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**On Compilation of Long Term Series of GDP
for the Former USSR Republics**

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FOR THE FORMER USSR REPUBLICS**

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General principles of the methodology

1. Broadly speaking, the methodology of compilation of long term series of GDP for the former republics of the USSR requires retrospective compilation of major accounts of the SNA dealing with the different stages of movement of the GDP in the economic process. Theoretically speaking it is necessary to compile the following accounts of the SNA for the exercise:

- Production account
- Generation of income account
- Goods and services accounts.

Compilation of these accounts would make it possible to compute GDP by the three methods:

- production methods which implies summation of the value added originated in all industries (or sectors) of the economy (production account data are needed for this purpose);
- income approach which requires summation of the primary income paid out by the producers of goods and services which are the residents of the given country (the data of generation of income account are required for this purpose);
- final expenditure approach which requires summation of the expenditure on final consumption, gross capital formation and net exports (the data on goods and services account are needed for this purpose).

The computation of GDP by the three methods is useful not only for achieving better accuracy of the figures but for analysis of the important aspects of the economic process.

Implementation of this approach implies the retrospective compilation of the above mentioned SNA accounts for the former USSR republics from the scratch using whatever information available now for the exercise. In addition implementation of this approach requires solution of some conceptual issues stemming from the peculiarities in organization of the economy of the USSR in which some transactions were carried out, financed and controlled by the units under jurisdiction of the central government but not by the governments of the republics. In other words, the compilation of the GDP of republics from the scratch can not help to avoid the problem of allocation of some transactions controlled and financed by the Central Government/

To some extent this approach from the scratch was used by the experts of the USA Bureau of the Census (Ms Tretyakova and Mr.Kostinsky) who in 1992 released the report entitled "Gross National product by republics of the former USSR". The report contains the GNP figures for the former republics for 1997, 1998, and 1999 years. During this period GNP and GDP in the USSR were practically equal because the net factor income received from abroad was negligible magnitude. In any case in the above mentioned report there are no figures on the net factor income received from abroad.

The GNP figures for the republics were obtained from the scratch, that is the official data on the net material product of the republics were not directly used as a starting point for the computation. The GNP figures were estimated by using a) income data (generation of income account) and b) final use data (goods and services account).

The description of the procedures and the sources of data used for the exercise is rather short and fragmentary. The authors refer to the data on Balance Money Income and Expenditure of Population (BMIEP) which was used by them in order to obtain the important items of information that was not available before. It is worth noting that BMIEP was considered in the USSR strictly confidential document but unfortunately the authors did not clarify how they managed to obtain these data and where they can be found. At the same time it should be admitted that the BMIEP does contain the data important for the retrospective computation of the GDP and therefore every effort should be undertaken to find this source of information. The authors admit that “the greatest problem of using the multitude of data sources is a lack of consistency, both among data set for a given country and among data sets available for different countries”. The authors admit that some elements are derived as residuals and the total residual for the USSR as a whole is not equal to the sum of the residuals obtained for the republics. It should be reminded that some expenditure were financed by the central agencies of the USSR but the issue of their allocation to the republics is not discussed in the report in sufficiently detailed manner. The only exception is the output of the external trade and on this issue the authors of the report explicitly note that allocation of the earnings from foreign trade among the republics is problematic. The tables where GNP for republics is derived by final use method contain the data on the net exports of each republic however no clarification on the procedure used to obtain these figures is provided. It should be reminded in this context that the official figures on the net exports of the USSR as a whole did not include the estimates of foreign trade among the republics which theoretically speaking should be taken into account in the process of retrospective computation of the GDP of the republics if the SNA definitions are to be used for the exercise. Also the purchases of the residents of one republic at the territories of the other republics should be taken into account to obtain the estimates of consumption and net exports in strict consistency with the SNA rules. All in all, both figures and the methods presented in the report seems to require more detailed analysis and evaluation. The overall approach used in the report seems to have some advantages and disadvantages. The derivation of the GDP of the republics by final use method seems to be less appropriate versus the income method due to peculiarities in organization of the economy and statistics in the USSR.

2. Another approach for retrospective compilation of the GDP of the former republics implies the use of conversion keys which describes the steps needed to derive the GDP from the figures on the net material product computed in the former USSR republics on the basis of the concepts and definitions of Balance of National Economy (known in the West as the Material Product System). The methodology of construction of the conversion keys in question is described in some documents prepared by the UN Nations Secretariat for the UN Statistical Commission, however, these documents were produced before the release of the SNA 1993 and at present time they require some adjustments pertaining to treatment of some flows. It is worth noting in this context that these conversion keys were used by the UN secretariat to produce estimates of national

product of the USSR (in terms of the SNA concepts) which were needed for derivation of the scale of contributions of the member –states to the UN budget.

Derivation of GDP of the former republics from the NMP by using conversion keys can be carried out for the period of 30 years (from 1961 to 1991 year) for which official NMP figures for the republics are available. However, the conversion tables for this period contain some coefficients which could be useful for calculations for other periods. This refers, for example, to the ratio between NMP and GDP.

It should be noted that official NMP of the republics was obtained in the past by reconciling NMP for the USSR as a whole (computed in the USSR Central Statistical Office) and NMP figures originally produced by statistical offices of the republics. This reconciliation required using some conventions and arbitrary procedures when some flows computed only for the USSR as a whole had to be allocated to the individual republics. These flows refer, in particular, to expenditures for military purposes, estimates of external trade output and in general to reports of enterprises submitted to the ministries of the central government (union ministries) the State bank of the USSR etc. It is important to note, however, that the above allocations were carried out by the experts of the USSR statistical office who were very much familiar with the peculiarities of the USSR economy and statistics.

3. The methodology of construction of the conversion table is based on the comparative analysis of the underlying concepts and definitions of both systems of national accounting. This analysis shows that despite some serious differences between the SNA and the MPS there are a lot of common features. Thus, in both a distinction is made between:

- production, consumption and capital formation
- intermediate and final consumption
- gross output and value added
- computation of major indicators both in current and constant prices
- current and capital flows
- stocks and flows
- registration of flows on gross and net basis
- national income and national wealth
- consumption by households and government
- primary income and redistributive payments (transfers)
- subsidies and other types of transfers
- taxes on products and taxes on income and property
- reproducible and not reproducible assets
- fixed assets and inventories.

In both systems there is a category of consumption of the fixed capital (wear and tear of fixed assets). In both systems the major aggregates are valued at purchaser's prices.

These common features seem to justify the idea of linking the corresponding indicators of the both systems with the help of conversion keys.

4. The differences between the SNA and the MPS are normally classified into the two following groups:

- differences in fundamental underlying concepts and definitions
- so called incidental differences.

The fundamental differences refer to underlying concept of economic production and to the concept explaining the role of different factors in creation of new value.

The incidental differences refer to different treatment of some relatively small flows (losses, expenditures on business trips, classification of transactions with cattle, a differences in allocation of the construction in progress to fixed capital and material circulating assets respectively, etc); the incidental differences arise because the two systems of national accounting were developed independently from each other.

5. The differences in definition of economic production do not make it possible to compare directly net material product (national income in official soviet terminology) and gross domestic product because the former is defined to include only material goods and material services but excludes all other services whereas the latter includes all activities producing both material goods and all services. The differences in definition of economic production do not make it possible to compare internationally the rates of economic growth because the share of services in the economy changes over the period of time.

6. The differences in the definition of economic production in the two systems affect not only the indicators of production, but also the indicators of consumption (both intermediate and final), indicators used to describe primary and secondary distribution. For example, in the MPS final consumption of population is defined to include material input by the organizations providing non-material services to population (educational, medical, cultural services and so forth), while in the SNA these inputs are allocated to intermediate consumption of the units providing these services. In the SNA purchases of services by the enterprises are treated as intermediate consumption to be deducted from the output, whereas in the MPS purchases of these services by the enterprises are considered first as a component of value added and then as a redistributive payment to the organizations providing these services to enterprises.

7. It is convenient to use the scheme of the simplified output table to demonstrate the impact of the differences in definition of the economic production in the SNA and MPS on the content of NMP and GDP and their major components. In this scheme, shown below, a distinction is made between the material sphere (denoted M) and non-material sphere (denoted S). A distinction is also made between the flows of material goods and non-material services as well as between the components of the costs (intermediate consumption, consumption of fixed capital and value added).

i	j		M	S	Y			O
					K	C	E	
M			x_{11}	x_{12}	k_1	c_1	e_1	O_1
S			x_{21}	x_{22}	k_2	c_2	e_2	O_2
A			A_1	A_2				A_3
V	W	V_1	W_1	V_2	W_2			
	T		T_1		T_2			
	P		P_1		P_2			
O			O_1	O_2				

However, in the SNA capital losses are not deducted from capital formation, they are not recorded as a component of final use of GDP but are treated as an item in the other changes in assets account. In other words, different treatment of losses in the two systems of national accounting affect the comparability of the structure of NMP and GDP and therefore this should be reflected in the conversion tables. Let me clarify the above said by using a simple numerical example. Let us assume that two trucks are produced in the country and one of them was destroyed by the fire. In the MPS output equaled 2 will be balanced by the two entries showing capital formation equaled 1 and capital losses equaled 1. In the SNA output equaled 2 will be balanced by one entry pertaining to capital formation equaled 2. So in the conversion table showing transition from NMP to GDP we have to add capital losses to capital formation and to deduct them from the item of final use of NMP called losses. If, however, the task is to derive only GDP and not the components of GDP, then the above mentioned adjustment for capital losses can be disregarded.

Another flow which is treated differently in the SNA and MPS is the expenses of enterprises on business trips of employees. In the MPS they are not deducted from value added and are regarded as part of compensation of employees, while in the SNA a part of these expenses used to pay for transportation and hotels is considered as intermediate consumption and therefore is deducted from value added.

The differences in treatment of social insurance contributions in the two systems also needs to be reflected in the conversion keys. In the SNA this flow is included in the compensation of employees whereas in the MPS it is not and as a result the comparability of the operating surplus is affected. In the SNA this flow is defined to include actual and imputed contributions. This flow should be taken into account in the conversion keys.

9. The conversion keys which can be used for practical calculations are presented below:

Table 1. Conversion of NMP into GDP on the basis of income type data

<p>Net material product</p> <p><i>Minus:</i> Purchases of non-material services by enterprises of the material sphere</p> <p><i>Plus:</i> Wages and salaries in the non-material sphere</p> <p><i>Plus:</i> Actual social insurance contributions in the non-material sphere</p> <p><i>Plus:</i> Imputed social insurance contributions in the non-material sphere</p> <p><i>Plus:</i> Taxes on production and imports in the non-material sphere</p> <p><i>Plus:</i> Net operating surplus in the non-material sphere</p> <p><i>Plus:</i> Net mixed income in the non-material sphere</p> <p><i>Plus:</i> Consumption of fixed capital in both spheres of economy</p> <p><i>Minus:</i> Expenses on hotels and transportation during business trips of employees in the material sphere</p> <p><i>Plus:</i> Adjustment for FISIM</p> <p>Gross domestic product</p>
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Among the items shown in the table 1 it is most difficult to find the data with respect of the purchases of non-material services by the enterprises of the material sphere (payments for renting of space, of machinery and equipment, payments for financial services, for juridical services, for sanitation services, for advertisements, etc) Some conventions seems to be unavoidable for estimation of this item.

Table 2. Conversion of NMP into GDP on the basis of final use data

Net material product	
<i>Plus:</i>	Final consumption of non-material services by households
<i>Plus:</i>	Final consumption of non-material services by general government
<i>Plus:</i>	Final consumption expenditure by the State Bank of the USSR
<i>Plus:</i>	Final consumption of non-material services by social organizations
<i>Plus:</i>	Net capital formation of non-material assets (originals of artistic works, etc.)
<i>Plus:</i>	Consumption of fixed capital in both spheres
<i>Plus:</i>	Net exports of non-material services
<i>Plus:</i>	Imputed dwelling services of owner-occupiers (minus wear and tear of dwellings used by their owners for own consumption)
<i>Minus:</i>	Losses of material circulating assets
<i>Plus:</i>	Adjustment for FISIM
Gross domestic product	

As was noted above, in the context of compilation of GDP of the republics by final use method it is problematic to derive for each republic the figures on the net exports, especially taking into account the flows of goods and services between the republics. However, in the context of the table 2 only data on the net exports of the non-material services are required and the exports of these services was very small and can be disregarded for the simplification sake. Another comment refers to treatment of the State Bank of the USSR At present time the SNA methodology recommends to allocate the output of Central Banks to the intermediate consumption of the commercial banks. In our view this treatment would not be appropriate for the computation of GDP of the USSR where the State Bank was an integral part of the government.

Table 3. Conversion of NMP into GDP on the basis of data on gross output

Net material product
<i>Plus:</i> Output of market non-material services produced for households
<i>Plus:</i> Output of market non-material services produced for enterprises, general government and social organizations
<i>Plus:</i> Output of non -market services produced by general government
<i>Plus:</i> Output of non-market services produced by social organizations
<i>Plus:</i> Imputed housing services produced by the owner-occupiers
<i>Minus:</i> Intermediate material input in the non-material sphere
<i>Minus:</i> Purchases of non-material input by the non-material sphere
<i>Minus:</i> Purchases of non-material services by the material sphere
<i>Plus:</i> Consumption of fixed capital in both spheres of economy
<i>Minus:</i> Payments for hotels and transportation during business trips of employees in both spheres of the economy
<i>Plus:</i> FISIM
Gross domestic product

It should be noted that the above conversion tables will have to be modified and expanded if it is decided to compute retrospectively not only GDP but also the components of the GDP. For example, it would require to take into account the differences between the SNA and MPS in treatment of capital losses which are not part of the capital formation in the MPS but are not excluded from gross capital formation in the SNA.

Sources of information

10. The sources of data needed to use the above conversion tables are described as follows.

- The official figures on net material product of the former republics of the USSR for the period from 1961 to 1992;
- The data on purchases of services by households from the balance of money income and expenditure of households for years when this balance is available, for other years using extrapolation procedures;
- The data on employment in the non-material sphere;
- The data on wages and salaries in the non-material sphere;
- The data on material input in organizations of the non-material sphere from the MPS, compiled for the USSR and distributed among the republics by using some conventions;
- The data of the balance of fixed assets on consumption of fixed assets in the non-material sphere;
- The data of input–output tables compiled in the former republics of the USSR;
- The data on execution of the state budgets of the republics;

- The estimates of the ratio between GDP and NMP for selected years for the USSR;
- The data on expenditures of the organizations of non-material sphere contained in the records submitted by them to the USSR Statistical Office for selected years (from archives);
- The data of experimental compilation of main national accounts for the USSR for 1988-1990 carried out jointly by the CIS Statistical Committee and OECD;
- Official figures of the GDP (by the components) of the CIS countries produced by their statistical offices for 1992-1995 years.

The data of the Balance of Money Income and Expenditure of Population

11. Before 1960 the NMP estimates have not been performed by the union republics in the systematic way. However, the data on NMP for some years can be come across at the publications. In 1999 the study of historical statistical publications of data for republics of the Central Asia was carried out by the CISSTAT. It revealed, for example, NMP estimates for Uzbekistan for 1928, 1932 and 1937 years at prices of 1926/27 years.

The results of the above study allow to make some conclusions about the sources of information available for historical GDP estimates.

In the period 1925-1960 the branch statistics of the republics produced the following data:

- output of industry and agriculture;
- capital investment;
- trade turnover;
- cargo and passenger transportation;
- number of employed persons by industries.

Additional information which can be also used contains:

- production of selected goods in physical terms;
- procurement of agricultural goods (in value and physical terms);
- prices of selected goods;
- revenue and expenditure of the state budgets by functions.

These data can be found in the statistical compendiums which were published regularly by the USSR Goskomstat and by the republican statistical offices since the second half of the 50th. Before this statistical compendiums were issued from time to time, as a rule in connection with some anniversaries. The published data contain some gaps especially for the early years of this period. During the war period (1941-1945) the Central Asian republics did not suffer from the occupation, their statistical offices functioned normally and the data referring to this period are available.

12. It should be also taken into account that the formation of the union republics of Central Asia went through several stages. After October revolution in 1918 Turkestan autonomous republic was organized which included in fact Uzbekistan, Tajikistan and Turkmenistan. Kazakhstan together with Kyrghyzstan were then the part of Russian Federation as the autonomous republic. In 1924 Uzbekistan and Turkmenistan separated from each other and became the union republics, while Tajikistan still remained within the Uzbek Union Republic as autonomous republic. It separated and became the union republic in 1929, while Kazakhstan and Kyrghyzstan - only in 1936. Until the late

1970-ies transfers of some regions between the republics took place from time to time which caused the revision of the time series.

13. The situation with the information referring to the beginning of the 20th century is more complicated. The Central Asian countries were entering the Russian empire by separate regions during the second half of the 19th century. Since the end of the 19th century for these regions the annual reviews were issued which contained a limited number of statistical indicators, mostly in physical terms. They included, for example, such data:

- crop of cotton, fruits, grain;
- production of wine;
- quantity of livestock by type;
- production of wool and skins;
- production of carpets and textiles;
- extraction of mineral resources;
- catch of fish and sea products;
- cargo transportation;
- a number of educational institutions, of students;
- a number of patients of health care institutions.

The data available in value terms are as follows:

- trade turnover;
- expenditure on construction and repairs of roads and other objects;
- expenditure from the state budget on health care, education, general administration;
- taxes and fees;
- prices on selected goods.

These data show that economy activities at this period was at the very low level of development: the agriculture prevailed, the industry was represented mostly by mining and artisan activities performed by small units; the number of goods produced was rather limited; services were in the primitive state. In principle, this allows to make some rough estimates on a limited information base. However, this will require the enormous and scrupulous work which implies the following steps:

- 1) searching the sources of information covering as long period as possible and the whole region in question. The above mentioned reviews and some other publications can serve as sources of information. Such sources can exist in the central libraries such as Lenin Library or Historical Library in Moscow as well as in the state archives;
- 2) systematizing and arranging the information on indicators needed;
- 3) allocation of information to corresponding countries;
- 4) estimating the components of GDP.

14. 1913 is the last year before the revolution, for which the most complete information exists. During the period 1914-1924, when such events as the First World War, October Revolution and the civil war took place, no regular statistical observations existed and only rare selected data could be found.

Brief conclusions

15. The estimation of the historical GDP for the former republics of the USSR represents rather complicated task and implies using specific approaches for various periods. Compilation of the retrospective estimates of the GDP of the former republics of the USSR requires collection of data from various sources, their analysis and systematization. These sources of data are often incomplete and differ in terms of coverage of flows of income and expenditure, underlying definitions and classifications. As a result, some procedures will need to be used for matching data collected from different sources in order to secure their better consistency. In this context some conventions and assumptions may be required.

In principle the retrospective computation of the GDP of the former republics can be carried out either i) from the scratch by compiling the relevant SNA accounts or ii) by using the conversion key. In principle implementation of both approaches is supposed to secure the results which are very close, if not identical, to each other. In practice both approaches seem to have advantages and disadvantages. It appears that they could be combined and supplement each other. For example, it appears that the from the scratch approach could be used for two-three years so that the results could be compared with the figures obtained with the help of the conversion key. This would make it possible to identify the weak points in the two sets of computations and introduce some adjustments if needed. The advantage of the conversion key is that since the net material product accounts for about 70 percent of the GDP the amount of data needed for computation is relatively smaller as compared with computation of GDP from the scratch. Another advantage of the conversion key approach is that the problem of allocation of some expenditure financed in the center among the republics had been handled by the experts of the USSR statistical office. The choice between the two approaches also depends on the resources (both financial and labour) available to the project.

It appears that the final use data approach to be used for derivation of the GDP of the former republics is less appropriate in this context irrespectively of whether conversion key or from the scratch approach are used. The major reason is the problem of estimation of the net exports for each republic. The estimation of the government final consumption of the republics which relies on the data on the execution of the budget can also be problematic due to peculiarities of these data in republics.

It is essential to decide whether the objective of the project should be estimation of the GDP as a whole or also the components of the GDP. The decision on this matter will have practical implications on collection of primary data and the costs of research.

The most important component of the project is the search of data which are not immediately available. As was mentioned above, it would be very useful to find the BMIEP which contains a lot of information needed to compile GDP by using both conversion key and from the scratch approach. This balance was considered in the past as strictly confidential and was disseminated in the limited number of copies.

The estimation of the long term series on the economic growth of the former republics of the USSR implies the need to derive appropriate deflators of the GDP. This topic has not been discussed in this paper and needs separate research. In this context critical analysis of the CPI computed in the USSR would be required. The deflator for

non-market services provided by the government both to households and a society as a whole will have to be estimated somehow.

The computation of the GDP of the former republics of the USSR should be based on the concepts and definitions of the SNA 1993. It recommends, among other things, to estimate the underground economy which existed in the USSR but never included **explicitly** in the official estimates of the net material product. However, it appears that some components of the underground economy were **implicitly** included in the net material product of the USSR; for example, some income originated in the underground economy was legally spent on purchases of goods and these purchases were included in the consumption expenditure as a component of the net material product. It appears that it would not be feasible for practical reasons to make retrospective estimation of the value added originated in the underground economy of the USSR and introduce some adjustments to the GDP.

It would seem to be useful to keep eye on the current work on revision of the SNA 1993 because some new features of the revised SNA may have impact on measurement of the GDP or its structure.

It is well known and documented fact that in the USSR there were two levels of prices: the relatively high level of prices of consumer goods and relatively low level of prices of means of production (raw materials, fuel, energy, equipment and machinery and so forth) and this phenomena had impact on the industrial structure of the net material product and the rate of the economic growth. Some scholars in the West were of the view that this two levels price system distorted the rates of the economic growth of the USSR and suggested some procedures intended to overcome this distortion. For example, the world famous American scholar by name Bergson suggested to use for analysis of the USSR economy so called “adjusted factor cost” in order to eliminate the distorting effect of the system of the two level prices; the adjusted factor cost was derived by redistributing turnover tax and profits in order to secure more equal distribution of these components among the various industries. (see, Economic Statistics for Economies in transition: Eastern Europe in 1990s, sponsored by the U.S. Bureau of labor statistics and Eurostat, Washington, 1991, Chapter 4 by Bergson entitled “Real National income Measurement: In Soviet Perspective”). This approach was used by the CIA. The famous American Scholar by name of Rosefielde was very critical of the use of the adjusted factor cost” as a rather subjective instrument which had nothing to do with economic reality and he showed in his comments on the above Chapter 4 by Bergson the use of “adjusted factor cost” for assessment of economic growth of the USSR had in practice very small effect as compared with measurements in actual prices. Our view on this topic is that although the price system in the USSR indeed distorted the measurements of some magnitudes, any attempt to construct “correct prices” (which would be economically meaningful and reflect economic reality) would be very subjective because these “correct prices” did not exist and there can be many ways to estimate “correct prices”. In our view the concept of “correct prices” derived with the help of some conventions, arbitrary assumptions and imputations can be used only for alternative analysis which could be considered only as a supplement to the analysis based on actual prices.