Praha: C. H. Beck. ISBN 978-80-7400-153-6.

[20] There are estimates published for Slovakia – Slovak Statistical Yearbook 1994. These estimates are not fully comparable with officially published figures.

KREJČÍ, I. (2010): Computation of the Stocks and Consumption of Fixed Capital with use of Markov Chain. In: [Proceedings of the 28th International Conference on Mathematical Methods in Economics 2010.] České Budějovice: University of South Bohemia in České Budějovice, Faculty of Economics, pp. 365 – 370.

MORVAY, K. et al. (2010): Economic Development of Slovakia in 2009. Ekonomický časopis/ Journal of Economics, *58*, No. 6, pp. 549 – 613.

NACHTIGAL, V. (1991): Retrospektivní propočty makroekonomických agregátů ČSFR za roky 1970 – 1988. Statistika, *28*, No. 3, pp. 97 – 115

OECD (2009): Measuring Capital. OECD Manual. Second Edition. Paris: OECD.

SIXTA, J. – FISCHER, J. (2008): Statistical Models in National Accounts – Capital Services. In: IASC 2008: Japanese Society of Computational Statistics (Yokohama).

SIXTA, J. (2007): Odhady spotřeby fixního kapitálu. [Estimates of Consumption of Fixed Capital.] Statistika, *87*, No. 2, pp. 156 – 163.

SIXTA, J. – FISCHER, J. (2010): Estimates of the Historical GDP Series for the Czech Republic (1970 – 2008): Methodological Issues. In: Statistical Days (Ljubljana).

SIXTA, J. – FISCHER, J. (2011): Retrospective Measures of GDP Using Input-output Tables for Former Czechoslovakia. Available at: <http://www.iioa.org/files/conference-2/279_20110429111_Paper_sixta_fischer_IO.pdf>.

SIXTA, J. – VLTAVSKÁ, K. – ZBRANEK, J. (2011): Souhrnná produktivita faktorů založená na službách práce a kapitálu. [Total Factor Productivity Measurement Based on Labour and Capital Services.] Politická ekonomie, *59*, No. 5, pp. 599 – 617.

UN (1968): System of National Accounts 1968 (SNA 1968). New York: United Nations.

UN (1977): Comparisons of the System of National Accounts and the System of Balances of the National Economy. Part One. New York: United Nations.

UN (1981): Comparisons of the System of National Accounts and the System of Balances of the National Economy. Part Two. New York: United Nations.

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

ZBRANEK, J. – FISCHER, J. (2010): The Impact of Research and Development and Expenditures on Estimates of Macroeconomic Aggregates. Statistika, *90*, No. 1, pp. 28 – 46.