# ARTICLE

# FEATURES OF ASSESSMENT OF REGIONAL BUSINESS CYCLES IN INTERRELATION WITH MACROCYCLES: RESEARCH METHODOLOGY

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## ABSTRACT

*From the point of view of scientific and practical significance, the issues revealing the interaction features of different-scale economic cycles are extremely relevant, especially in the context of studying the issues of cyclical development of regional socio-economic systems and their integration into generated macrocycles. This methodological issue is the subject of this article. The research object is the macro- and mesoeconomic cycles. The research subject is the methodology of formalized assessment of the identification of relationship between multiscale cyclic fluctuations of economic systems. As a result of the proposed and scientifically based approaches, it is revealed the role and significance of assessing the expectations of economic agents in the process of constructing phase shifts of the cyclical development of economy. Relying on this research paradigm, we formed the methodological approaches that allow quantifying the level of interconnection between cycles of various orders and scales. The implementation of this approach is based on measuring cyclic fluctuations on the basis of determining an integral index that estimates the expectations of business entities regarding future transformations in the system of socio-economic transformations and forming phase shifts in the cyclical development of economic systems of the meso- and macro levels.*

## INTRODUCTION

The use of traditional mechanisms and tools for diagnosing cyclical fluctuations in the economy does not fully contribute to the objective modeling of economic processes. This makes it necessary to develop new (adapted to new realities) methods for assessing the economic cycles and key parameters that trigger their development paths. Moreover, these methods shall be based on a wide array of factors involved in the processes of generating cyclic transformations in the economy. At the same time, in accordance with the basic principles of economic and mathematical modeling, "the use of a large number of predictors in models leads to a series of known problems" [1, 2]. In this regard, it seems appropriate to use a limited number of exogenous factors in the developed models of economic cycles, without reducing the impact potential of the indicated wide group of explanatory factors at the same time. In our opinion, the use of predictor that characterizes the expectations of economic agents organically fits into this concept, which reflects the transformation of many factors of an institutional and conjunctural nature in a concentrated form.

It should be noted that the solution of such a problem, focused on the development and justification of methods for identifying the relationships between different-scale economic cycles, is a very difficult process thus far. First of all, this is due to the factors of different scale and content that generate various kinds of cyclical fluctuations in the economy. For example, the theory of cycles proposed by Kondratiev is based on the empirically proven assumption that the phase change is a consequence of the mechanisms of "capital saving, accumulation and dispersal" [3], required for updating fixed assets (launching mechanisms of scientific and technological progress). The theory of medium-term cycles is based on fluctuations in the investment volume in fixed assets. The theory of short-term cycles is based on fluctuations in the level of interest rates on the financial capital market, etc. Thus, all the theories considered have a different set of features and factors affecting cyclic fluctuations, which significantly complicates the process of solving the problem of correlation and comparison of economic cycles of various orders.

At the same time, the issue revealing the interconnection of cycles of different scale and amplitude is the most acute and debatable in the economic literature at the present time. An understanding of the mechanisms that determine this type of relationship lies in the plane of definition of a unified (for all studied cycles) indicator evaluation system (and the corresponding unified measurement scale) characterizing phase shifts. However, given the varying scale levels of cycles, and consequently, the factors that drive the cyclical development of economy, the solution to this problem is very difficult, requiring consideration and correlation of short-term market drivers of phase shifts and long-term factors of demographic, social, scientific, technological, economic, environmental and other developments.

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## MATERIALS AND METHODS

Generalization of existing approaches that determine the relationship between cycles of different time scales and territorial projections suggests the development of a unified methodological framework, in which the authors propose using a concept based on modeling the expectations of economic agents. The latter, in a concentrated form, are a reflection of the system of short-, medium- and long-term indicators of the socio-economic development of the territory, characterizing and determining the turning points of the cyclical development of economy in the future. Moreover, taking into account the fact that the expectations of economic agents are a reflection of promising macro generations in the future, a quantitative determination of the values of their parameters allows determining the future phase shifts within the economic cycles that are classified as short-, medium-, and long-term depending on the assessment of factors generating the corresponding short-, medium- and long-term expectations. Thus, using a single indicator for all cycles that generates the trajectory of their development in the future - the expectations of economic agents, - we can solve the problem of comparability of factors determining the phase shifts of the cyclical development of economy. Thus, the main idea is that any transformations occurring in the economic development, including in the field of phase shifts of economic cycles, are driven by the system of expected estimates concerning changes in the key parameters of factors generating conditions for these phase shifts. By identifying the expected estimates of economic agents regarding future changes in the system, it is possible to determine phase shifts within the economic cycles with a high degree of certainty. Moreover, depending on the expectations assessed (short-, medium- or long-term), the corresponding turning points of cyclical development are programmed. In addition, the relevance of using an indicator that estimates the expectations of economic agents is also increasing in the framework of solving the problem of identification and formalized assessment of the relationship between different economic cycles. The construction of cyclic development paths on the basis of this indicator forms the basis for conducting economic analysis in a single measurement system, which determines new possibilities for comparing various economic cycles with each other.

It is important to note that the use of this approach allows getting closer to the solution of such a significant problem in the economic theory as the search and justification of methodological approaches that ensure the process of constructing meso-level economic cycles and, accordingly, the search for formalized assessments of the relationship between regional, national and global economic cycles.

## RESULTS

The search for answers to these issues is undoubtedly not trivial. The solution to some of them is reflected in the works of Russian scientists, such as Zhikharevich B.S. [4], Brukhanova V.B., Antokhonova I.V. [5], Zageeva L.A. [6], Smirnova S.V., Frenkel A.A., Kondrashova N.V. [7], Kovaleva A.V., Mesoedova S.F. [8] et al. A significant contribution to the development of this issues in the theory of economic cycles was made by several foreign researchers like Viber R. [9], Schilman M [10], Chase C, Villard A [11], Thomson W [12], Russell C [13], Modigliani and Brumberg [14], Nelson and Plosser [15], Perez C [16], Samuelson P [17], Lucas R [18], and Marchetta C [19].

At the same time, despite the considerable interest on the part of the scientific community in the study of the interconnections between economies of various scales, it should be noted that the vast majority of them rely on qualitative analysis methods, which, in our opinion, introduces elements of subjectivity in solving the problems posed. This necessitates the development of formalized methods that allow a new approach to the search for solutions revealing the laws of such interaction based on a systematic study and understanding of internal logic, determining the directions of this form of interaction.

In connection with the foregoing, the main goal of this study is to strengthen understanding and develop a methodological apparatus that allows, on the basis of systematization of existing developments and studies, forming a model of interaction and mutual influence of national and regional cycles on the basis of modeling the expectations of economic agents formed at the macro- and mesolevel.

I our opinion, the search for the answer to this issue shall lie in the mainstream of empirical analysis. However, the complexity of carrying out this type of works, the results of which would contribute to the determination of such relationships, contributes to the uncertainty and lack of a generally accepted point of view. Indeed, a methodologically challenging task is the search and determination of the time series characterizing the economic cycle. An even more difficult task is the economic and mathematical modeling of the relationship between cycles of different macroeconomic levels. Our position on this issue is as follows: since the economic cycles are a reflection of discrete rational expectations of economic agents according to our earlier statement, the process of modeling interdependencies and relationships shall be implemented through the prism of assessing and analyzing the expectations of economic agents. At the same time, it should be borne in mind that the expectations of economic agents are sufficiently differentiated, which creates the basis for asynchronous formation of the cyclical development of regional economic systems of a relative national macrocycle.

Adhering to the proposed approach on the feasibility of determining the relationship between macro- and mesocycles of the same order through an assessment of the corresponding expectations of economic agents, it is necessary to give a number of additional methodological explanations.

Firstly, given that expectations are a reflection of the process of evolution and transformation of the system of institutional and market factors that form the phase shifts of cycles, their assessment allows looking into the origins of the cyclical development of economy, and, therefore, determining the nature of the incipient phase shifts both on macro and mesolevel.

Secondly, it should be emphasized that in the context of studying the synchronicity of the development of meso - and macrocycles of the same order, it is necessary to take into account the scale of economic cycles. This is due to the fact that as the cycle scale level (long-, medium- and short-term) increases, the expectations of the meso- and macrolevel economic agents undergo a smoothing effect. In other words, following the logic put forward, the long-term cycles, the phase shifts of which are generated under the pressure of expectations, based mainly on the institutional transformations of the system, are less sensitive to the transformation of market parameters based on short- and medium-term expectations. However, the latter are decisive in the imbalance of regional and macroeconomic cycles. Therefore, as institutional factors dominate in the process of generating incipient phase shifts of the economic cycle, the macro- and meso-level expectations begin to smooth, as a result, the regional economic systems begin to form synchronous trajectories of cyclical development relative to the macroeconomic (national) cycle. At the same time, with the growth of expectations, the horizons of which are medium- and short-term in nature, the economic agents begin to rely on more localized information, including at the regional level, as a result of which the formation processes of asynchronous development of cyclic oscillations of the meso- and macro levels begin to take place.

Thirdly, since the expectations (short-, medium- and long-term) of economic agents are in a single coordinate system and can be measured in a single system of indicators, their correlation among themselves in terms of differentiating their level by macro- and mesolevels allows determining the statistical relationships. This, in turn, allows answering the main question posed in this work, as well as having a high level of methodological significance - what is the relationship between macroeconomic and meso economic cycles, as well as to what extent do the regions react to the phase shifts of macrocycles, as a result of which the resynchronization of regional and national cycles occurs. Based on the presented axioms and assumptions, the algorithm for modeling regional economic cycles in conjunction with macrocycles can be represented as a sequence of interconnected iterations [Fig. 1, 2].
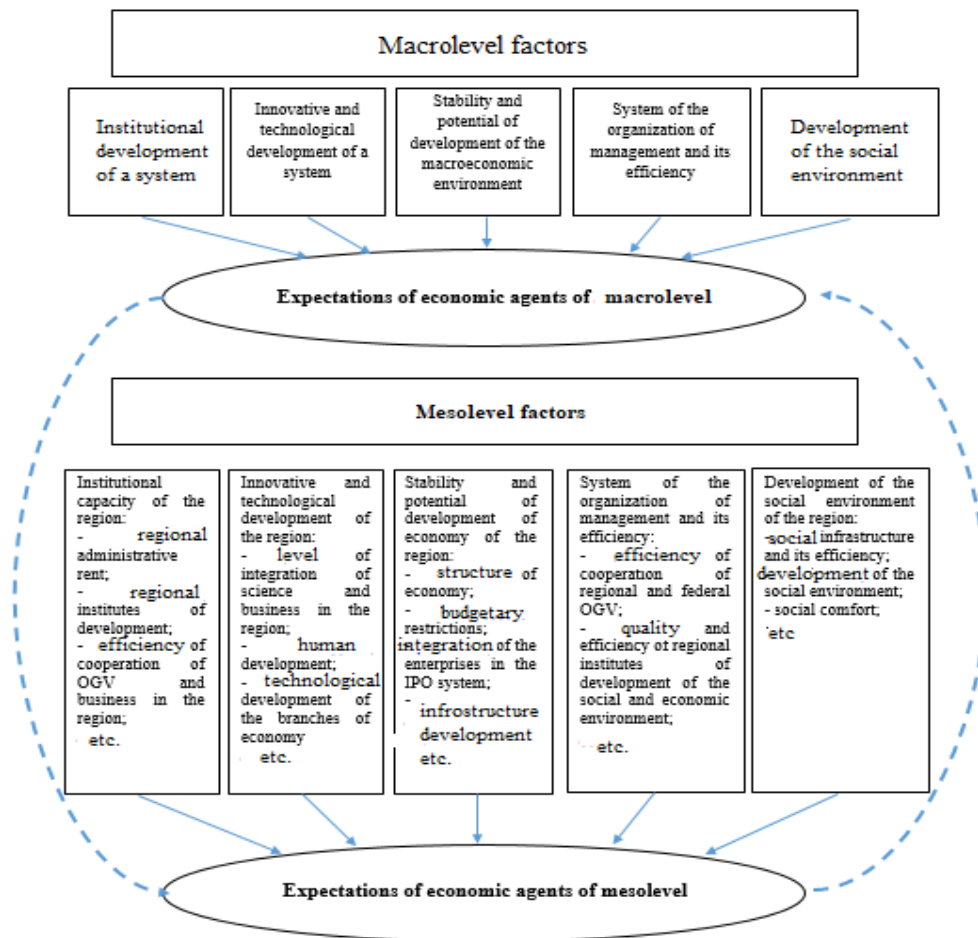


**Fig. 1:** Graphic interpretation of the mechanisms of asynchronous formation of the cyclic development of regional and macroeconomic systems based on a system of interrelated expectations of various orders.
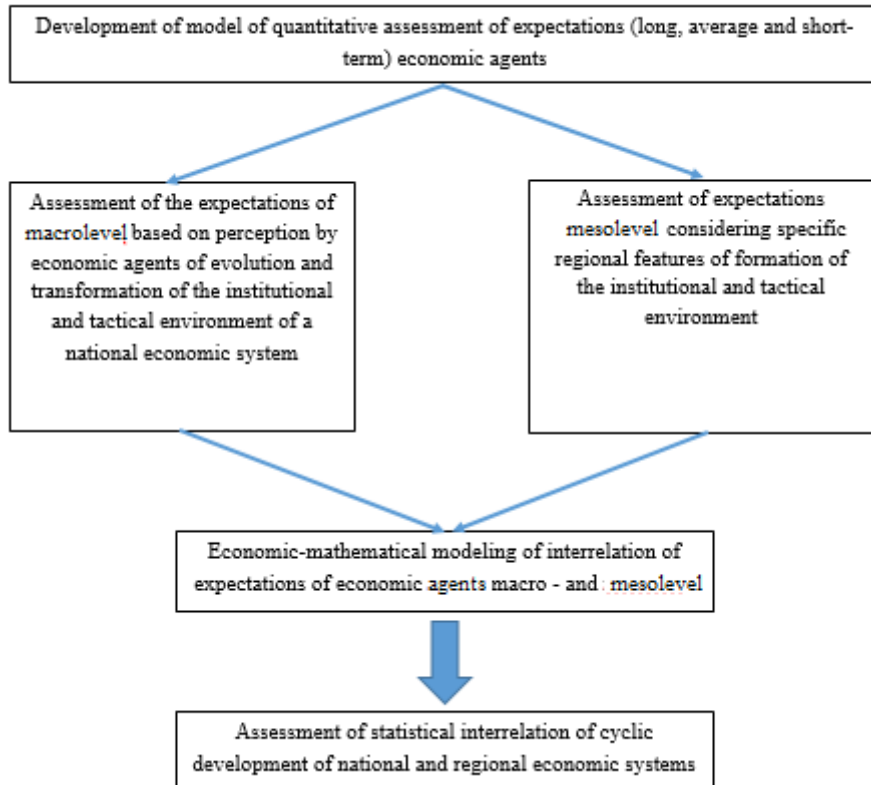.................................................................................................................................................

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**Fig. 2:** Algorithm for modeling the regional economic cycles of the Russian Federation in conjunction with macrocycles.

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## SUMMARY

The developed algorithm for modeling the regional economic cycles in conjunction with macrocycles significantly expands the horizons of analysis and methodological substantiation of the relationship between regional and national (macroeconomic) cycles. In other words, this algorithm allows tracking the relationships, both on horizontal and vertical cyclic projections on a specific economic cycle of the region, which largely brings us closer to an objective understanding of the cycles of regional economies, which are formed under pressure of the totality of endogenous (internal) parameters, and exogenous ones.

## CONCLUSION

Undoubtedly, the approach developed by us is not barred, like many other methodological approaches existing in theory, for the debatability elements. In essence, this work is an invitation for the scientific community to concentrate efforts in this direction. This work is not only an attempt to justify the hypotheses and assumptions put forward above, but also an invitation to a discussion in this direction, revealing the relationship between the expectations of economic agents and phase shifts in the economic cycles. It is able to form a breakthrough in the study of cyclical development of economy not only in the part of identifying cyclic shifts, but in the field of comparing cycles of different scales with each other as well. It seems to us that the insufficient level of elaboration of the issue posed can be overcome on the basis of a new paradigm in the economic theory, based on the study and comparison of the integral indicators characterizing the dynamics of expectations of economic agents forming the phase shifts in the cyclical development of economic systems of meso- and macro level.

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