

## QUESTIONS OF METHODOLOGY

### THE INDEX ANALYSIS OF FERTILITY IN THE SYSTEM OF PROCEDURAL GUIDELINES FOR MUNICIPAL STATISTICS

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The authors substantiate possibilities that index method presents in the analysis of fertility in the Leningrad region in general and by municipal districts for 2004–2014 (on the example of estimations of dynamic characteristics of special and age-specific (partial) fertility rates). The groups of municipal districts (that differ both in terms of special fertility rate and the ratio of changes of partial fertility rates in various age groups) were selected.

It has been established that the overall trend of displacement of the highest fertility indicators from the age of 20–24 years to 25–29 years old failed to manifest itself in all the municipal districts. The paper presents the techniques and calculation results of the index analysis of specific birth rates by municipal districts of the Leningrad region. The article reveals the differences in demographic situation between the municipal districts according to the degree of influence of factors on the overall change in the special fertility rate. The authors demonstrate that the covariation index, that reflects synergistic effect of interrelation between gender and age changes in gender and age specific fertility rates and the age structure of women of childbearing age, can take a value exceeding other private indexes. This effect, as well as the impact of structural changes in the age distribution of women, was identified specifically at the level of municipal districts. However, this conclusion is relevant in the broader context of the study of age structure affect on the demographic processes.

*Keywords:* municipal statistics, index method, factor analysis of fertility, general fertility rate, special fertility rate, age structure, synergistic effect.

*JEL:* C43, J11.

### METHODOLOGICAL PROBLEMS OF ESTIMATING GROSS REGIONAL PRODUCT IN RUSSIA

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After a brief description of the role of the gross regional product (GRP) in the analysis and management system with regard to modern Russian conditions, the authors on the basis of a critical examination of the pressure points of regional macroeconomic statistics have formulated their proposals for improving information and methodological support of gross regional product calculation.

The article describes differences in the calculation of gross domestic product and gross regional product, analyzes their causes and possible ways to harmonize the statistics of final product at general federal and regional levels. Special attention is paid to the quality of statistical data in the context of opportunities for implementation of the recommendations of international statistical standards for a more complete and adequate display of the results of economic activities, identified in relation to the territorial administrative units such as constituent entity of the Russian Federation.

Experimental calculations related to additional valuation parameters for GRP volume of Moscow and St. Petersburg, as well as the interpretation of the results of comparative analysis of the sectoral structure of gross value added produced in Russia and the sectoral structure of the gross regional product (during 2012-2014) are shown to have independent significance.

*Keywords:* gross domestic product, gross regional product, gross value added, financial intermediation services, estimation of nonobserved economy, «retained gross added value».

*JEL:* E01, R11.

## **MATHEMATICAL AND STATISTICAL METHODS IN ANALYSIS**

### **IAN ANALYSIS OF CONSTITUTIONALITY OF THE ECONOMY USING THE METHODS OF CLUSTER AND FACTOR ANALYSIS\***

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The article formulates methodological approaches to determine the level of constitutionality of the national economy. The economy's constitutionality is considered in the context of optimizing the combination of the economic feasibility and the level of the constitutional development of the country. To assess the level of economy's constitutionality are used factorial and cluster analysis tools. Seven components of the index (that were presented in 2015 as part of the report prepared by non-governmental organization Freedom House) calculated for the 76 countries are proposed as cluster criteria. The following characteristics are used for the complex analysis of constitutionality of the considered countries' economies: accessory of countries to clusters, distances of each country from the cluster centers, values of the latent factor, ratings of the countries on this indicator, and also distinctions in levels of constitutionality of the countries' economies in comparison with the country-criterion.

An important feature of the presented approach is the possibility of complex use of cluster and factorial analyses tools. From the received results should be singled out the use of the factorial analysis for creating generalized indicator for constitutionality of the economy, along with the use of cluster analysis tools to assess the degree of constitutional backwardness of national economy.

*Keywords:* constitutional economy, cluster analysis, factor analysis, generalized index, constitutionality level assessment.

*JEL:* C43, C82, C88.

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# STATISTICAL ANALYSIS AND MODELING OF THE VARIABILITY OF WASTEWATER QUALITY IN THE SYSTEM OF INDUSTRIAL WASTEWATER

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This article presents results of the study on economic and statistical justification for improvement of water and environmental management of an industrial enterprise. As a main tool the authors applied - was the method for modeling time series using stationary stochastic processes. The models of the integrated auto-regression and moving average, seasonally adjusted were used as the base. The models of fractionally integrated processes and models of autoregressive conditional heteroskedasticity were tested to reflect the long memory in time series of indicators. Analysis of dynamic links was based on vector autoregression model.

The authors demonstrated that for all the analyzed indicators of pollution, along with the apparent lack of mid-level trend, there is a considerable variability of values, which manifested in both annual and non-seasonal cyclical and structural changes. The longstanding interrelations between the individual indicators were revealed - for most of them the damping effect of a single excess discharge of any other indicator lasted for at least a year.

The article proves sufficiency of the applied econometric tools which have determined the possibility for reliable forecasting the wastewater quality along with optimization of the measures for preventing excessive discharges. Identifying the character of the periodicity of the discharges with account to seasonality, as well as the synergistic effect of contamination indicated the possibility of increasing the efficiency of water treatment process by selecting the optimum costs. The identification of the inertia of the processes of pollution of individual indicators, testified to their possible aggregation from different sources to the necessity of strengthening of control over wastewater discharges for each anthropogenic source and the natural background contamination. Determining the dynamic interrelations between the individual polluters justified a reasonable opportunity to improve the pool cleanability with regard to the structure and duration of those relations.

*Keywords:* statistical analysis, quality of wastewater, time series, multidimensional analysis, volatility clustering, long memory, Hurst exponent, Granger causality.

*JEL:* C22, C32, Q53, Q57.

## IN THE COURSE OF DISCUSSION

### ON THE CALCULATION OF VALUE ADDED FOR PEASANT (FARM) ENTERPRISES IN RUSSIA

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This article presents critical approach to the proposal made by Tarasov N.G. and Eryukova I.D. (published the journal «Voprosy statistiki», no. 11, 2015) regarding the calculation methods for value added of peasant (farm) enterprises in Russia on the basis of form of statistical accounting № 1-KFKH implemented by the Ministry of Agriculture of the Russian Federation.

The authors demonstrate errors in the proposed calculations which were caused by the lack of initial information, the fact that indicator of gross output (comprising of marketable and non- marketable parts)

was substituted for sales proceeds from only marketable products, as well as the lack of data on the actual intermediate consumption at current prices, including intra-enterprise (farm) needs.

The experience of Goskomstat of Russia in scientifically-based calculation of value added of peasant (farm) enterprises for 1995-1997 is evaluated positively. Based on the analysis of the data from 1999 survey on standard and large peasant (farm) enterprises it is proved that the selling prices of their products are significantly higher than those in agricultural enterprises, at prices of which gross output of peasant (farm) enterprises is currently estimated, thus skewing their place and role in the agricultural economy and also undermining their efficiency.

The authors propose to make improvements to the statistical reporting of the Ministry of Agriculture of the Russian Federation (it being the subject of official statistical accounting) towards the calculation of gross output and intermediate consumption of peasant (farm) enterprises at actual current prices of this important and promising category of enterprises (farms).

*Keywords:* peasant (farm) enterprises, efficiency, value added, information support product assessment.

*JEL:* C82, Q10, Q13.

## **PAGES OF HISTORY**

### **THE 90<sup>TH</sup> ANNIVERSARY OF THE FIRST BALANCE OF NATIONAL ECONOMY: ORIGIN AND EVOLUTION OF MACROECONOMIC STATISTICS OF RUSSIA**

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The article contains contemporary interpretation of underlying concepts, definitions and classifications of the first balance of national economy (BNE) compiled by the Central Statistical Board of the USSR for 1923/24 financial year; the content of major tables of this balance is considered in considerable details; it is noted that compilation of this balance meant the birth of the Russian macroeconomic statistics. Evolution of macroeconomic statistics during Soviet Union period is considered at some length. It is emphasized that experience with compilation of the BNE obtained during many years secured a good basis for relatively fast transition to the SNA. The description of the experience in implementation of international standards in national accounting is presented. The article considers the concepts and methods used for transformation of business accounting and statistics in accordance with international standards which were outlined in the Government program on transition to the system adopted in international practice; the requirements for analysis of market economy were taken into account in this program; the major results of implementation of this program are also considered in the article.

A considerable attention is paid to discussions on principle and specific distinctions between BNE and SNA used for description of economic process in countries with various organization of economy. It is clarified that despite important conceptual differences between the BNE and SNA there are many similarities between them in respect of methodological approaches to description of economic process.

The article notes sufficiently high potentiality of Russian school of balance statistics which secured gradual implementation of international standards in national accounting in Russia.

*Keywords:* balance of national economy (BNE), macroeconomic statistics, concept of material production, indicators of production of national product, input-output tables, system of national accounts (SNA), boundaries of economic activity, system of macroeconomic indicators, conversion keys.

*JEL:* C67, C82, E01, E11, E12.