METHODOLOGY OF USING STATISTICAL INDICATORS IN MACROECONOMIC ANALYSES

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Abstract   *The system of macroeconomic indicators development has been imperative in order to meet the requirements of the characterization and business social - economic analysis at various organizational levels and for the whole national economy. Targeting the mass phenomena characterization, statistics draw up specific methodologies and techniques. The main characteristic of the mass phenomena and processes is the variability of individual forms of manifestation in time, space, and at an organizational level. The approach of these individual forms of manifestation includes the need for building a large number of statistical indicators. The statistical indicators are information carriers, with a genuine content, a determined objective and can be used either to characterize sides of certain processes and/or mass phenomena, as for their structure and volume, or as a system of indicators, in order to analyses the same phenomena or mass processes in their mutual interdependence.*

1. Introduction

The content and forms of the statistical indicators, as well as stage of their elaboration and usage in statistical phenomena characterization, are closely related to the functions they may have. The statistical indicators fulfil several functions: the measurement function, the function of comparison, the analysis function, the synthesis function, the assessment function, the function of checking the statistical assumptions and/or of testing the used parameters significance.

a) The measurement function is derived from the particular features of the statistics study that analyses the quantitative aspects of the qualitative determinations of the mass phenomena. They are subject to statistical laws action in concrete terms, variable in time and space.

The quantitative characterisation of phenomena, in terms of number, can be achieved either by a direct observation at the level of each unit, or through an operation of aggregation or disruption of the statistical data in horizontal or vertical structure of the informa–tional statistic system. Further to these operations there are obtained absolute indicators expressed in absolute numbers, quantities, values etc., measuring a statistical unit or an entire community. As these absolute indicators are expressed in concrete units of measure, they are highly ranked in the system of indicators that characterise the entire statistic collectivity.

The absolute indicators, coming directly from the input data in the informational statistic system, will be successively processed, by means of computing models and statistical analysis, resulting in other derived indicators with a much more output power of knowledge.

Constant numeric relations both on horizontal and vertical plane are determined among the statistical indicators. For this reason, the statistical indicators must be approached from a systemic point of view thus ensuring the opportunity to characterize the diversity and complexity of mass phenomena and processes;

b) The function of comparison occurs whenever it is imperative to know all the changes which occur in the volume, structure and dynamic phenomena which are the subject of the statistics study. These changes can be noticed only by directly comparing the absolute indicators, either as a difference or as a ratio*.*

As a difference, there can be compared only absolute indicators with the same content and they are expressed in the same units of measure.

This comparison as a difference provides absolute indicators expressed in concrete units of measure in accordance with the compared phenomena.

As a ratio, there can be compared either the same indicators or different indicators, but there must be an interdependence relation between them. The comparison on ratio basis provides some derived indicators expressed in abstract units as coefficients, percentage, profile etc.

c) The analysis function is closely connected with the characteristic of the complex variables which can be broken up, by means of a multiplicative relation, into a product of several factors, a product of several components, or in an amount of several factors or the sum of several components.

By the means of statistical indicators analysis, there can be examined the relations between part and whole or between each factor and the result.

The analysis function is also encountered in statistics when the different individual values are present and provide real content to the calculated synthetic indicators. It is about totalizing absolute indicators or average indicators formed on the basis of individual units recorded with different values.

By the means of analytical function there are found and eliminated those cases which significantly deviate from the specific rule regarding the studied phenomena variation. These are the so-called „absurd cases";

d) The synthesis function is closely connected with the imperative to summarize the individual values in a single numeric expression, which thus becomes what is essential and typical for the entire mass of phenomena of the same kind. Using the synthesis function, the statistical collectivities may be studied as a whole, with the aid of indicators expressing tendency, the lawful expressing ways of all the individual units. As a general rule, these indicators shall be calculated in the form of average values, with direction of trend only if the data are homogeneous.

Nevertheless, the synthetic indicators do not refer only to the average values, but also to the macroeco–nomic aggregates. Most macroeconomic aggregates: gross domestic product, gross national product, national income etc., are synthesis indicators, the outcome of a vertical and horizontal aggregation process of the national economy components.

e) The assessment function is specific to statistical indicators. Statistical assessments are valid both for statistical characteristics taken independently and for statistical characteristics which will be carried out according to the prevailing factors. In this situation, the indicators obtained will be expressed in the form of arithmetical mean, and will be regarded as an assessment equation.

The assessment function occurs in the statistical survey theory as well, when the appropriate indicators of the general collectivity are assessed, considering the indicators calculated in the representative sample.

f) The function of checking the statistical assumptions and of testing the used parameters

significance is frequently used in statistical investigation, in particular when the data come from a statistical survey. As the mass phenomena are variable in time and space, it is necessary to separate influences of the systematic factors from the accidental ones and to place their action in a hierarchical system..

There has to be stressed that the application of the verification methods for the assumptions and testing the significance of indicators calculated in the sample relies on the probabilistic interpretation of the phenomena and its purpose will be to keep the most appropriate model, but it also relies on the representativeness of the calculated indicators.

2. Ways of comparing the statistical indicators

The mass phenomena occur and evolve as phenomena with a high degree of complexity, with the result that they are backed by a system of partial and general indicators, factorial and resultative ones, with points of view combining several functions of knowledge with simple and multiple quantitative and qualitative relationships. At the same time, the statistical indicators functions are present in a permanent complementarity so that in the end, the analysis function occurs, as a rule, together with the synthesis function, or the assessment function is complementary with the function of checking the assumptions and testing the used parameters significance, and the results are to be found in the report of statistical conclusions.

For example, the international comparison of the development level reached by different countries and the level of their economic structures finds it necessary to use the statistical indicators in macroeconomic analyses. When the European states integration increased the concerns in the international comparisons area widened.

These comparisons were compulsory both in national statistical institutions and in the specialized international organizations. Such a field is and characterization of the standard of living and quality of life both in national and international statistics. Therefore, it is imperative to establish and develop concepts and methodologies to enable international comparisons.

The international comparison regarding the different countries degree of economic development can be carried out on the basis of comparable indicators in a physics expression by comparing the recorded production and consumption per capita concerning a range of basic products.

Thus, two lists will be made: one with the countries going to be compared and the other one with the basic products. It is necessary that these products must be representative of all the countries covered by

comparison and as far as possible in terms of quality.

Thereafter, in order to draw conclusions on the level of development, on the living standard and the quality of life, after having checked the indicators comparability as a method for the data collection and processing , a country will be considered as a basis (with a high level of development), and levels achieved by other countries should be compared with the country taken as standard. For this purpose there will be used the coordination relative sizes (Y):

$$Y_i = \frac{X_i}{X_E} \cdot 100 \qquad (1)$$

Where:
X_i – indicator level of the country ii;
X_E – indicator level of the standard country.

Such individual comparisons, although necessary, are less conclusive. A satisfactory comparison can be carried out using the full system of macroeconomic indicators calculated in the S.C. N. , a system used by most of the worldwide countries.

The international comparison of the level, structure and development rate on the basis of macro-economic indicators requires solutions for two essential problems, namely:

✍ ensuring the indicators comparability from the point of view of the content and the calculation methodology and their scope of coverage;

✍ ensuring comparability of indicators from the point of view of unit values (monetary) in which is expressed, in the case of parametric values indicators.

Currently, since most of the countries and international organizations are using S.C.N. for macroeconomic calculations, the first problem is solved. The countries applying S.C.N. determine macroeconomic indicators, also for the living standard and quality of life, taking into account a uniform conception and methodology. Some non-essential differences arising as a result of special features of the system of national accounts are relatively easy to erase.

In the case of parametric values indicators the essential and very difficult issue is the expression of indicators in a single currency. The evaluation of these indicators in a single currency can be carried out on two ways:

1. Considering the rate of exchange, a practical method, but which may affect actual values, as the exchange rates do not reflect - as a rule - the purchasing power of the currency. This can be explained by the fact that - on the one hand - the operative event for the exchange rate is influenced only by a small number of goods, which are covered by commercial relations between the respective countries,

and - on the other hand - the exchange rate is strongly influenced by the various "gambles" on the stock exchange. That is why the indicators assessment in a single currency on the basis of the exchange rates is not a recommended method for performing accurate international comparisons concerning the levels, structures and development rates of various countries.

2. Assessing the purchasing power parity of the currency in the compared countries. This method of assessing the macroeconomic indicators in a single currency is more indicated to use, as compared to the method of the exchange rates. It consists of the use of price indices calculated on the basis of the prices of goods and services in the country and calculations of comparison price of same material goods and services in the country whose currency was decided to be used for expressing macroeconomic indicators (as a general rule, US dollar)**.**

For the calculation of the price indices of the products of the country compared to the prices of those products of another country is the same as in the situations when they compare the prices of two different periods. The difference consists only in the fact that the products prices of the two countries will be weighted either to the quantities of the country (for example, the country (A), or to the quantities other countries (for example, country B). The calculation relations will be:

$$IP_P^{A/B} = \frac{\sum p_A q_A}{\sum p_B q_A} \qquad (2)$$

$$IP_L^{B/A} = \frac{\sum p_A q_B}{\sum p_B q_B} \qquad (3)$$

Between the results obtained by the use of the two price indices there are no differences in the value system due to the application of the weights. In order to eliminate these influences there will be calculated a price index of type Fisher, as an average of the indices of geometric Paasche and Laspeyres-type.

$$IP_F = \sqrt{IP_P IP_L} = \sqrt{\frac{\sum p_A q_A}{\sum p_B q_A} \cdot \frac{\sum p_A q_B}{\sum p_B q_B}} \qquad (4)$$

Regardless of the type of the used indices (Paasche and Laspeyres or Irving Fisher), their calculation is very difficult, and can only be performed by national and international statistics organizations. In any case it is necessary to establish the classification of products and services, the volume of consumption and the variation in their prices, so that the methodology for the acquisition of such an index contains a series of transactions which, in short, can be previously planned

as follows:

✎ composition of list of products and services to be taken into account in the index calculation. The list includes products and services consumed in the compared countries. A special concern must be to ensure equivalence, in terms of quality of products and services taken into account. Products which differ qualitatively must be converted - by means of calculations - into equivalent products in terms of quality;

✎ composition of certain groups of products on the basis of those included in the list. Groups shall be made up by bringing together similar products and services;

✎ prices recording in each country for the products and services contained in the list and the calculation of individual price indices of the country compared to the prices of other countries.

On the basis of the data regarding the prices and quantities in each country there will be be calculated the aggregated price indices into groups and for the products and services contained in the calculation as well.

The price indices thus calculated show purchasing power parities of the national currencies in the compared countries. In other words, they express the ratio between the necessary monetary units of the country A and of the country B, for purchasing the same quantity of products. These indices show, as a matter of fact, the relationship existing between currencies of the countries concerned.

After recalculation of the macroeconomic indicators expressed in national currency, there may be carried out a series of calculations of international comparisons. Hence there are calculated sizes characterizing directly the living standard and quality of life and indicators conditioning this aspect:

✎ Domestic Product, National Income, consumption per capita and clues of these indicators, starting from the levels per capita recorded in other countries;

✎ structure on different branches and dynamics of the resultative indicators, compared with structures and dynamics recorded in other countries;

✎ efficiency of the production factors (labor productivity, fixed capital efficiency, goods consumption efficiency) and their comparison with specific indicators of efficiency in other countries;

✎ the existing resources used during the period of calculation.

The calculations by comparisons between countries, carried out on the basis of macroeconomic indicators of efficiency and results between countries, expressed in an international currency, enable us to draw certain conclusions on the development level of the countries, on the effectiveness of production factors, on the development rate, on the living standard, as well as on the existing disparities between the compared countries.

3. Conclusions

In order to improve the relevance of the statistical indicators system used in macroeconomic analyses, there should be elaborated certain indicators and statistical data going to reflect the status and the evolution of mass socio-economic phenomena and to develop a very complex and powerful system of macroeconomic indicators, to grasp the progress of the factors affecting the socio-economic phenomena and processes at macro-economic level.

References

1. Biji E.M., Gogu E (2009) „Teoria şi tehnica sondajului statistic", Editura Oscar Print, Bucureşti

2. Institutul Naţional de Statistică (2011). *Repere economice şi sociale regionale. Statistică teritorială*

3. Institutul Naţional de Statistică (2013). Ancheta bugetelor de familie

4. *** www.insse.ro

5. *** www.gfk-ro.com

6. *** www.iccv.ro