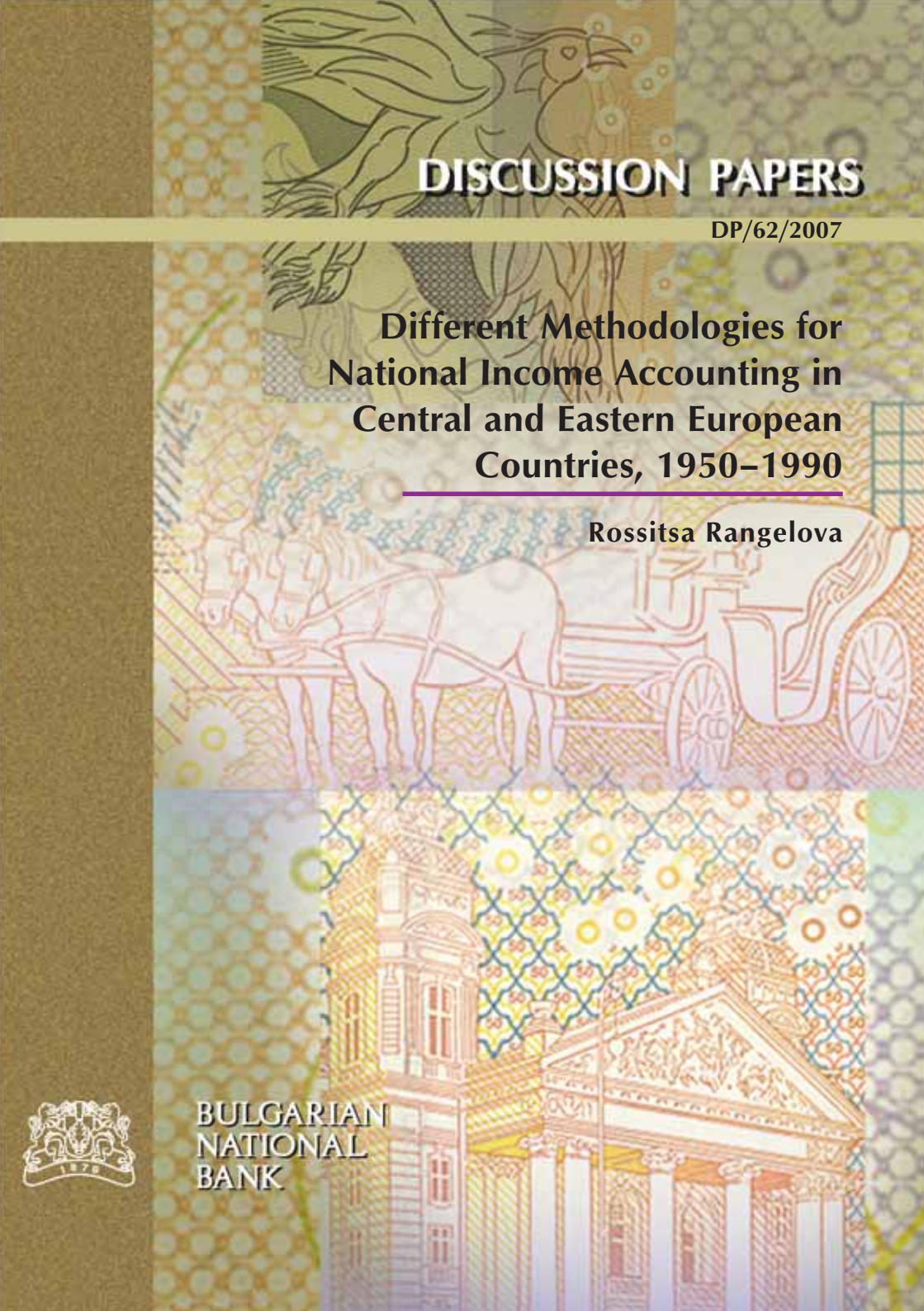

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Rossitsa Rangelova

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Contents

SUMMARY. During the period of centrally planning in the Central and Eastern European (CEE) countries the officially applied accounting system was the so-called Material Product System (MPS), it was different from the System of National Accounts (SNA). This hampered the international comparisons of national income (Net Material Product – NMP), which was the basic macro-indicator of the centrally planned economies (CPEs) and Gross Domestic Product (GDP) in the market type economies. In parallel with the official practice in CPEs, individual authors (like T. P. Alton et al, A. Maddison, and others) and international organisations derived estimates of these countries' national income mainly trying to transform NMP into GDP. The International Comparison Project (ICP), where countries from CEE participated, was of great importance for producing comparable estimates.

In this study different approaches are presented, their methodological specificity is analysed, and estimates of national income and economic growth for the period 1950–1990 in CEE countries, including Bulgaria are compared.

Abbreviations:

CEE	Central and Eastern Europe
CMEA	Council of Mutual Economic Assistance
CPE	Centrally Planned Economy
EKS	Elteto–Kóves-Szulc method
EU	European Union
FRY	Macedonia Former Republic of Yugoslavia
GDP	Gross Domestic Product
GDR	German Democratic Republic
GK	Geary–Khamis method
GNI	Gross National Income
GNP	Gross National Product
GVA	Gross Value Added
ICP	International Comparison Project
MPS	Material Product System
NMP	Net Material Product
OECD	Organisation for Economic Cooperation and Development
PPP	Purchasing Power Parity
PWT5	Pen World Tables, Mark 5
SNA	System of National Accounting (Accounts)
UNs	United Nations
USA	United States of America
USD	US dollar
USSR	the Soviet Union

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Introduction

During the period of central planning (1950–1990) the CEE countries applied a specific accounting system known as Material Product System (MPS). It was initiated by the planning and statistical bodies in the USSR in the early 1920s. After World War II it was introduced in all countries which fell into the political and economic sphere of the USSR and which formed the so-called socialist system of CPEs.[1] From the beginning of the 1970s onwards the MPS received an equal status with that of the SNA in the international statistics of the UNs. Thus the two accounting systems coexisted throughout several decades. During that period the two systems exerted a mutual influence which was useful for their development.

In fact the MPS was the official statistical standard used for measurement of economic performance and development for nearly seven decades in the USSR and three decades in fifteen other CPEs. This means that all data on the economy of the former CPEs available in national and international yearbooks or other statistical publications are conformed to the definitions and classifications of the MPS.

Hungary was the only country which considerably extended the scope of its macroeconomic statistics and introduced a unique accounting system. In this respect it was different not only from all other former member countries of the Council of Mutual Economic Assistance (CMEA) but also from all market economies. Basically, the Hungarian system preserved all important indicators required by the MPS, but also incorporated all major macrostatistical aggregates proposed by the SNA.

As the previous economic system was marked by stimulation of high growth, the macroeconomic statistical indicators were often overestimated. The first very sharp critical publications on this topic in Russia dated from the middle of the 1980s. The critical attitude was against the published data in a jubilee yearbook presenting an increase of the industrial production for the period 1917–1987 by 330 times and of the NMP – by 149 times.[2] In the case of Bulgaria, the 1988 increase of the NMP was originally reported as 6.2 per cent, but only after several months it was reduced to 2.4 per cent.[3] This means that the trust in statistics was more or less eroded.

[1]These countries were: Albania, Bulgaria, China, Cuba, Czechoslovakia, the German Democratic Republic (GDR or East Germany), Hungary, Cambodia, the Korean Democratic Republic, Laos, Mongolia, Poland, Romania, Vietnam, and Yugoslavia.

[2] See Guzhvin, P., 1992, No. 9, pp.3–21.

[3]See Rangelova, R., 2003, p. 73.

The basic methodological differencies between the two systems hampered many of the international comparisons of national income between the centrally planned and market type economies. Different international organisations, research centres or even individual authors elaborated approaches to overcome these differences producing their own estimates of NMP (or GNP) in the former socialist countries. They tried, on the one hand, to overcome the methodological difficulties at achieving comparability of the national income indicators due to the different systems of national accounting, and, on the other hand, to deliver parallel of the official sources estimates of NMP, respectively the economic growth rates. Maybe the most methodologically consistent and reliable work is that of T. P. Alton et al, who produced long-term calculations in parallel with the official sources in the CPEs.

The paper aims to consider in a comprative perspective the applied methodologies for the national income (NMP) and GDP and respectively the economic growth in the CEE countries over the period from 1950 to 1990. Firstly, the main features of the MPS and its historical development are presented in short, and basic differences between the MPS and SNA related to the differences in the NMP methodology in comparison with the GDP methodology are discussed. Then the variety of approaches to estimating NMP or GDP for these countries is discussed. They are shown briefly in the Appendix, where this variety is divided into two regions: for the CEE countries and for the former USSR, as far as then a special attention was devoted to the accounting problems of this country. The listed methodologies are classified also by the type of the used approach – based on PPPs, factor cost or physical indicators. Among these approaches the most well-known projects and authors (ICP, T. P. Alton et al, A. Maddison, *etc.*) are analysed in the study. The estimates of NMP/GDP and the economic growth rates derived by them are compared with the offical data. Finally concluding remarks are given.

Material Product System: the Official Accounting System of the Centrally Planned Economies

Theoretical Background

The MPS

The roots of the MPS could be found in the economic theory created by Adam Smith more than two hundred years ago. In his work "An Inquiry into the Nature and Causes of the Wealth of Nations" known as "The Wealth of Nations" (1776) he restricted the scope of productive work and creation of value to activities in the sphere of branches producing material goods. After A. Smith, during the 19th and a part of the 20th century the concept of material production was the dominating theoretical basis for the definition and estimation of national income in the developed world. Many proponents of economic science – the best known amongst them was Karl Marx – accepted and incorporated this conceptual basis of national income. Thus the fundamental concept of national income was derived by both A. Smith and K. Marx from the theory of "value-creating labour". According to this theory, "value-creating labour" produces material goods only. This means that national income is creating only in the material production sphere, and it is determined by the sum of the material goods. Thus in the MPS (in difference with the SNA) are separated two spheres: material production and non–material production. The so-called production sphere covered the three major sectors: (a) industry (including coal mining and power production) and construction; (b) agriculture, forestry and fishing; (c) transport and trade (the only parts of these services which are of material nature).[4]

It should be noticed that the main features of the MPS were determined not only by the underlying economic theory, i.e. the limited scope of productive activity, but also by the specific economic policy and economic management system in the CPEs.[5] The Hungarian statistician J. Arvay argues that the MPS is not the only possible and adequate system of central planning. In his view "the latter does not necessarily exclude the concept of national income based on all fundamental needs of the population. At the same time the MPS-type system does not satisfy the statistical needs of a market economy".[6]

[4]The economic views and analyses within the MPS, however, differ significantly from those within the SNA even for branches which are covered by the two systems, like industry or agriculture.

[5] See "Basic Principles of the System of Balances of the National Economy". Studies in Methods. Series F, No. 17. United Nations, New York, 1971.

[6] See Arvay, J. 1992, 2006, No. 6, pp. 79–101.

The SNA

Unlike the MPS, the theoretical approach of the SNA assumes a broader interpretation of the scope of the economic activity.[7]

The theoretical framework of this work was taken from the ideas of John M. Keynes. In his famous book "The General Theory of Employment, Interest and Money" (1936) known as "The General Theory" he outlined the key role of the aggregates real income and national income, focusing attention on disaggregating the expenditures of consumers and investors, and stressing the importance of intersectoral economic relations.

The SNA concept covers all kinds of labour creating consumer values, where the final result is a priced value, independently if they are material goods or non-material services (such as healthcare, education, culture, administration, *etc.*). The inclusion of these services and goods in the value added was due to the fact that they influence in one way or another the overall people's living standard.

The greatest advantage of the SNA is manifested in the fuller coverage of economic activities although the inclusion of non-material services into the value of national income or GDP increases their magnitude to a relatively small extent (only 15–20 per cent) and does not change the growth rate of the economy considerably.[8]

Historical Development of the MPS

Considering the MPS development three basic stages can be outlined:

- **First stage** – from the early 1920s when the work on the MPS was initiated in the USSR to 1948–1950 when it was adopted as a common accounting system for the newly-created CPEs integrated in the CMEA.

The initial version of the MPS-type statistical system was elaborated in the early 1920s in the USSR. The first relatively detailed data on the national income and other macroeconomic aggregates covering the fiscal year 1923/1924 were presented in the so-called inter-department table.[9] The official

[7]Official interest in the comparability of economic information dates back to 1928, when the League of Nations held an International Conference Relating to Economic Statistics to encourage the compilation of this kind of statistics and the adoption of uniform presentation methods. Thus this organization initiated an activity to create a comparable system of national accounting. In the following years a growing recognition of the usefulness of national income estimates to fiscal and economic policy-making (in particular for war-time mobilisation in some countries) strengthened official interest in this field. For more details on emergence and developments of the SNA in a comparative perspective with the MPS see Arvay, J. 1992, 2006, No. 6, pp. 79–101 and Rangelova, R. (2006b).

[8] See Arvay, J. (1993).

[9]In this work participated Wassily Leontief (1906–1999), who later on migrated to the USA and continued working on input – output analysis. For the input – output model elaborated by him he received the 1973 Nobel Prize in Economics.

compilations of the national balances continued and stabilized in the second half of the 1920s and in the 1930s. After World War II when the Soviet-type system of central planning was introduced in the CEE countries, they followed the practice of the USSR statistics in respect to the accounting system.

- **Second stage** – from the end of the 1940s to the beginning of the 1970s when the MPS was developed and recognised by the UNs as an official accounting system on a par with the SNA.

Actually the first description of the MPS intended to cover the entire economic system and to be generally accepted by all member countries of the CMEA, was initiated in 1957 by the UNs Statistical Commission. Its main purpose was to improve the international comparability of the main macroeconomic aggregates.[10]

In 1971 the UNs Statistical Commission approved the submitted by the CMEA Secretariat the newly adopted system and decided that this document titled "Basic Principles of the System of Balances of the National economy" was to be published and widely disseminated by the UNs as one of the available international recommendations.[11]

- **Third stage** – from the early 1970s to 1990 when the MPS application was terminated.

During the time of mutual coexistence improvements and developments of the two systems were observed both on national and international level. In the 1980s the former socialist counries undertook more active efforts to participate in different international comparisons approaching in this way the methodological principles of the SNA. Some of these countries undertook parallel accounting procedures on the basis of the two systems. These changes in the statistical work of the CPEs were caused by several factors:

> the extending international relations in the world;

> the new ideas and proposals on economic reforms, which had been under discussion since the 1960s in almost all countries and several of those reforms were put into practice in some countries. The reforms focused on the increase in independence and self-management of enterprises and on the development of market conditions and financial instruments;

[10]There was also a more specific goal, namely to answer the question whether the different scope of national income had a considerable impact on the membership fees to be paid by the individual countries to the UNs. There was a wide-spread view that the membership fee of countries using the MPS should be increased because the scope of national income in these countries was narrower than that of countries using the SNA.

[11]Basic Principles of the System of Balances of the National Economy. Studies in Methods. Series F No.17. United Nations, New York, 1971.

> the increasing role of the so-called non-material products and services, which raised the question whether their interpretation based on the MPS was reasonable;

> the existing difficulties to compare the main economic aggregates between CPEs and market economies, *etc.*

At the end of the 1980s a question of integration of the two systems was on the agenda, meaning basically to widen the scope of the MPS. The political and economic transformation which has taken place in the former socialist countries in CEE countries since 1989, including the dissolution of the CMEA, the disintegration of the USSR and the transition of these countries to a market-type economy put an end to the use of the MPS in the region officially changing it by the SNA.

Links between the SNA and the MPS in Terms of the Main Macroeconomic Indicators

Since the first half of the 1970s the Conference of the European Statisticians (CES) has initiated an activity to build bridges for transforming the main aggregates from one system into the other and vice versa. This work resulted in two UNs publications which are known as Document F.20, containing the so-called transition matrix. It presents three transformation tables showing the necessary steps to derive GDP from NMP and vice versa.[12]

At the end of the 1980s most of the statistical offices of these countries started to publish data on GDP and its major components as defined in the SNA.[13]

Some of them have also gained an experience with participation in international GDP comparisons. Hungary was the only country from the former CPEs consistently participating in all phases of the UNs ICP carried out since the end of the 1960s. Poland, Romania and former Yugoslavia participated in one or two rounds before 1990.

[12]See Comparison of the System of National Account and the System of Balances of the National Economy. Part One: Conceptual Relations. Studies in Methods. Series F No. 20. United Nations, New York, 1977. Part Two: The Transformation of SNA Aggregates into MPS Aggregates and vice versa in Selected Countries. United Nations, New York, 1981. Bulgaria is an example of a country with available data series for GDP 1980–1990 calculated on the basis of Document F. 20.

[13]The practice until 1988 was the following. Some CMEA countries which have been members of the World Bank and the IMF still since the 1980s (Yugoslavia, Romania, Poland, Hungary), supplied data on their economic performance to these organisations according to the requirements of the SNA. In their own official publications, however, these countries (with the exception of Hungary) published macrostatistical data exclusively according to the MPS.

Basic Methodological Differences between National Income Accounting in the MPS and the SNA

Two major indicators of output are of central importance in the MPS. One of them is global social product (named also gross material product) which is the sum of all material goods produced in the sphere of material production during the accounting year, including products used for the production of other products (the so-called intermediate consumption) and those used for final uses. According to the SNA terminology this value is gross output of branches producing material goods. The other major category of output in the MPS is national income which is derived from global social product by deducting the intermediate consumption of goods and consumption of fixed assets used for the production of other goods (Table 1). In the international terminology this concept is referred to as Net Material Product (NMP) to avoid confusion with national income as defined by the SNA.[14]

According to the SNA, 1993, GDP is the sum of Gross Value Added (GVA) of all resident producer units (institutional sectors or, alternatively, industries) plus that part (possibly the total) of taxes, less subsidies, on products which is not included in the valuation output. GVA is the difference between output and intermediate consumption. In contrast to GDP, Gross National Income (GNI) is not a concept of value added but a concept of income (primary income). It is equal to GDP less primary incomes payable to non-resident units plus primary imcomes receivable from non-resident units (Table 1). GNI at market prices was called Gross National Product in the 1953 SNA, and it is commonly denominated GNP.[15]

[14]It should be noted that the MPS does not regard the factor incomes coming from or going abroad, because at the time of formulating this accounting system such types of incomes were negligible in the CMEA countries See Rangelova R., M. Raynova and T. Radev (1989).

[15]System of National Accounts, 1993. Prepared under the auspices of the Intersecretariat Working Group on National Accounts. Commission of the European Communities – Eurostat, International Monetary Fund, Organisation for Economic Cooperation and Development, United Nations, World Bank. Brussels/Luxembourg, New York, Washington, D.C., 1993, p. 41.

Table 1

BASIC METHODOLOGICAL DIFFERENCES BETWEEN GDP BY THE SNA AND NMP BY THE MPS

<table>
<tr><th colspan="5">SNA</th><th colspan="2">MPS</th></tr>
<tr><td>Gross National Income (GNI)</td><td colspan="4"></td><td colspan="2"></td></tr>
<tr><td>Net Primary Incomes from the Rest of the World</td><td colspan="4"><u>GDP</u></td><td colspan="2"></td></tr>
<tr><td></td><td>Consumption of Fixed Capital</td><td colspan="3">Net National Product</td><td colspan="2"></td></tr>
<tr><td></td><td></td><td>Indirect Taxes</td><td>National Income</td><td></td><td>Gross (quasi–net) Material Product</td></tr>
<tr><td></td><td></td><td></td><td>Income in Non–material Sphere</td><td><u>NMP</u></td><td>Consumption of Fixed Capital</td></tr>
<tr><td></td><td></td><td></td><td>Income in Material Sphere</td><td>National Income in Material Sphere</td><td></td></tr>
</table>

Comparing national income of the SNA and the MPS it turned out that the addition of value added originating in the non-material sphere is not the only major adjustment needed to bring the value of national income in CEE countries to the level of national income as determined in the SNA. It was also necessary to carry out another major adjustment in the opposite direction. In the 1953 version of the SNA national income is defined on the basis of "factor cost", i.e. excluding net indirect taxes. In the MPS national income is defined at prices paid by the final users, i.e. including indirect taxes. Therefore, if the CMEA countries followed the recommendations of the SNA in their compilation of national income indicator, the final result would not significantly differ from the original official value because the net value added of non-material services would increase it by 14–17 per cent, but the deduction of the turnover tax would decrease the value of national income by 20–25 per cent.[16]

[16]In all CPEs turnover tax was treated as an indirect tax. It was the main channel of centralizing revenues in the state budget, while the role of direct taxes was negligible. The 'compensation' between the value added of the non-material product and turnover tax was the decisive argument against that time intention to increase the UN membership fee of the CMEA countries based on the national income indicators.

NMP by Official Data

NMP Growth Rates by Official Data

The official source of comparable macroeconomic statistical data for MNP and its dynamics in the former CPEs was the CMEA (Table 2).

Table 2

ANNUAL AVERAGE GROWTH RATES OF THE PRODUCED MNP IN CEE MEMBER COUNTRIES OF THE CMEA, 1951–1988, PER CENT

Country	1951–1955	1956–1960	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985	1986–1988	1951–1988
Bulgaria	12.2	9.7	6.7	8.8	7.8	6.1	3.7	4.3**	7.4
		–	–	+	–	–	–	+	
Hungary	5.7	5.9	4.1	6.8	6.3	2.8	1.3	1.7	4.3
		+	–	+	–	–	–	+	
East Germany	13.1	7.1	3.5	5.2	5.4	4.1	4.5	3.5	5.8
		–	–	+	+	–	+	–	
Poland	8.6	6.6	6.2	6.0	9.8	1.2	–0.8	3.9	5.2
		–	–	–	+	–	–	+	
Romania	14.1	6.6	9.1	7.7	11.4	7.0	4.4	5.1	8.2
		–	+	–	+	–	–	+	
The USSR	11.4	9.2	6.5	7.8	5.7	4.3	3.2	2.8	6.4
		–	–	+	–	–	–	–	
Czechoslovakia	8.2	7.0	1.9	7.0	5.5	3.7	1.7	2.4	4.7
		–	–	+	–	–	–	+	
CMEA– total*	10.8	8.5	6.0	7.4	6.4	4.1	3.0	3.0	6.1
		–	–	+	–	–	–	–	

* Including Vietnam, Cuba and Mongolia.

** The official data is 5.6 per cent, but we corrected it taking into account the 6.2 per cent overestimated growth rate for 1988 given by the official statistics instead of 2.4 per cent.

Source: Статистический ежегодник стран–членов Совета Экономической Взаимопомощи, 1989. Москва, Статистика, с. 18–28.

The CMEA member countries displaed a comparatively high NMP growth rate during the period under review – 6.1 per cent in total. The highest rates are observed for Romania, Bulgaria, the USSR, East Germany (GDR), *etc*. Considered by subperiods, the highest even double-digit rates of growth are achieved in the first half of the 1950s, as the lowest rate of growth then is that in Hungary – 5.7 per cent.

In general, the countries under review kept their ranking by the level of economic development within the next nearly 40 years. The data also show that the MNP dynamics did not display a constant increase. Since the second

half of the 1950s a decline of the MNP growth rates began. The only exception was Hungary, where the increase was very low – by 0.2 percentage points. The MNP growth rates continued to slow down in 1961–1965, as this time the exception was Romania. The second half of the 1960s was more successful for most countries (with exception of Romania and Poland). A new wave of slow-down in the MNP dynamics started from the first half of the 1970s, including most the CMEA member countries and this tendency was sustained until the end of the 1980s.[17]

The CMEA Comparison

Depending on the organization of the international comparisons there are two major groups: detailed (based on a large data set and performed by individual organizations or in collaboration) and shortcut (which are performed by individual experts using data from official sources). The detailed comparisons of national income are regarded as more reliable source of comparable data. In relation to the CPEs in the period under review, two basic comparisons are interesting – under the CMEA and the ICP.

The CMEA comparison was based on the method of detailed repricing. It was organized by the CMEA Statistical Standing Commission and started at the beginning of the 1970s. The main aim of this comparison was to estimate selected benchmark years and they were, as follows: 1973, 1978, 1983 and 1988. Since this comparison was confidential, it had a very limited utilization. After the collapse of the centrally planned system and the dissolution of the CMEA, the main results of this comparison were open and published.[20]

There are common features between the methodology of the CMEA comparison and that of the ICP, which are the following:

Firstly, in the two of them national income indicators were calculated, through processing huge statistical information on quantities of a great number of identical or similar representative goods and services, and their prices for each country were included in the comparison.

Secondly, both of them were carried out on the principle of a "star" system, as for the CMEA countries the former USSR was a numeraire country, while in the ICP this country was (and still is) the USA. It should be noted that against the advantages in terms of easy understanding and calculation, using the "star" system the estimates for the various countries are influenced by the

[17]Some authors distinguish cycles in the development of the former socialist countries (see for example Kolodko, G. (2000) as well as the Bulgarian authors: Avramov, R. (1989), Avramov, R. (1990), Antonov, V. (1987), *etc.*

[18]See Georgieva, D. and Y. Ivanov (1990).

structure of the country chosen as a centre of the star. For example, domestic USSR prices which overvalued manufactures and undervalued primary products, influenced intra-CMEA price and respectively CMEA comparisons. In this comparison non-material services include only activities in education, science, culture, management and some kinds of social services. Thus the CMEA Statistical Standing Commission did not include all activities in the service sector, or at least the representative part of them.

Thirdly, both of them aimed at obtaining more reliable data on the main components of the national income indicator. In the case of the CMEA comparison, the main goal was not only to estimate NMP, but also the following indicators: used NMP, consumption fund, accumulation fund (it covers changes in stock and gross capital formation net of depreciation), fixed capital formation, total consumption of population, total industry and agriculture output, total labour productivity.

Fourthly, the two comparisons were organized periodically, in consecutive rounds (phases).

According to the specificity of the MPS, respectively the CPEs official data presentation, the figures are given mainly as index numbers and/or structure breakdowns (Table 3).[19]

Table 3

INDICES OF PRODUCED AND USED NMP PER CAPITA IN CEE COUNTRIES IN 1988

(THE USSR=100)

Country	Produced MNP			Used MNP			Labour productivity
	USSR=100	In national currency	Average index	Total	Including		
					Consumption	Accumulation	
Bulgaria	108	105	106	113	123	88	92
East Germany	156	131	143	147	174	92	132
Poland	109	93	101	99	105	85	92
Czechoslovakia	137	126	132	151	151	67	137

* Hungary did not take part in this round of the comparison.

Source: Georgieva, D. and Y. Ivanov (1990), Macroeconomic Indicators: An Attempt at International Comparison), Economic Cooperation of CMEA Member Countries, Moscow, No. 10, pp. 104 –11.

[19]The same data on NMP per capita are given for 1983: 2241 rubles in Bulgaria; 2268 rubles in Hungary; 1843 rubles in Poland; 2598 rubles in East Germany; 1983 rubles in the USSR and 2497 rubles in Czechoslovakia.

In the process of calculation the Gershenkron effect has appeared, i.e. value indicators for a given country are higher if they are calculated at prices of the partner-country and are lower if they are calculated using the prices of the same country. This effect is evident for all countries in the Table 3, as the most expressed difference is marked for East Germany – the index number of the produced NMP per capita related to the USSR=100 is 156 but related to the national currency it is 131.

The estimates of the consecutive phases of comparison allow coming to the following conclusions:[20]

- The highest level of economic development marked GDR (East Germany), followed by Czechoslovakia. Hungary, Bulgaria and Poland changed in different years and by different indicators. The advanced position of GDR and Czechoslovakia could be explained by their higher level of labour productivity, caused by more developed industrial production, *etc*. The USSR produced over 70 per cent of total CMEA NMP, but judging by the basic figures on economic performance, it lagged behind the other countries.
- There are CMEA estimates comparising the total consumption of population in 1988; if the USSR=100, the ratio for Bulgaria is 119, East Germany – 159, Poland – 98 and Czechoslovakia – 140. Judging by the disaggregated data, consumption of material goods exceeded consumption of services. Concerning the latter, GDR and Czechoslovakia were again in advanced positions in comparison with the other countries.

The ICP Detailed Repricing Comparison of GDP Including CPE and Shortcut Approaches

Comparison of countries with different economic systems based on a detailed repricing was first started in 1968 in the framework of the ICP. This project is based on the method pioneered by M. Gilbert and I. Kravis (1954).

The ICP is regarded as the most significant progress in the area of economic level comparisons. It is based on aggregate GDP (according to SNA methodology), produced by final expenditure approach. Although the fundamental framework of this methodology remained basically the same over time some changes and improvements were implemented.[21] Maybe the most important modifications were the setting up of regional subprojects at

[20] See Rangelova, R. (1986).

[21] The ICP methodology and its experience are well-known so we will shorten its presentation and will refer to the significant number of publications on it. One of the latest critical analysis of the ICP was made by Korzeniewicz et al. (2004).

the end of the 1970s, including European Comparison Project, or the changed approach of pricing from the so-called GK to EKS.[22]

Concerning the former CPEs, from the very beginning Hungary was included in the ICP. In the different phases other CEE countries like Poland, Romania and Yugoslavia were included only in a single phase or more times.[23]

At times scholars use shortcut approaches for producing estimates of national income indicators. Notwithstanding the advantages of these approaches to international comparisons (they require less time and are less expensive), under the conditions of central planning first of all they could be considered an initial or supplementary phase of the real work, namely involvement of the countries in detailed repricing international comparisons.

Further on the shortcut approach of R. Summers and A. Heston, who produced at that time their own estimates based on the ICP results, are presented. The two authors' comparable estimates are regarded as consistent and reliable long-time series. They as well as the estimates of A. Maddison are the most widely used in the world practice.

The Shortcut Approach of R. Summers and A. Heston

In parallel with the work on the ICP, R. Summers and A. Heston, who were amongst its methodologists, calculated time series of real GDP and of its major components: consumption, investment and price level, for many countries, most of which were not included in the project. The idea they implemented is the following: the application of the system of national accounting in individual countries leads to the calculation of data in national currencies which are not comparable in an international perspective. On the other hand, the periodically carried out ICP, as well as comparisons drawn by other international organizations provide estimates of the real GDP for certain years. On the basis of these comparisons it is possible to obtain estimates for other years around the basic one, before and after. In other words, Summers and Heston made interpolations between the individual rounds on the basis of the real growth rates presented by the national official statistics. Their calculations embraced the period under consideration in the

[22]For details about the so-called Geary–Khamis (GK) method and Elteto–Köves–Szulc (EKS) method see for example Rangelova, R. International Economic Comparisons: Methodology and Analysis, Chapter VII "UNs' International Comparison Project". NEXT Publishing House, 2003, pp. 110–121.

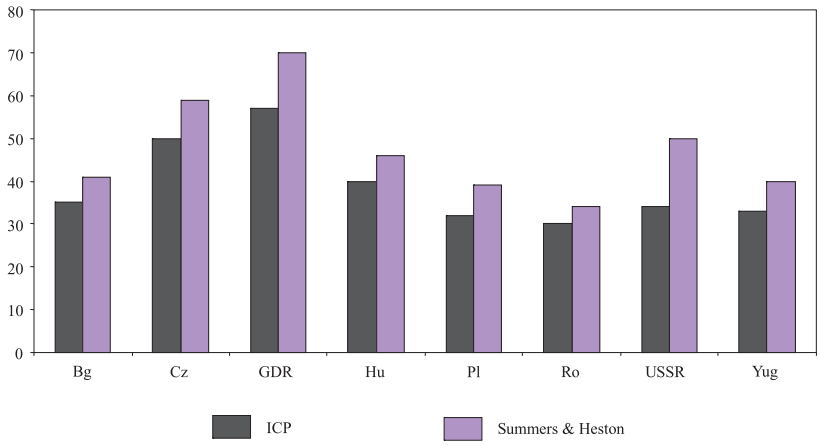
[23]Since Bulgaria was not included in the ICP some authors made attempts to estimate GDP for the country using indirect methods and Hungary as a bridge country (see Rangelova and Raynova, 1990).

present paper (1950–1988) covering 130 countries, 9 of which were CPEs. The data are presented in the so-called Penn World Tables (PWT) derived from the benchmark studies of the ICP, which cover the years 1970, 1975, 1980 and 1985. The estimates of GDP for 1975 for the CPEs were obtained using the following method: four of them (Hungary, Poland, Romania and Yugoslavia) participated in the third phase of the ICP and their estimates were used, while for the remaining five countries data from national statistics were used. This was followed by extrapolation backward and forward in time using data from the official national statistics of these countries for the rates of economic growth in constant prices.

At the end of 1980s time series for per capita GDPs of four other CPEs – Bulgaria, Czechoslovakia, East Germany and the USSR – did not appear in PWT5, i.e. up to 1988. This was due mainly to the events of that time and particularly to the growing consensus among CPE experts that both the levels and growth rates in these economies were overestimated and this prevented the two authors from attempting to provide estimates (see Figure 1). Only four CPEs had full representation in PWT5 – China, Hungary, Poland and Yugoslavia, which supplied SNA data over time. The latter three participated in benchmark ICP studies, while China was involved in a quasi-benchmark comparison with the USA.

Figure 1

INDICES OF GDP PER CAPITA BASED ON PPPs IN 1985, ESTIMATED BY ICP AND SUMMERS AND HESTON, USA=100



Comparison of the GDP per Capita for the CPEs Using Shortcut Approaches Based on the ICP

Another shortcut approach was used by two Bulgarian authors. They used primarily the results from the fourth phase of the ICP for 1980, as well as the comparisons of the basic value indicators for 1983 among the CMEA countries. These latter comparisons involved calculations of the value volume of the non-material services rendered in various countries, thereby making it possible to calculate indirectly the approximate ratios of their GDP. The employment growth rates in the non-productive sphere were also taken into account. The estimates in international dollars were obtained indirectly through the PPPs of Hungary and Poland, which were included in both comparisons undertaken by the ICP and the CMEA. In the case of Bulgaria, there had already been some experience from the bilateral GDP comparison with Finland for 1982 (where it was calculated that for Bulgaria it was by 28.2 per cent higher than the MNP), as well as from the estimates made by individual authors.

In Table 4 are given the GDP per capita estimates for Hungary and Yugoslavia in the fourth and the fifth phase of ICP, based on 1980 and 1985 respectively. The estimates for the rest of CPEs were calculated by Rangelova and Raynova (1990). These estimates were compared with those Summers R. and A. Heston. The main findings from the 1980–1985 period are as follows:

- The two approaches outline a decreasing or stagnating trend of the indices related to USA=100 for almost all countries, in particular Poland.
- The Summers and Heston approach gives higher estimates for the real GDP per capita, which has already been discussed (see Figure 1).

Table 4

GDP PER CAPITA BASED ON PPPs, 1980 AND 1985 (IN INTERNATIONAL GEARY–KHAMIS DOLLARS, 1985 PRICES)

Country	ICP estimates of GDP*				R. Summers R. and A. Heston estimates of GDP – 1985			
	Fourth round – 1980		Fifth round – 1985					
	Intern. Dollars	USA= 100	Intern. Dollars	USA= 100	1980		1985	
					Dollars	USA=100	Dollars	USA=100
Bulgaria	4183	37	4331*	35	4904	43	5 113	41
Czechoslovakia	5856	51	6063	50	7002	61	7 424	59
GDR	6312	55	6969	57	7891	69	8 740	70
Hungary	4660	41	4885	40	5508	48	5 765	46
Poland	4278	37	3898	32	5006	44	4 913	39
Romania	3430	30	3625	30	3946	35	4 273	34
USSR	3894	34	4214	34	5626	49	6 266	50
Yugoslavia	4042	35	4052	33	4733	42	5 063	40

*The estimates for 1980 for Bulgaria, Czechoslovakia, GDR, Poland, Romania and USSR and for 1985 for all CPEs are produced by Rangelova and Raynova (1990).

Sources: World Comparison of Purchasing Power and Real Product for 1980. Phase IV of the International Comparison Project. United Nations, Commission of the European Communities, 1986; World Comparisons of Real Gross Domestic Product and Purchasing Power, 1985. Phase V of the International Comparison Programme. United Nations and Commission of the European Communities. United Nations, New York, 1994; Summers, R. and A. Heston (1988).

The Alternative Approach of T. P. Alton and Associates to Estimating GNP in Six Former CPEs: Empirical Comparison

The work team of Thad P. Alton carried out a research project on national income in CEE over the period of centrally planning. Assessing the Alton's team approach as a whole, we come to a conclusion that it is of a great importance for the former CPEs trying to revaluate their official statistical data in retrospective. This is why we devote more attention in the study to the Alton and associates approach.

Alton and associates followed SNA methodology in construction a set of national income accounts for six CEE countries. On the basis of the official statistical data and numerous additional information sources they transformed the basic indicators of NMP to GNP by sector of product origin. The authors revalued all components of NMP in terms of their real factor cost aiming to eliminate many of the shortcomings of the official statistics of the former CPEs and to obtain more reliable and more comparable to Western statistics data for resource allocation. As a result, they present estimates of

GNP and index numbers of the real growth and structural changes for the considered countries.[24]

A starting point of the Alton team's approach is that the GNP indicator covers various service sectors excluded from the NMP concept. Besides, the latter is calculated by subtracting from gross material product of officially defined material sectors only so-called material costs, including depreciation, but not subtracting inputs from the excluded service sectors. For this reason NMP is not a "clean" value added measure.

Gross National Product by production approach (at factor cost) =
Net Material Product
+ consumption of fixed capital in the material production sphere
+ Gross National Product in non-material sphere
– net indirect taxes (taxes minus subsidies)

One specificity of this approach is that the sectoral indexes of Alton's team are combined into the overall GNP index number by means of approximate factor cost weights, while the official figures are based on actual prices which in some cases diverge substantially from factor costs and in this way distort the structure and the growth rate of the economy from what it would be at factor cost.

It is known that in CPEs the relatively slow growing sectors of agriculture and services were subsidised. Application of market prices in deriving weights for those sectors overstates the total growth because it gives a relatively low weight to the slow growing sectors and a high weight to fast growing sector of industry. For this reason estimates of GDP/NMP growth rates depend partly on whether they are at market or at factor cost. Differences in these estimates reflect the uneven sectoral distribution of indirect taxel, such as turnover tax, and subsidies.

One of the most important points of Alton's team approach is the more detailed breakdown of GNP at market prices by sectors of product origin. Market price structure is interesting in view of following the actual transactions. However, because of the price specificity in the former CPEs the official prices could not reflect the actual resource cost of producing various commodities. The Alton's team adjustments to factor cost reveal the change

[24]In fact Abraham Bergson elaborated the methodology of transforming NMP into GNP thus making them more comparable. A. Bergson focused his attention on the former USSR, while T. P. Alton and associates considered six CEE countries (see Appendix).

in the ratio of industry to agriculture at market prices in favour of the former to favouring agriculture at factor cost. An example in the case of Poland is given in Table 5.

Table 5

POLAND: GNP STRUCTURE FOR 1956 AT MARKET PRICES AND AT FACTOR COST, TOTAL=100

Branches	At market prices	At factor cost
Industry and crafts	45.1	28.1
Agriculture	23.2	30.0
Construction	6.5	6.2
Transport and communications	5.7	6.9
Trade and catering	6.7	6.1
Housing construction	1.6	10.9
Defense	1.9	1.8
Others*	9.3	10.0

* Including all other branches where no change is observed, namely: forestry, other services, education, arts and culture, science, health care, administration and law, religion and police.

Source: Alton et al. (1965), Polish National Income and Product in 1954, 1955, and 1956. Columbia University Press. New York and London, pp. 86–87.

In Table 5 are presented only the branches where using the two approaches (at market prices and at factor cost) a difference in their share is observed. No changes in the share are marked for the so-called non-productive sphere. Comparatively small are the differences between the shares of the material sphere branches, where the labour and capital production factors participate in a different way and indirect taxes and profit have complementary (distributive) nature like transport and communications, trade and catering. Most substantial is the difference between industry and crafts and agriculture, where the proportion is 2:1 at market prices and 1:1 at factor cost. That is why Alton and associates paid special attention to the latter two branches. The share of housing construction estimated at factor cost is nearly 7 times bigger than that estimated at market prices. The latter fact reflects the pricing specificity of the CPEs prompted by the social state policy.

The Alton's team produced estimates of GNP using two ways of calculation: by production approach and by final use (Table 6). But while producing the GNP origin estimates the authors have a consistent set of weights reflecting adjusted factor cost, the weights for the final use estimates are defined by them as hybrids. The lack of necessary data and research time constraints are pointed out as the real reasons for not extending the factor cost concept comprehensively to weights for final uses.[25] For this reason and

[25] Alton, T.P. et al. (1986a and 1986b).

because the production approach is closer to the NMP methodology we focus our attention on the weights for the GNP aggregates which reflect adjusted factor costs for country-specific base years.

The estimates for Poland in Table 6 are just an illustration of this approach. Considering the basic components ratio, i.e. total consumption to gross fixed capital formation we see that estimation at market prices favours the total consumption in comparison with the estimation at factor cost (which favours the gross fixed capital formation).

Table 6

POLAND: GNP STRUCTURE BY FINAL USE IN 1956, PER CENT

	At market prices	At factor cost
Individual consumption	59.5	56.5
Collective consumption	9.9	8.4
Gross fixed capital formation	26.8	30.7

Source: Alton et al. (1965), Polish National Income and Product in 1954, 1955, and 1956. Columbia University Press. New York and London, p. 82.

The GNP volumes are estimated both in national currency and USD, as the first option takes advantage of using original data sources and respectively ensuring higher reliability of the estimates, while the second one allows better cross-country comparability (Table 7).

Table 7

CEE: GNP PER CAPITA, 1970 AND 1975–1985, IN USD, AT 1985 PRICES

Years	Bulgaria	CSSR	GDR	Hungary	Poland	Romania	Average (6)	USA
1970	4 973	6 891	7 202	5 811	5 175	3 410	5 449	13 168
1975	6 082	7 869	8 639	6 709	6 777	4 496	6 704	13 939
1976	6 237	7 948	8 845	6 693	6 878	4 935	6 875	14 477
1977	6 144	8 230	9 125	7 081	6 938	5 010	7 020	15 003
1978	6 270	8 302	9 286	7 229	7 119	5 196	7 174	15 636
1979	6 502	8 317	9 553	7 233	6 945	5 337	7 205	15 835
1980	6 290	8 467	9 758	7 297	6 714	5 219	7 144	15 634
1981	6 436	8 416	9 958	7 349	6 300	5 196	7 041	15 762
1982	6 619	8 556	9 938	7 624	6 180	5 303	7 076	15 209
1983	6 484	8 659	10 111	7 555	6 425	5 286	7 173	15 590
1984	6 658	8 868	10 451	7 776	6 584	5 509	7 382	16 456
1985	6 590	8 993	10 723	7 718	6 638	5 580	7 457	16 671
Index 1985-1970	133	131	149	133	128	164	137	127

Source: Alton, T.P. et al (1986a), Economic Growth in Eastern Europe, 1970 and 1975–1985, Research Project on National Income in East Europe, OP–90, p. 23.

The estimates in Table 8 outline the scale of each CEE country under review, as well as their common potential changes from 1970 to 1985. The temporal comparison shows the known fact about the slowdown in the CEE economic growth after 1975. While the index numbers of GNP increased from about 79 to 100 within only five years (from 1970 to 1975) in the following 10 years it reached only 117. The highest GNP per capita was observed in East Germany, followed by Czechoslovakia, Hungary, *etc.*

The estimates given in Table 8 allow presenting the individual country contribution to total GNP for the six countries (Figure 2). In 1985 the biggest was the share of Poland – nearly 30 per cent, followed by East Germany – 21 per cent, Czechoslovakia – 17 per cent, Romania – 15 per cent, Hungary – 10 per cent and the smallest was the share of Bulgaria – over 7 per cent.

Table 8

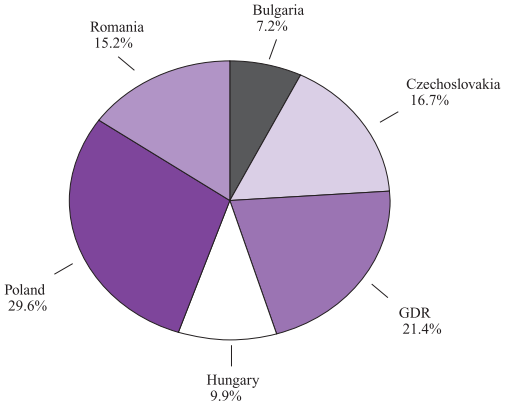
CEE: TOTAL GNP AND ITS DISTRIBUTION BY COUNTRY, 1970 AND 1975–1985, IN USD, AT 1985 PRICES

Year	Distribution of GNP among the six countries (Total=100)						GNP – total for the six countries	
	Bulgaria	Czechoslovakia	GDR	Hungary	Poland	Romania	USD	Index 1975=100
1970	7.5	17.6	21.9	10.7	30.0	12.3	561 278	78.9
1975	7.5	16.4	20.4	9.9	32.4	13.4	711 820	100.0
1976	7.4	16.1	20.2	9.6	32.3	14.4	734 711	103.2
1977	7.2	16.4	20.2	10.0	31.8	14.4	755 325	106.1
1978	7.1	16.2	20.1	9.9	32.1	14.6	776 522	109.1
1979	7.3	16.2	20.4	9.9	31.2	15.0	783 997	110.1
1980	7.1	16.6	20.9	10.0	30.6	14.8	781 580	109.8
1981	7.4	16.7	21.5	10.2	29.2	15.0	773 885	108.7
1982	7.6	16.8	21.2	10.4	28.7	15.3	781 170	109.7
1983	7.3	16.8	21.2	10.2	29.5	15.0	795 221	111.7
1984	7.3	16.7	21.2	10.0	29.6	15.2	821 619	115.4
1985	7.2	16.7	21.4	9.9	29.6	15.2	833 127	117.0

Source: Alton, T.P. et al (1986a), Economic Growth in Eastern Europe, 1970 and 1975–1985, Research Project on National Income in East Europe, OP–90, p. 23.

Figure 2

DISTRIBUTION OF THE TOTAL GNP IN SIX CEE COUNTRIES, 1985



Source: Alton et al. (1986a), Economic Growth in Eastern Europe, 1970 and 1975–1985, Research Project on National Income in East Europe, OP–90, p. 23.

The authors point out that the dollar estimates were provisional and served for calculating annual growth rates or interpolating estimates between the individual phases on the basis of the real growth rates presented by the national official statistics. The set of individual country's dollar values should not be considered as precise comparative indicators of absolute development levels. They have to be used for very rough comparisons between the countries growth rates (see Table 9).

Table 9

CEE: AVERAGE ANNUAL RATES OF GNP GROWTH, 1966–1990, PER CENT

	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990
Estimated by T. P. Alton and associates – GNP					
Bulgaria	4.7	4.5	1.2	0.9	–1.8
Hungary	3.1	3.4	2.3	0.9	–0.5
Poland	3.8	6.6	0.9	1.2	–1.1
Czechoslovakia	3.5	3.4	2.2	1.4	0.8
Accounted by the CMEA – produced MNP*					
Bulgaria	8.8	7.8	6.1	3.7	4.3**
Hungary	6.8	6.3	2.8	1.3	1.7
Poland	6.0	9.8	1.2	–0.8	3.9
Czechoslovakia	7.0	5.5	3.7	1.7	2.4

Notes:

* The last time subperiod is 1986–1988.

** This growth rate is corrected by the author of this paper due to the already discussed mistake of the official statistics in Bulgaria for the 1988/1987 growth rate (6.2 per cent instead of 2.4 per cent).

Source: Alton et al. (1992), Economic Growth in Eastern Europe, 1975–1991, OP–120, pp. 31–32; Statistical Yearbook of the Member Countries of the CMEA, 1989. CMEA, Moscow, pp. 18–28.

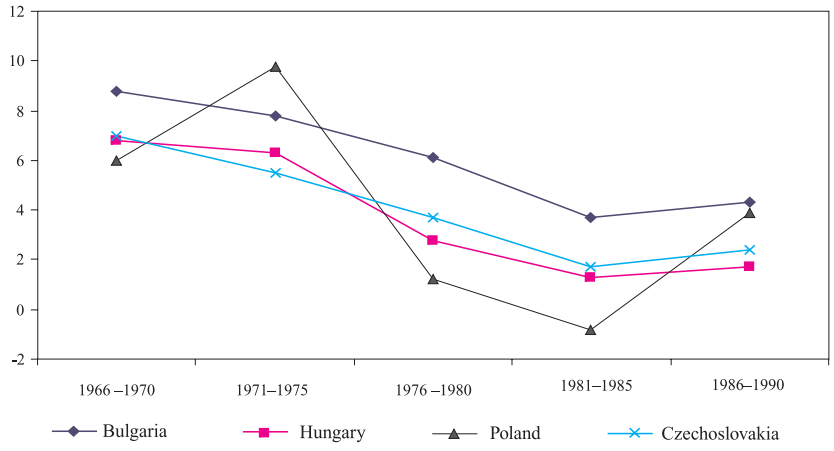
Comparing the dynamics of the two indicators – GNP and NMP, we should take into account the conventionality caused by their different scope, which could contribute to the lower growth rates estimated on the basis of GNP in comparison with MNP. On the other hand, we cannot prove that the official data are calculated correctly at constant prices.[26]

The growth rates estimated by Alton and his team as a whole are lower than those of the official CMEA statistics (see Figures 3 and 4). What is common is the observed decreasing GNP trend over time for the individual countries, in particular between 1970 and 1975. According to Alton's team contrary to the CMEA estimates the economic growth continues to slow down in the second half of the 1980s.

The lines presenting the individual countries show that for three of them (Bulgaria, Hungary and Czechslovakia) the Alton and associate's estimates are lower than that in the former CMEA comparison, while for Poland the economic slowdown around 1980 estimated by the SMEA comparison is more substantial than in Alton's comparison.

Figure 3

AVERAGE ANNUAL GROWTH RATES OF PRODUCED MNP IN 4 CPEs, 1966–1990 ACCOUNTED BY THE CMEA, PER CENT



[26]Comments and critical remarks on the Alton and associates approach one can see in Rangelova, R. (1996) and Maddison, A. (1998).

Figure 4

AVERAGE ANNUAL GNP GROWTH RATES IN 4 CPES, 1966–1990 ESTIMATED BY ALTON AND ASSOCIATES, PER CENT

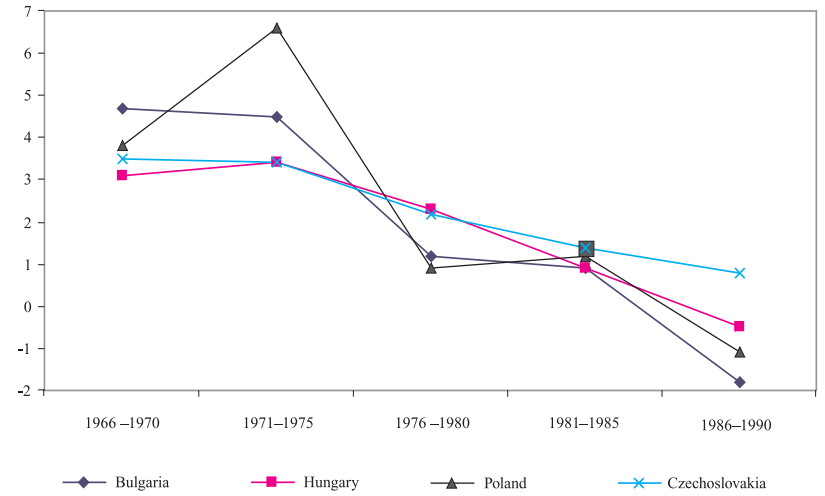


Figure 5

AVERAGE ANNUAL GNP GROWTH RATES IN BULGARIA, 1966–1990, ESTIMATED BY ALTON AND ASSOCIATES AND THE CMEA, PER CENT

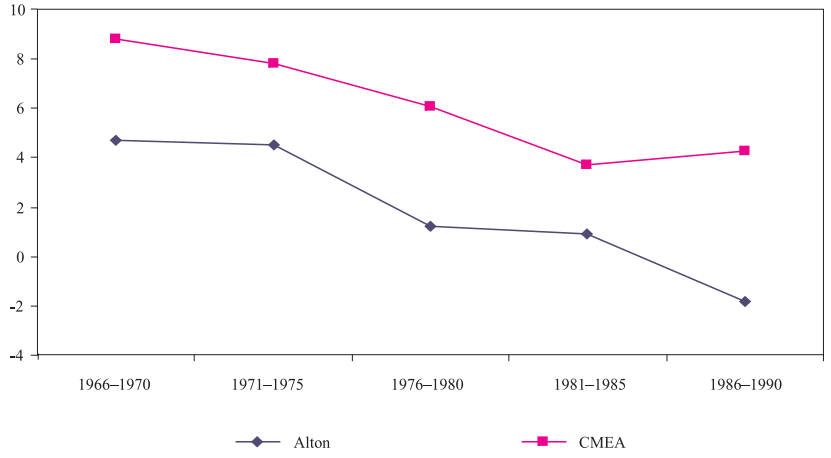


Figure 6

AVERAGE ANNUAL GNP GROWTH RATES IN HUNGARY, 1966–1990, ESTIMATED BY ALTON AND ASSOCIATES AND THE CMEA, PER CENT

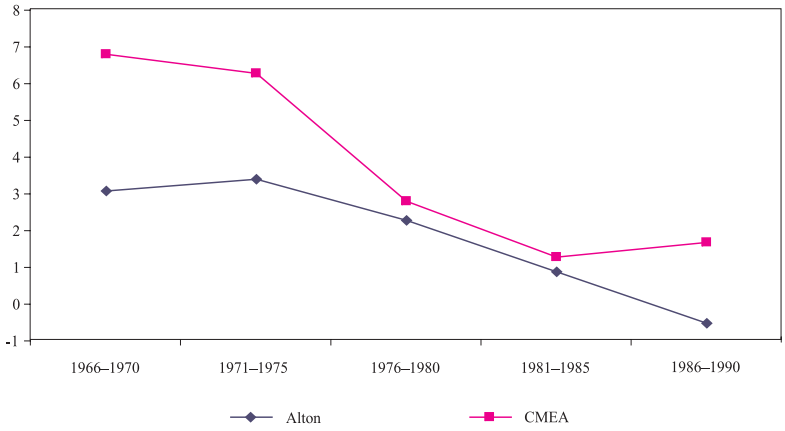


Figure 7

AVERAGE ANNUAL GNP GROWTH RATES IN POLAND, 1966–1990, ESTIMATED BY ALTON AND ASSOCIATES AND THE CMEA, PER CENT

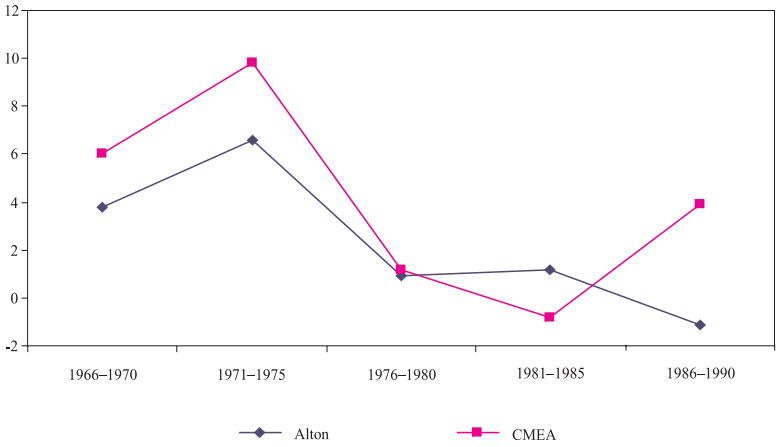
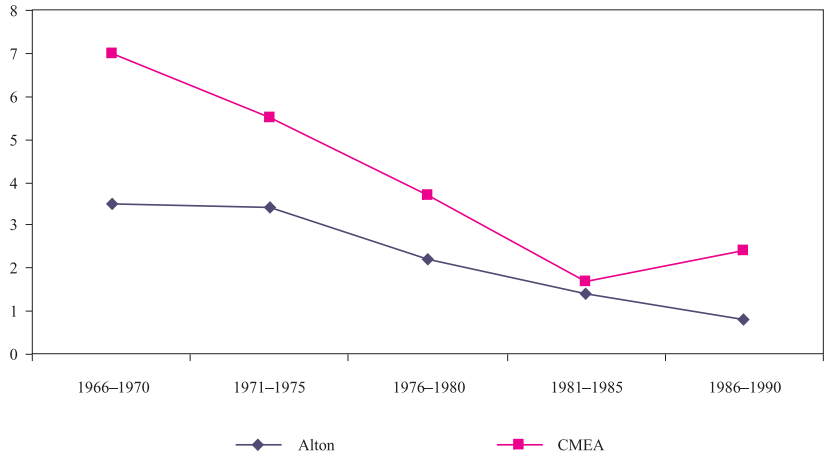


Figure 8

AVERAGE ANNUAL GNP GROWTH RATES IN CZECHOSLOVAKIA, 1966–1990, ESTIMATED BY ALTON AND ASSOCIATES AND THE CMEA, PER CENT



The Maddison Approach

The work of A. Maddison is intended as a reference source for empirical analysis of world development, and for assessment of individual nations comparative performance. His approach is close to the ICP methodology but there are essential differences in comparison with the Summers & Heston approach. Maddison realises that the EKS PPP is the convertor preferred by Eurostat and OECD, he uses the Geary–Khamis convertor. The latter is usually nearest to the Paasche convertor, while the Fisher convertor is somewhat higher, and the Laspeyres convertor shows the highest PPPs. The wider the dispersion between alternative PPPs, the lower the relative GDP per capita of the country concerned. For consistency with the procedure used for non-OECD countries, Maddison uses the Geary–Khamis PPPs.[27]

His belief is that the variance between successive ICP rounds is more likely to be a source of problems than could be any errors in the national growth measures. This is why in general he keeps to the successive ICP rounds. The last Maddison series is based on the ICP6 Geary–Khamis

[27] Maddison, A. (1995).

benchmark for 1990. For the former USSR he used the A. Bergson's estimates, and for the other CEE countries he used the Alton and associates' estimates.

In Table 10 are presented the Maddison estimates of per capita GDP for fourteen European countries: Western European countries forming the so-called "old" EU (without Luxemburg) and seven former CPEs in CEE for selected years – 1950, 1975 and 1990. The second chosen year (1975) reflects the best results in most countries of the two groups over the period under review, followed by more or less clear slowdown.

The ranking of the CPEs by GDP per capita remained almost the same during the period after the Second World War until 1990. Leaders were East Germany, Czechoslovakia and Hungary, but countries with lower level of GDP, like the Bulgaria, Romania, the USSR, Yugoslavia, realised faster economic growth, i.e. the catching up effect was observed.[28]

The CEE countries have never been among the wealthy nations in Europe, but during the period of CPE they worsened their position in terms of income per capita in comparison with the Western countries. In 1939 the average position of CPEs was about 52 to the Western European countries' 100 (the EU-14), in 1989, i.e. in the year of the CPEs collapse this ratio decreased to nearly 42:100, or by 10 percentage points.[29]

[28]The latter was observed also in the more-backward ex-republics of the former USSR or in the-republics of the former Yugoslavia, like FRY Macedonia.

[29]See. Rangelova, R., 2006a, pp. 116–120.

Table 10

EUROPEAN COUNTRIES: GDP PER CAPITA IN 1950, 1975 AND 1990 (1990 GEARY–KHAMIS DOLLARS)

Country	1950		1975		1990	
	(1)	(2)	(1)	(2)	(1)	(2)
Austria	3 731	87	11 724	106	16 792	109
Belgium	5 346	124	12 133	110	16 807	109
Denmark	6 683	155	13 104	119	17 953	116
Finland	4 131	96	11 098	100	16 604	107
France	5 221	121	13 101	119	17 777	115
Germany	4 281	99	13 034	118	18 685	121
Greece	1 951	45	7 867	71	10 051	65
Ireland	3 518	82	7 117	64	11 123	72
Italy	3 425	80	10 558	96	15 951	103
Netherlands	5 850	136	13 037	118	16 569	107
Portugal	2 132	50	6 790	61	10 685	69
Spain	2 397	56	9 151	83	12 170	79
Sweden	6 738	156	14 185	128	17 695	114
United Kingdom	6 847	159	11 701	106	16 302	105
EU-14*	4 306	100	11 043	100	15 463	100
Bulgaria	1 651	38	5 831	53	5 764	37
Czechoslovakia	3 501	81	7 384	67	8 464	55
Hungary	2 480	58	5 805	53	6 348	41
Poland	2 447	57	5 799	53	5 113	33
Romania	1 182	27	3 761	34	3 460	22
USSR	2 834	66	6 136	56	6 871	44
Yugoslavia	1 546	36	4 693	42	5 458	35

Legend:

(1) – GDP per capita, in dollars based on PPPs

(2) – Index at EU-14 =100 (EU-15 without Luxemburg)

Note:

* Without Luxemburg.

Source: Maddison (1995), Monitoring the World Economy 1820–1992. OECD Development Center, Paris, Appendix D, Levels of GDP Per Capita, Table D–1(a, b, c, d), pp. 194–201; www.ggdc.net

It should be noted that the former CPEs, in particular Bulgaria, Romania and Yugoslavia, were in their best position in comparison with EU-14 around 1975. According to the Maddison estimates the GDP per capita level of Bulgaria for 1975 was 5,831 dollars and the index number was 53 at EU-14=100, while in 1990 it was 5,764 dollars but the index was only 37. The other CPEs under review (Czechoslovakia, Hungary, Poland, USSR) definitely worsened their position concerning EU-14=100. The common trend for all seven countries was the slowdown of the economic growth after 1975.

The Maddison estimates allow following the process of converging the two groups of countries – CPEs to the Western European economies. For example the variation coefficients in the former group decreased from 36.5

per cent in 1950 to 26.3 per cent in 1990, while in the latter group decreased from 38.3 per cent in 1950 to 19.4 per cent respectively in 1990, which is an indication that the process of convergence in Western Europe was more clearly expressed.[30]

Concluding Remarks

• The fundamental statistical concepts in the MPS accounting system which was active under the conditions of the CPEs are based on the Smithian economic theory (and reinforced by Marx) on "value-creating labour", i.e. excluding services from production. The concepts in the SNA (which is adequate to market economies) are based on the economic theory of John M. Keynes, assuming a broader interpretation of the economic activity scope. The former theory was less ludicrous in an era where large parts of the population lacked sufficient material goods to survive, but services were not, as they now might be, able to substitute for goods. This theory was more appropriate to countries which were concerned, as was eighteenth and ninethinght century Britain or early Soviet Russia, with the economy as the basis for military or diplomatic power, and where the objectives of the state were expected to override the countries of individusl welfate.

The difference between the MPS and the SNA predetermines the narrower scope of the NMP concept in comparison with that of the GDP concept. Because of their specificity, however, it is statistically not correct to look for unconditional judgement which methodology, respectively estimates of national income among the discussed in the paper, are better and preferable to use. In no doubt the SNA is the up-to-date approach of estimating national income.

• The coexistence of the two accounting systems allowed to endure mutual influences and to develop them both separately and jointly, including the building of links between them. In the 1970s and 1980s some of the former socialist countries introduced in parallel with the MPS calculations of basic indicators by the SNA. The collapse of the CPEs in the CEE imposed the replacement of the MPS by the SNA.

• In this paper we have tried to present different applied methodologies in order to illustrate their own specificity which in one way or another reflects on the derived estimates. We agree with T. P. Alton and associates that "international comparisons of national product levels encounter serious methodological and basic data problems. Every approach

[30]See Rangelova, R., 2005.

leaves something to be desired".[31]

- Many of the developed methodologies were connected with international comparisons of the economic performance made at that time. In this way any participation of a given country in an international comparison is a valuable contribution. Such a country could have benefited from a higher cooperation level of the host country and more extensive expert field of observations than the actual situation allowed. Among the former socialist countries Hungary was this typical case.

The variety of the worked out and applied methodologies shows the great intellectual efforts which experts employed in order to achieve comparability between the indicators of national income (NMP) in the acting MPS in the former CPEs and of GDP in the MPS acting now in the market SNA economies. These efforts deserve their place in economic history.

[31]Alton, T.P. et al (1986).

Appendix

ALTERNATIVE METHODOLOGIES AND APPROACHES TO ESTIMATION OF MNP (OR GDP) IN THE CPES

Organisation /Author(s)/Year	References	Essence of the methodology (approach)	Comments or/and remarks
GDP approach based on PPPs			
International Comparison Project (ICP) – Gilbert, M. and I.B. Kravis (1954), An International Comparison of National Products and the Purchasing Power of Currencies, OEEC, Paris.	The most comprehensive and prestigious comparison of real GDP of the UNs and World Bank carried out periodically since the end of the 1960s.	– PPPs calculated using quantities ('real' volumes) of goods and services expressed in GDP; – Decentralised price surveys carried out by national statistical offices and coordinated by the ICP office at the World Bank.	Major critiques: –Low quality of direct and indirect price estimates, in particular due to quality differences in goods and difficulty in determining price of services and some goods through input prices; –Limited number of observations due to irregular and limited benchmark studies.
– Summers, R. and A. Heston (1988), New Set of International Comparisons of Real Product and Prices: Estimates for 130 Countries, 1950–1985.The Review of Income and Wealth, March 1988, pp. 6–25.	A. Heston and R. Summers took part in the ICP work from its inception in 1968 until about 1985. They produced the so-called Penn World Tables on the basis of the ICP rounds estimates. These tables cover a great	The approach of the two authors concernes the expenditure side of GDP. They produced time series for individual countries based on temporal and spatial interpolations or extrapolations from successive ICP benchmark studies of countries and years not covered in the periodical surveys. In particular: –They used the original basic data for countries participating in the different ICP rounds and reworked the Geary–Khamis PPPs on a global basis. – The updating was done on a disaggregated	R. Summers and A. Heston could not overcome the main shortcoming of the official MPS estimates, i.e. they tended to underestmate the level of output and exaggerate growth rates. (See Heston, A. (1994), A Brief Review of Some Problems in Using National Accounts Data in Level of Output Comparisons and Growth Studies. Journal of

Summers, R. and A.Heston (1991), The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988. Quarterly Journal of Economics, Vol. CVI, May, Issue No. 2	number of countries in the world (over 150), including the former CPEs. In 1990 the Center for International Comparisons at the University of Pennsylvania (CICUP) was established. The present directors of the Center are the two authors.	basis, with separate estimates for consumption, investment, government expenditure and net foreign balance. –The procedure to eliminate the variance between successive ICP rounds involved modification of the growth rates in national prices.	Development Economics. Vol. 44, No. 1, pp. 29–52.
Maddison, A. (1995), Monitoring the World Economy, 1820–1992, Development Centre of the Organisation for Economic Co-operation and Development, Paris.	In the book the author uses the ICP-6 Geary–Khamis benchmark for 1990 as the latest available and the most complete in country coverage.	A. Maddison assumes that the variance between successive ICP rounds is more likely to be a source of methodological problems than errors in the national growth measures. His updating is cruder than that of R. Summers and A. Heston and is done only at the GDP level. Although the EKS PPP is the convertor now preferred by Eurostat and OECD, A. Maddison prefers to use the Geary–Khamis method in order to keep consistency with the procedure used for non-OECD countries.	– The applied Geary–Khamis method may suffer from Gerschenkron effect, i.e. it may produce biased estimates for those countries whose expenditure and price structure differ substantially from the international average, which tends to be dominated by high-income countries, since the weighting scheme reflects country shares in total expenditure. –The author recognizes that measures of output over such a long period are necessarily rough.

Rangelova, R. and M. Raynova (1990), Comparability of GDP in the International Comparisons, Economic Thought, Journal of the Institute of Economics, Bulgarian Academy of Sciences, Year VI, pp. 93–105.	This is a shortcut method based on the fourth (1980) and the fifth (1985) rounds of the ICP. The main intention was to estimate GDP for Bulgaria as a country which did not participate in the ICP.	The authors used primarily the results from the ICP-4 for 1980, as well as comparisons of the basic value indicators, including NMP for 1983 among the CMEA countries. The latter comparisons involved calculations of the volume indexes of the non-material services rendered in the various countries, thereby making it possible to calculate indirectly the approximate ratios of the GDP in them. The employment growth of rates in the non-productive sphere was also taken into account. The estimates in international dollars were likewise obtained indirectly through the PPPs of Hungary and Poland, which were included in both comparisons: of the ICP and the CMEA. In Bulgaria's case there had already been some experience from the bilateral comparison of GDP with Finland for 1982, as well as from estimates derived by other individual authors.	The applied shortcut method was one of the small number of methods that could be used in Bulgaria under the conditions of the different accounting systems. However it led to rough estimates.
Approach based on factor cost			
Alton, T. P. et al (1956–1992), see: – Alton, T.P. et al (1980), Statistics on East European Economic Structure and Growth, Research Project on National Income in East Central Europe, OP–48.	This is the most consistent approach for estimation of GNP in the CPEs using the official statistics and trying to correct the NMP according to SNA. Annual recalculations were made for the whole	A. Bergson developed an "adjusted factor cost" framework for valuation of Soviet output, where the commodity prices were adjusted to equal average cost, and imputations were made for capital cost. Later he adjusted turnover taxes and subsidies. He also adjusted the scope of the accounts so that they were approximated to the SNA concept of GDP, and indicators of production volume were intended to reflect value added rather that gross output. Bergson' approach was adopted by the USA Central	The general remarks concern the approach using the employment rate in the branches of the non-productive sphere in order to estimate the value added; it does not reflect the changes in the labour productivity. In our view as far as the MPS is not suitable for accounting the non-productive activities it is

– Alton, T.P. et al (1992), Economic Growth in Eastern Europe, 1975–1991. L.W. International Financial Research, Inc. New York, OP-120, and others.	period of central planning in CEE countries allowing to estimate more precisely the real economic growth. Alton and associates began this work at the beginning of the 1950s. As a result they published numerous papers – over 130 both for the CEE courtiers as a whole and for the individual countries.	Intelligence Agency (CIA) which made the annual estimates of CPEs' GDP. T. P. Alton and his team did the same work for CEE countries. It should be stressed that the experts are very correct in terms of references, trying to use mainly original and reliable sources of data. They are also exceptionally precise in using statistical data.	difficult to derive their real contribution to GDP (GNP). Even if we assume that the productivity in the service sector changes according to the employment growth rates (what is the Alton team assumption), the data show that we could hardly agree with the low and even negative growth rates of government and other services.
PlanEcon, see PlanEcon, Review and Outlook for the Eastern Europe. Washington: PlanEcon Inc., December 1999.	This was a research agency in the USA which produced alternative estimates of the CPEs economic performance.	The main approach of this agency was using both national statistics of the former CPEs and additional data and applying shortcut methods to correct the officially declared economic performance data in these countries. The methodology was not clearly published.	Like all shortcut methods this approach also has some limitations, but in general it indicated the probable overestimation of the official statistics of the CPEs and thus served as a corrective.
Approach based on physical indicators			
Ehrlich, E. (1968), International Comparisons of per capita NMP in Socialist and Capitalist Countries.	At the end of the 1950s the Hungarian economist F. Janossy developed a method trying to	The idea is the following: the method is based on a set of physical consumption indicators, for which an attempt is made to find a functional dependence on the per capita GDP value. Preference has been given to consumption indicators because there is closer dependence	The advantages of this method consist in the following: (a) possibility of correcting the ER and (b) determining the GDP for each country in which data on GDP were not available,

In: "Methodological Issues of International Comparisons". Part 1, Moscow (*in Russian*); – Ehrlich, E. (1992), Economic Growth in Eastern Central Europe after World War II. Institute for World Economics, Hungarian Academy of Sciences, Working Paper, No. 7.	avoid the difficulties arising from the two socio-economic systems in the world and the differences in their pricing systems. Later on F. Janossy and E. Ehrlich continued working on the application of this method.	between them and the size of the GDP, as compared to the dependence between the GDP and the production indicators. A geometric mean, which is the corrected value of this macroindicator, is calculated from the quantities of its level for each country, depending on each physical indicator. The distorting influence of the exchange rate (ER) has been removed to a certain extent in the applied geometric mean. Comparisons of GDP per capita for several basic years covering the 1937–1980 period have been done with the active participation and further developments by E. Ehrlich. The last comparison relates to 46 countries for 1980, by employing 49 physical indicators.	but there were statistical data on the physical indicators. Disadvantages: (a) using physical indicators in order to estimate the output volume in many cases where they are not representative for a given branch (for one or another reason) and they are connected with the output ratner than with the value added; (b) using physical indicators which make impossible accounting of the quality and technical progress; (c) the method is not very suitable for comparing the per capita GDP of countries for which a big gap between their income levels is observed.
Marer, P. (1985), Dollar GNP's of the USSR and Eastern Europe. Published for the World Bank. The John Hopkins University Press, Baltimore and London. – Marer, P. et al (1992), Historically Planned Economies.	The applied method is similar to that of F. Janossy and E. Ehrlich.	This method comprises the most general lines of correcting the ER and of calculating the index of the GDP (GNP) in the so-called approximate US dollars.	This idea is developed in: Comparative GDP Levels (1993), Physical Indicators, Phase III, by I. Borenstein. Economic Commission for Europe. Economic Studies No. 4, UNs, New York.

A Guide to the Data. The World Bank. Washington, D.C.			
Havlik, P. (1986), Comparison of Real Products between East and West, 1970–1983. The Vienna Institute for Comparative Economic Studies (WIIW), April, No. 115.	P. Havlik used the F. Janossy method with certain modifications.	The level of economic development of a given country is presented by per capita GDP, converted from national currency into US dollars through the current ER. The purpose is to calculate the dependence between this indicator and selected physical indicators for countries for which such data are available. This dependence is also used for obtaining estimates about countries for which no such data are available. Havlik adopts a critical approach to this fact, inasmuch as it introduces a high degree of conventionality in the results. He has selected 28 physical indicators which are closer in composition to the ones used in the Economic Commission for Europe than to those used by E. Ehrlich.	The author's considerations are connected with the kind of the mean used for obtaining the aggregate estimate. The geometric mean (applied by E. Ehrlich) leads to lower estimates, while the arithmetic mean (used by P. Havlik) is influenced by the extreme values of the individual quantities.
Estimation of the USSR NMP/GDP			
Bergson, A. (1953), Soviet National Income and Product in 1937, Columbia University Press.	This research work was initiated by A. Bergson and his associates in the early 1950s, and developed by	The CIA presented two sets of estimations for USSR national income and its growth: at Soviet prices and at adjusted factor cost. The Bergson's practice is followed in converting data on Soviet purchaser prices into producer prices at factor cost in order to get a more realistic appreciation of the resource costs involved. Bergson's' measures were in terms of expenditure categories, whereas the CIA preferred to estimate mainly by industry of origin. The move	As a result the factor cost adjustment brought some minor changes in the growth rates of industry and services, but the big changes were in the weights of the different sectors. In the early 1990s there was a strong criticism of this research approach and the US

	government funded research in the Rand Corporation and later by Central Inteligence Agency (CIA) and other government agencies. Afterwards forty years of scholarly activity followed in producing estimates of the USSR national income performance.	from purchaser to producer prices involved removing indirect taxes, transport and distributive margins, and adding subsidies just as it is according to the SNA methodology. It involved also an adjustment of Soviet profit margins, which were simply markups on labour and material inputs, but they did not reflect the cost of capital assets. This is why a major statistical weakness of this approach was the poor quality of the official USSR estimates of capital stock which were the basis for the CIA imputations.	government stopped funding it and similar work on CEE countries. Most of the archives of CIA which financed work on CEE countries now seem to have been destroyed. It would be a pity to have the same thing with the archives on the former USSR (see Maddison, A., 1998, Measuring the Performance of a Communist Command Economy: An Assessment of the CIA Estimates for the U.S.S.R. Review of Income and Wealth, Series 44, Number 3, September 1998, pp. 307–323).
Edelman, M. (1992), Revision of the Main Aggregates Series. Journal of Statistics, National Statistical Office, Moscow, No. 4, pp. 19–26.	In his capacity of a leading statistician at the research Statistical Institute at the State Statistical Committee (Goscomstat) in Russia Edelman was in a position to dispose with more accurate and disaggregated data.	Edelman produced alternative indexes of the USSR economic growth for the years of central planning.	The results show that the alternative trajectory of the USSR economic growth reflects the original (official) data. In general there are differences only concerning the machine building sector.

Ruocho, S. (2001), Soviet Economic Growth in Retrospective: Evaluation of the Methodology's Calculations, Statistics Issues, journal, Moscow, No.1, pp. 26–36.	The author has been producing for years alternative estimates of the official Soviet statistics concerning national income and growth. At the	Ruoho's main point is to prove that the economic growth declared officially was comparable with that estimated by applying by the USSR statistics known alternative approaches. He applies mainly the index number analysis or the physical indicator Model (PMI) using officially published indicators of the USSR economy and trying to discover the influence of the unaccounted inflation.	Ruoho's results are close to those of Edelman.
Kouwenhoven, R. (1996), A Comparison of Soviet and U.S. Industrial performance 1928–1990. Research memorandum GD 29, Groningen Growth and Development Centre, May 1996.	The University of Groningen developed an alternative approach called International Comparison of Output and Productivity (ICOP) intended for measuring the levels of performance by industry of origin, using census and input/output data and other information on quantities produced and producer prices.	Within the framework of the ICOP, comparisons are made for the USSR industry and farming for the benchmark year 1987 and they are retrapolated for several decades. The year 1987 was chosen as a benchmark because of the availability of input–output tables for both the USSR and the USA.	The results of farming show that the USSR advantage was greater in terms of gross value added, as the USA ratio of inputs to gross output was higher than that in the USSR.

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