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APPROACH TO THE ASSESSMENT IRREGULARITY AND CYCLIC DYNAMICS OF TERRITORIAL DEVELOPMENT

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ABSTRACT

Purpose *– The main purpose of this study is a modelling of assessment processes for irregularity and cyclical of dynamic regions development, which used to reduce inter-regional contrasts, disruptions and variations in a socio-economic development on base an effective regional financial policy.*

Design/methodology/approach *– The conceptual provisions and model basis of an estimate of irregular and cyclic dynamics of the socio-economic development of any regions, which are functioning in some conditions of a high level of an uncertainty the external environment. At the same time, this external environment has a significant influence to increase of risks and losses in design making.*

Findings *– The model basis presents as a complex of some interconnected modules: the module for estimate and analysis of the irregularity of the socio-economic development any regions; the module to form some management scenarios of the socio-economic development any regions. Targeted direction of the first module is an estimate of an interregional socio-economic differentiation, a detection of some disproportions in the regions development. Description of the second module is a forming of any management scenarios of the socio-economic development any regions which to direct to decrease of a level of the interregional differentiation while ensuring of a sustainable economic growth.*

Originality/value *– Was formed the models complex of a differentiation of the develop regions which can provide a possibility for estimation of some sustainability for the cluster formations regions by a level of the socio-economic development and to make an analysis of their structural dynamics. Also was been developed a complex of a methodical ensuring for a system forecasting of cyclical dynamic of an economic territories growth. The main blocks of this complex are the forecasting of macroeconomic indicators considering some indicators of the cyclical development; a detection and analysis of any cyclical fluctuations indicators of the region development; a forecasting of some crisis and catastrophes in the socio-economic region development. Was been developed the model of an alignment of the socio-economic disproportions on the interregional level on base the fiscal or tax-budget state policy. For forecasting of some consequences change of fiscal policy can be used some scenario approach which realization is doing on base an imitation simulation.*

Keywords: Region, Socio-economic development, Irregularity, Structural disproportions, Management, Scenario simulation, Approximation and econometric methods, Regional policy, Balancing, Fractal mathematics and catastrophe theory methods.

JEL Classifications: O11, R11, R 12, R58, C53, C54, C63.

1. INTRODUCTION

The modern stage of a development of the national economies of some different countries (for example, Ukraine and the Russian Federation, the authors have been made this research for these countries) is characterized by an increasing of an unbalanced economic space for any countries and by an irregularity of the Socio-Economic Development (SED) of the Regions (SEDR). The unequal growth of the individual elements that make up the socio-economic system of the region, leading to some negative trends: does not give an opportunity to fully using a potential of an interregional cooperation. As well, it leads to increase of a depth of the cyclical crises, to increase the threat of a disintegration. That the irregularity and a cyclic development are considered as the generally factors of a destabilization, which reduces some paces of an economic growth of these regions.

Necessity of creating of the effective stabilization policy in the conditions of the cyclical downturn led to the heightened attention to questions about perfection some mechanisms of the government regulation, including regional development. This development is directed to ensure of the balanced SEDR. The fiscal policy, including the tax and budget policy, is the basic component of the stabilisation policy. That policy is carried out either by management of the transformation processes of the tax legislation and tax relations, and also tax collection and redistribution of taxes between territory budgets (it's the tax policy), or by management of the expenses of the budget, dotation's, subventions and budget investments (it's the budget policy).

Change of the parameters of the tax policy at the conditions of the cyclical downturn is been directed to stimulate the supply and demand based on ensuring of the balanced development for some sectors of economy and an equalization of incomes from different social group of the population. Along with this, given the time lag, the change of those parameters of the tax policy

leads to a reduction for the budget revenues and this change requires of the agreed change for the budget policy. In particular, it also requires some changes of the financial regional policy, which is directed to decrease a crisis depth in the regional systems, to smoothing of the cyclical fluctuations and to alignment of the SEDR's level.

The foregoing is indicating that the modern conditions for the functioning of the regional systems are been characterized by a high level of an uncertainty of an external environment that significantly affect to increase of the risks and losses at making of the decisions. Therefore, these processes of a management for SEDR are the poorly formalized processes, because they carried out in some conditions of an incompleteness, an uncertainty and an ambiguity of the original information. Since, building of some Systems of the Regional Development (SRD) should take into account the requirements of a dynamic stability, a reliability of functioning, an invariance with a respect to the external disturbances, the noise insensitivity to some changes in the parameters, maneuverability, economy, etc. An additional factor of an incomplete information at the management of the regional development is need to using of the assessment models and the analyses strategies of the development on base a simulation and forecasting of an influence of any different threats. The theoretical bases of a development for the models of the balanced SED are been reflected in many works of some national and international authors (Barro and Sala-i-Martin, 1991; Cuadrado-Roura *et al.*, 2000; Lukyanenko, 2004; Ponomarenko *et al.*, 2004; Geyets *et al.*, 2006; Lopez-Rodriguez, 2008; Lychkina, 2009; Khalil and Wajid, 2013; Sbaouelgi and Ghazi, 2013). In the following papers (Lukyanenko, 2004; Khalil and Wajid, 2013) are considered those simulation methods of the mechanisms for budget regulation on different hierarchical levels such as the econometric methods, the casual and non-casual methods, and panel data. Studies, which are presented in the paper (Klebanova and Kizim, 2010), are considering some questions about using spatial lags models for testing of an availability of a spillover effect and an opportunity for decreasing of some expenses, which are being linked with a stimulation of the regions development. In addition, in the following papers (Ponomarenko *et al.*, 2004; Geyets *et al.*, 2006) has been proposed a complex of the models. This complex gives an opportunity to determine the dominant threats of the sustainable developments of the regions and priority spheres of life activity of the regional systems on base the methods of the multidimensional analysis and a method of adaptive filtration by Calman-Bucy. In last time is been formed a new focus of the economic researches, which is linked with using a big set of the formalized and unformalized methods for the analysis of the cyclical dynamics and for the crisis forecasting in development of the economic systems of the territories. In the papers (Mezentcev, 2007; Solov'ev and Ganchuk, 2009) is using the methods of the econophysics for an analysis of the crisis's on the foreign exchange markets. In the papers (Grinyaev *et al.*, 2010; Sadovnichiy *et al.*, 2011) is proposed to use computer simulations on base the conception of system dynamics by J. Forrester for forecasting of terms of approach of the crisis's and for the analysis of the cyclical dynamics. In the paper (Mashchenko, 2002) carried out the forecasting of the cycle phases with help of the expert methods of forecasting based on the method of the analytic hierarchy by T. Saaty. In the paper (Tsvetkov *et al.*, 2010) the

methods of the analysis and simulation of the cyclic development of the economic dynamics are been added by the approach, which based on using of the production functions and an effectiveness of which is been proved on the big array of the empirical data.

However, some questions for a definition of a comprehensive quantitative assessment of SED's level, an assessment of an inhomogeneity for an economic space, an identifying of the source factors of the development asymmetry, a construction of the forecasted scenarios for a development are not adequately reflecting in the majority of some scientific researches.

2. CONCEPTUAL SCHEME FOR AN ASSESSMENT OF SEDR'S IRREGULARITY AND CYCLIC DYNAMICS

The model basis is the set of some methods, techniques, algorithms and models to determine a degree of SEDR; is the factors, which have the most influence on the amplification of the irregularity; is the parameters of the regional policy. As well, as a result, it improves the quality of the management decisions, and it aims at mitigating of the SRD's development asymmetry. Model basis forming is been based on the following conceptual statements (Ponomarenko *et al.*, 2004; Klebanova *et al.*, 2011).

1. About forming of the conceptual apparatus. The regional development is the mode of the SRD's functioning, which is focusing on a positive dynamic of the level parameters and a quality of a population life. In addition, it is providing a sustainable, balanced and multifactor reproduction of some social, economic, resources and environmental potentials of the region. The SED's asymmetry (irregularity, differentiation) is the type of the regional development, which has an increase of some differences between regions by a level of the accumulated economic potential, a degree of a well-being of the population, and other characteristics of the economy in the social region areas. The safely level of the SED's differentiation is the level of the interregional differentiations, at which formed an integral competitive economic space. Thus, this space promotes the most efficient using of a resource potential of each individual region and a national economy as a whole. The threat of an amplification for the irregularity development of the regions is the level of an interregional differentiation at which a competitive economic space becomes fragmented. It leads to increase a number of the depressed regions, to growth of the social tensions, to formation of the centrifugal tendencies. A policy of a smoothing of the interregional SED is a complex of the organized legal, economic, financial actions. These actions are directing to a stimulation of the territories, which unable to functioning in a mode of the self-development, to activation and resource supporting of a social mobility population in the separate regions, to creation of some conditions for a formation and functioning of a national significance of the potential points of a growth, as well as enforcement of the generally national functions of the individual territories.

2. About SEDR. Since regional systems are been characterized by high degrees of a complexity and diversity of some activities, then an information model of their state must include a large number of the quantitative and qualitative indicators of the economic, social, financial,

environmental and other situations in the region. Records many of the indicators are greatly improve a quality of this information model, and it leads to an information overload in the decision-making processes and complicates of an interpretation of the results. Because of this, at formation the system of these indicators should take into account the following requirements: this system of the indicators should provide a maximum informatively of the results. In addition, this system of the indicators must be completed and provided of a sufficient intensity change, i.e. these indicators should be to form an interrelated system, to have a large internal variability. Therefore, this system of the indicators should be reliable. Formed system of the indicators should adequately reflect a real state of a regional system; also, it should be a neutral with the regard to all objects assessment. The list of the indicators should include some indicators that do not have a double interpretation and they are affordable.

3. About a complex approach to the SEDR's assessment. SEDR's assessment should provide a comprehensive analysis of some different spheres of a life activity. This analysis is possible on a basis of a synthesis of some different complex and systematic approaches. The first approach involves the consideration of all SEDR's components. The second approach makes it possible to carry out a cause-and-effect analysis of any indicators that characterize the development of any spheres of the life activity regions.

4. About an asymmetric typology of the regional development. To determine the possible parameters of a state regulation of the development regions need to generate some models. With help of these models need to determine a type of an asymmetry of the development of the regional systems. With an account of the possible objects and regulation tools at determining a type of the asymmetry of the development regions are grouping of the regions by an economic and social development level, a definition of the factors-sources of an amplification of the irregularity development, a formation of some measures to mitigate of the SEDR's asymmetry.

5. About the formation of a contour for the proactive management. Content of this provision is the classification and the assessment threats in a system of management of the development regions. The threat is the set of the conditions and factors that causing a crisis in the different spheres of some life activity regions. The process of a classification and threat assessment includes the following tasks: a creation of the threats classes, an identifying of the cause-and-effect relationships between the threats and causing losses, the development of a measures list for a prevention and removal of these threats, an assessment and forecasting of a threats level.

6. About the formation of the decision support system to mitigate of the interregional disparities in some conditions of a cyclicality for the development regions. Decision support system uses for reducing of the SEDR's irregularity and asymmetry, also it uses to the threat prevention and removal, and for the assessment and forecasting of some threats level.

7. About an adaptive SRD's properties. The adaptive properties of SRD are been achieved through the reliability, maneuverability and flexibility of its functioning. At threats exposed to SRD, it needs for its adequate response to them, and a system restructuring for the current conditions. The maneuverability reflects of a maximum possible speed of the system adaptability

use to changing of some conditions. In turn, the SRD's maneuverability provides a flexibility that some reflects of the system possibility to repay of any disturbance without its transformation.

Considered above the conceptual provisions were used for forming of the model basis of the SEDR's assessment irregularity (Klebanova and Kizim, 2010). Diagram of a relationship of the complex of these models for the irregularity and cyclic dynamics assessment is show in Fig. 1. The following elements are a content of the modules and a schema model. Target orientation of the first module is an assessment of an interregional social and economic differentiation, use to identify of the imbalances in a development of the individual regions. This module includes the following models.

Model of a forming of some indicators for an information space. The purpose of this model is an identification of the most important indicators of a state for the regional systems. A list of the initial indicators was been formed based on data from the State Statistics Committee. It includes 52 indicators that to characterize 14 structural components of the economic and social development of the regions, such as the "Industry", the "Employment", the "Agriculture," the "Financial strength", the "Housing", the "Medical care", etc. Due to the not information provision of many indicators during the analyzed period (2000-2009) was necessary to reduce the dimensionality of the some indicators of the information space. We used the method "center of gravity", which gives the restrictions on a type of data and a volume of a selection to build of such model. This method allows selecting the so-called signs-represents for each structural component (Klebanova *et al.*, 2011). Using one of the methods of the factor analysis – the method of main components gave an opportunity to find the generalized latent factors that have the most significant impact on the SEDR's level (Ponomarenko *et al.*, 2004; Kavun, 2007).

Model of the grouping regions in terms of the socio-economic development. The content of this model is an identification of the homogeneous socio-economic characteristics of the groups for these regions for that can be developing some differentiated variants for a regional policy. To build of this model can be used the cluster analysis methods, in particular, the iterative methods, which provide of the non-overlapping clusters, and which do not have the restrictions on a number of the objects and describing of their symptoms (Klebanova and others, 2007; Klebanova *et al.*, 2011). Model of the integrated assessment of the SIR's level. Target orientation of this model is a quantitative (or cumulative) assessment of the SIR's level for a region. To build of this model can be used a taxonomic indicator of the level development, it is a synthetic value, which is "a resultant" from the all indicators of the SEDR (Klebanova *et al.*, 2009; Klebanova *et al.*, 2011). A choice of a method is due to its following advantages: the original system of the indicators can include some symptoms that have the different dimensions. In addition, the values integral index has a normalized variation range, which ensures the interpretability of these results. Comparative analysis of the SEDR based on the obtained values of the integral index is conducting in the space and space-time cuts. Integrated indicators provide some opportunities: to explore the structural mix of the identified groups of the regions; to get a comprehensive assessment of the current and projected level of the SEDR; to evaluate some possibility of the strengthening of the inter-regional

social and economic differentiation.

Model evaluation of the irregularity and asymmetry of the development. A destination of this model is an estimate of the heterogeneity of economic space. As the indicators of the irregularity regional development are considering: the absolute and relative range of a variation; a coefficient of the bundle; the quantile range of the variation; the average linear deviation; the variance; the different coefficients of the SED's indicators. For some analysis of the asymmetry of the SEDR, as well as the intercompany imbalances are using the taxonomic analysis methods and the techniques of a panel data analysis (Klebanova *et al.*, 2011).

Model of the cyclical development. On the one side, the current territorial structure differentiation leads to strengthen the instability dynamics of the regional development and the appearance of the cyclical ups and downs. However, on the other side, it leads to the polarization of an evolution of different groups of regions. To predict the cyclical dynamics of a region can be used the following methods and models: the models of the time series decomposition; the analytical smoothing trend; the approximation methods based on the Fourier analysis; the econometric methods (the regression analysis with the panel effects and modeling production functions); the Markov's processes (in particular, the modeling transitions between the stages of a cycle); the methods of the fractal mathematics and catastrophe theory; and the simulation. Predictive values of the macroeconomic indicators use to determine of a potential of the convergence and stability rates of the SED of the regional groups (Klebanova *et al.*, 2009; Klebanova *et al.*, 2011). The content of the second module can be uses to forming some management scenarios of the SEDR (areas), aimed to reducing of the regional disparity at simultaneous ensuring of the sustainable paces of some economic growth. This module includes the following models:

Models of forming variants of some financial regional policy. The destination of these models is a determination of the possible volume of a public investment, some subsidies or donations for the regions. For build a simulation model of some distributing of the resources can be used a method of the system dynamics by J. Forrester. An identification of some priority regional systems for the public financial control of the activity areas is performing on some base of the results of the analysis of the asymmetric development for the regions.

Model of a choice of some strategies for a financial development of the regions. The content of this model is an estimate of an impact of different financial strategies for the social and economic dynamics of a region. Since the region is a complex socio-economic system, which includes the production, employment, finances subsystems, etc., then this model of the characteristics of these subsystems can be combined into a unified approach based on the system dynamics by J. Forrester (Klebanova *et al.*, 2006).

Model of an assessment of the impact of the different variants of the financial policy. With the help of this model can be build some scenarios of a change of some socio-economic characteristics of the regions through a realization of the different variants of a financial regulation: the priority financial support for the regions with a high or low level of a development and the uniform financial support for these regions. Model of a choice of the regional financial policy. The destination

of this model is a determination of some variants of the financial policy. These variants should reduce the inter-regional social and economic differentiation at the maximum rate of a growth of GDP of the country in general (Ponomarenko *et al.*, 2011).

Implementation of a set of these SEDR's models provides an opportunity to balance the rates of a growth of different groups of the regions. Also, it can reverse the adverse effects of the foreign economic conditions on the dynamics of the macroeconomic processes. To achieve the tasks of the first module of the offered set, which included: the grouping regions by the SED's level; the identifying of the numbered assessing and an analysis of the rate of the SEDR's growth; an assessment of the irregularity regional development; an analysis of the asymmetry of the SEDR, when as an input data are considered some space-time data of the social economic indicators from 25 regions of Ukraine and 79 regions of the Russian Federation for the period 2000-2009. With help of a classification on base of the methods of the cluster analysis was identified two groups of the regions. The analysis of the average values for each group provides an opportunity to pick out the areas with high (H) and low (H) level of the SED. Optimality criteria's partition, which addressing to some group and intergroup of the values is confirm a correctness of that classification. Checking of the quality classification of each study region for selected group is accomplishing based on the discriminated analysis. The Wilks's lambda values and values, which found for posterior probabilities, are indicating 100% correct classifications.

Based on the methods of a taxonomy was also determined the values of an indicator of the SEDR's level for a period from 2000 to 2009 (on example of Ukraine). Positive growth of the indicator of the SEDR's level are observed in 14 regions, it is representing above 56% (Fig. 2).

Analysis of a share of the regions with positive growth indicator values in the group with high level development is observed 50% of the total, and in the group with low level development – 45,45%. Also, was determined the leading regions with the highest values of the index level of the SED (on example of Ukraine, it is Kharkiv, Odessa, Dnepropetrovsk regions). Similar studies were been conducted in some regions of the Russian Federation. The share of the Russian regions with some dynamic of the growth of the level of theirs development are 22,08% of the total (Fig. 3). The positive growth trend of this indicator in the group of the regions with high level development is observed 16,67% of the regions, and in the group with a low level development – 22,54% of the regions. Leaders by the level of the SED from 2000 to 2009 are Tyumen, Moscow and Sakhalin regions (on example of the Russian Federation). Certainly, these similar researches can be doing for any other countries and regions based on some requests from a management (or a governance) of these territories.

Average values are indicating about the highest level of the SEDR (on example of Ukraine) as compared with other regions (on example of the Russian Federation) during the analyzed period. Visualization of some results related to the distribution of the regions (on example of Ukraine) according on the level of a development and it is based on the cartogram (Fig. 4). This cartogram is showing a rank region that determines its place in the general population, depending on the founded value for the level of development. Analysis of a growth of the SED (on example of

Ukraine) has shown that a high growth rates have the well-defined regions (Kirovohrad and Chernivtsi regions in Ukraine), in which the value of the index in 2009 compared to 2000 increased 2,89 and 2,81 times respectively. Such a growth rate has led to a significant reduction of an inequality in the group of the regions with a low level of the development. In addition, this rate improves a balance of a social and economic environment in the country as a whole. Within Russia, the highest growth rates of the SED have Chukotka autonomous district. Overall, the dynamic changes in average annual growth in regions of Ukraine and Russia indicate about slowdown of the SED in both countries.

For the analysis of some disparities in the SEDR used the indicators such as an absolute and relative range of a variation; the coefficient of the bundle; the quantile range of a variation; the average linear deviation; the variance; the different coefficient variations. One measure of the asymmetry of the SED is the entropy Theil-index. Table 1 is showing the absolute values (IT) and the relative (E) Theil-coefficient for Ukraine for the period 2001-2009, which allow to assessing of an irregularity of the SEDR. Growth values of the Theil-index in 1,5 times, and the dynamic of the changing values of other indicators of an irregularity shows an imbalance of the regional development (on example of Ukraine). At the beginning of the study period of the maximum level of the SEDR (on example of Ukraine) exceeds the minimum in 16,43 times and at the end of the period this ratio was 6,58 times. The ratio from maximum to minimum level of the SEDR (on example of the Russian Federation) at the beginning of the period is 62,49 times and at the end of period – 152,34 times, it is indicating about some disparity in the regional development.

A comparative analysis of the SEDR makes a possibility to determine of the qualitative features and directions of the development regional groups, "advantaged regions" – characterized by the values of the levels of the SED above an average. For those regions, i.e. the regions with high level of the SED, the current task is minimize of a costs to achieve a certain social result; "economically inert regions" – compared to the average, it is a low the value of a level of the economic development, but a high level of the social development. The most important task of the group is to maintain some balance between the economic opportunities and the social needs; "socially inert regions" – compared to the average them low level of the social development, but a relatively high level of the economic development. This situation is due primarily to lack of an attention to the social issues; "depressed regions" are characterizing by values of the levels of the SED below the regional average. These regions do not have equity any transfers for the normal development. For these regions is characterizing by the full range of the social and economic problems. The examples for Ukraine and the Russian Federation, throughout the study period in the group of the prosperous regions include the regions, which is showing in Fig. 5. Thus, the analysis of the economic space of Ukraine and the Russian Federation confirms a growth of the irregularity in the SEDR, which could have the serious consequences in some terms of a slowing down the pace of the SED of both countries.

For an asses and analyze of a possibility of a convergence of the levels of the SEDR need to use the complex models, which based on the conception of the β-convergence. It covers the following types of the convergence: the σ-convergence, which shows some trends in reducing the variance of the indicators of the regional development; the β-convergence, reflecting a situation where the regions with low level of the development have higher growth rates than those regions with high level; the global convergence, which is understood a convergence of the development levels of those regions across whole population; the cluster convergence, suggesting of the grouped regions into the homogeneous clusters, in which a speed of the convergence is much higher than the corresponding indicator for the total selection (Barro and Sala-i-Martin, 1991; Cuadrado-Roura *et al.*, 2000; Lukyanenko, 2004; Lopez-Rodriguez, 2008; Ponomarenko *et al.*, 2009). Hypothesis of the β- and σ-convergence are related, but not equivalent. The β-convergence points to the existence of a trend to a reduction of the inter-regional social and economic differentiation. However, at the same time, the random shocks, which are affecting the economy of that region, can counteract that trend and temporarily and to increase a dispersion of the distribution parameters of the SED (it is the σ-divergence). To test those hypotheses of the σ- and β-convergence, the global cluster convergence were used some panel data of the Gross Regional Product (the GRP) of the regions of Ukraine for 2000-2009, as most indexes. As base model in the proposed complex was considered the Barro's and Sala-i-Martin's models (these models of the unconditional β-convergence), which assumes that in the long time period those regions come to common for all paths of the proportional growth. Analysis of the results of this model suggests that the statistical insignificance of the parameters for a model of the unconditional convergence, that supporting the hypothesis about an absence of uniform for all regions of the equilibrium growth path. Because the space-time analysis of the SEDR will provide the stable cluster structure of those regions with high and low level of the development, in addition, with the basic model was been used the model conditional of the β-convergence, in which was been made the assumption about the different equilibrium growth paths for different regions.

These results are indicating an existence of the effect for the convergence of levels for the SEDR with high level of the SED. A comparison of the rate of the convergence in the selected peer groups of those regions with rates of the convergence for the whole set of those regions makes it possible to conclude that the presence of the cluster convergence and a need to forming of the differentiated strategies for the SEDR of different groups.

To analyze the effect of the inter-regional cooperation for the processes of convergence was used the models of spatial econometrics. With them help was accounted the spatial lags, was verified an importance of the spatial externalities effects, that are caused by a growth of the neighboring regions. Implementation of the conditional convergence model with a spatial error yielded to get the statistically significant estimates at the exogenous and endogenous spatial lags. Also, it concludes a presence of the positive inter-regional effects: increasing the pace of the economic development in nearby regions is improving the business activity of the regions. Confirmation of the positive impact of the inter-regional cooperation on the convergence processes

suggests a possibility of minimizing the costs associated with the stimulation of the regional development and elimination of the disparities.

Thus, the analysis of the economic space of Ukraine and the Russian Federation confirms the growing imbalance and asymmetry, as in the SEDR, it can slow down the pace of the SED of both countries.

3. FORECASTING CYCLIC DYNAMICS OF THE INDICATORS FOR THE TERRITORIAL DEVELOPMENT

Model forecasting of the cyclic dynamic for the indicators development (Fig. 1) includes the following steps (Daradkeh *et al.*, 2012) preliminary analysis of the time series for the economic indicators; 2) elimination of the trend component from the time series levels, modeling and analysis of the periodic component; 3) construction of the models for the random component; 4) forecasting economic indicators is considering of the cycle formation; 5) an identification of the crisis points.

At the first stage, the component structure of the time series studies for the SED's indicator. The following main components: an evolving (a trend), a cyclic, a seasonal, a casual. Under the trend, understand some change, which is the overall for the direction development, the main trend of the time series. Along with the long-term trends in a time-series can be observed the regular oscillations – the periodic components of the dynamic series. If some period of an oscillation does not exceed one year, then are the following season fluctuations (the short-term cyclical). At a higher oscillation period is the cyclical component. Irregular component is influencing by the factors of sudden drastic action and the current factors, the influence of each of them slightly, but them summary effect is been felt. Depending on the nature changes in the levels series, the listed of the components can be represent as a model in an additive or multiplicative form. The additive model uses to describe of the time series, which have a constant amplitude for the periodic oscillations which independent on the trend level. At choosing a multiplicative form model assumes that the amplitude oscillations are been changed over time in a proportion for the trend level. The mathematical tools for some tasks of this type are considering the Dickey-Fuller's test (the ADF-test) and the adaptive forecasting methods. The Advanced Dickey-Fuller's test (the ADF-test) uses to check the time series of an analyzed indicator of the SED on a stationarity. If the calculated value of the ADF-test is less than the critical value, then accepted the hypothesis of a stationarity of the series. If the hypothesis is been rejected, then using of the various procedures to give those series to a stationary form. Adaptive forecasting methods are using to determine the type of the periodic component and to formation of assumptions about the trend type. Are been considered the following classes of the adaptive models: the models of the exponential smoothing with and without considering of the trend component, the adaptive trend-seasonal models. Choosing of the best model of the forecasting indicators taking into account the short-term cyclical fluctuations bases on the various statistical criteria's.

In the second stage, this construction is building of the trend component for the time series and them elimination from the levels. Building a model of the trend component of the series includes a selection of the function type, through which can be described a trend; an assessment of the model

parameters; an assessment of the quality model. Selection of the function type performed empirically. If this selection of the function type is difficult (trend is not pronounced), then a study of the variability for the characteristics of the series: the first and second differences; the growth rates; the growth rate of the first increment, etc., corresponding to the different types of the growth curves. Quality assessment and selection of the best variant for the model of the trend components for the series is doing by using the following criteria's such as the coefficients of correlation and determination, the Student's t-tests (t-test), the Fisher's F-test.

In the third stage, was doing the analysis of the periodic components (cyclical and seasonal or short loop). To study of the periodic component of the series are used the spectral analysis methods, which has several advantages over traditional methods of the research cyclical component. In particular, the spectral analysis can simultaneously determine the oscillation period of the different periodic components and intensity (amplitude) of these oscillations, whereas the traditional analysis methods based on the assumption that the parameters variations are already know. Since the periodic component describes the various wave processes, for its modeling should use the Fourier series expansion. The number of harmonics is determined based on their statistical significance. Fourier expansion includes only those terms for which the harmonics are significant.

In the fourth stage, was doing the construction of a model of the random component. As a model of the random component are considering the ARIMA-model. Identification of the test versions of this model based on the study-selected autocorrelation and private autocorrelation functions. After identification of the general set models were assessed their parameters based on the different approaches: the OLS, the nonlinear OLS, the maximum likelihood method, etc. To test of the competing versions of this model to adequately used the Box-Pierce's statistics and the Akayka's criteria. In the fifth stage, was doing the synthesis for the models of the different components for the time series, which gives some opportunity to build the combination-forecasting model. Comparison of the competing variants combined this model and selected of the best of them, which was been carried out using a number of the criteria's forecasting accuracy. Based on the best variant of the combination model formed the forecast for the SED.

In accordance with the above stages was doing the forecast economic indicators, which are characterizing the state of the national and regional economies. In addition, for those economies was formed the hypotheses about cyclic dynamics of the development. As those economic indicators are considered the following: the volume of the industrial production (million conventional units, MCU), the retail sales (MCU), the average monthly salary (conventional units, CU), the index of real wages (%), the index of consumer prices (%), the index producer price (%), the exports of goods and services (MCU), the investment in some fixed assets (MCU), the volume of the construction works (MCU), money supply (an aggregate M3), the migration rate (thousand people). Analysis of these results based on the forecast models of those parameters allows the following conclusions: the short-term cyclical components have the most impact on the dynamics of those indicators as the real salary index (%), the index of the consumer prices (%), the producer price index of the industrial production (%), the exports of goods and services (MCU). The

medium-term cyclical components have the most impact on the dynamics of indicators such as the volume of the industrial production (it explained 84,38% of variance of the process), the average monthly salary (it explained 87,84% of variance of the process), money supply (an aggregate M3, it explained 83,65% of variance of the process). The medium-term cyclical fluctuations have a significant impact on the dynamics of the retail trade, the volume of the construction works and migration coefficient. Medium-periodic components of the time series for the retail trade account are 45,483% of variance of the process, the volume of construction works – 33,02%, the migration coefficient – 17,27%. The long-term cyclical fluctuations exert a dominant influence on the dynamics: of investment in basically capital; the migration population; to the study of the medium-term periodic components for the time series and the volume industrial production, the volume of the retail sales, the average monthly salary, the volume of the construction works, money supply (an aggregate M3). This dynamic to the migration coefficient possible to identify: some phases of the economic cycles in the planning period (for example, January 2011 – December 2013); the phase matching decline in a dynamics of these indicators such as the volume of the industrial production, the retail sales, the average monthly salary, the migration coefficient. It all indicates the formation of some crisis situation. The considered set of these models was used to forecasting of the cyclical dynamics of those indicators for the SEDR (for example, in Ukraine): the total utilized capital investment, the magnitude commissioned the total area of the retail trade, the financial results from some operations, the average monthly salary, the migration growth coefficient of the population. Study of the medium-term periodic components and resonance phenomena in the dynamics of the regional development indicators suggests some possibility for formation of the crises in the second half of 2013. Modeling of the crisis dynamics of the regions development based on the hidden Markov's models, the umbilical and kapsoidical models of the catastrophe theory. There are confirmed some high probability of the crisis in the economy for the period 2013-2014 (Klebanova *et al.*, 2011).

Thus, the proposed set of the models allows exploring the cyclical components, which have the most significant impact on the dynamics for those indicators of the economic development of the territories (regions), to forecast the formation of some crisis situations in the SEDR.

4. ALIGNING SOME DISPROPORTIONS OF THE REGIONAL DEVELOPMENT BASED ON SOME FISCAL POLICY INSTRUMENTS

Important tool for a regulation of the socio-economic disproportions on the interregional level is the fiscal policy country, which aimed at reducing amplitude of the cyclical fluctuations in the economy and to stability of the economic system country in generally. That fiscal policy is implemented, either by the managing transformation processes of tax laws and some tax issues, to tax collection and redistribution of some taxes among the territory's budget (it's the fiscal policy), or due to cost of a control budget, some subsidies and grants, some budget investments (it's the budget policy). Change of some parameters for the tax policy in a cyclical downturn is designing to stimulate a supply and demand by eliminating disproportions, to ensure a balanced development of

some economic sectors, to equalizing some incomes of the different social groups for the population. In the medium-term, the tax reforms lead to an increase in the demand, to reducing of capital flight, to accelerated modernization of the fixed assets of the enterprises, to develop of some high-tech industries. However, due to the presence of a certain time lag, which needed to form a positive "feedback" in the economy, the consequence of the change in the tax policy is a reduction in any tax revenues for the country budget, to formation of the budget deficiency, to reduce some financial capacities for an equalization of the SEDR's levels. Using the scenario approach can forecast some effects of any fiscal policy changes, to evaluate an effectiveness of some decision-makings, and to identify a synergistic effect for the introduction of some complex scenarios. The implementation of this scenario approach based on the simulation, the basic concept of which is the system dynamics method (Klebanova and Yastrebova, 2009; Klebanova *et al.*, 2012).

Scenario planning of the regional economic development includes the following steps: 1) formation of some inertial scenario of change in some characteristics of the SEDR, because have an implementation of the fiscal policy; 2) the dynamic analysis of the regional development imbalances, 3) design and analysis of some alternative scenarios for the SEDR.

At the first stage, the formation of the inertial scenario change of some characteristics for the SED as a result of implementation for the adopted fiscal (or tax-budget) policy. Decision of the tasks of this type is carried with help the model imbalances using some tax instruments and the simulation model of the financial regulation territories. Model of the financial regulation for the territorial development has two main components. The purpose of the first component is simulating the possible extent for any investment transfers, any subventions, and some grants to any regions. Targeting of the second component is simulating of the influence for the extent of any investment transfers, any subventions, and some grants to any regions for the SEDR. Developed the simulation model of the financial regulation territories is enabling to conduct some multivariate forecast calculations for the regional economic development and state, depending on the adopted policy of the state financial regulation (Ponomarenko *et al.*, 2011). This simulation model of the public financial management and the SED include the simulation distribution model of some resources and 25 simulation models of any socio-economic characteristics for the regions. Output data of this stage are the inertial scenarios of the SEDR as a result of the implementation for the adopted tax-budget policy (Table 2).

As shown in Table 2, the inertial pessimistic scenario is forecasting the parameters of the tax-budget policy in presence of the time lag in formation of some positive "feedback" in the economy and as a consequence of the fiscal failure. The inertial optimistic scenario assumes the slow expansion of the tax base due to change of the tax policy parameters. Modeling of the fiscal policy is based on some parameters of the distribution for any grants, some subsidies, and some investment transfers to the regions, which adopted by the stabilization country policy.

At the second stage, was been doing the analysis for the formation of some imbalances in regional development in the following directions: an assessment of the SEDR's level; an assessment of a differentiation of the SED; an assessment of the irregularity of the SED; an identifying any sources of

some structural imbalances. Considers the following factors of increase some regional imbalances: an unbalanced development of some groups regions with the high SED's level (it's the donor regions) and some regions with the low SED's level (it's the recipient regions); an unbalanced regional development of the regions with the high SED's level; an unbalanced development of the regions with the low SED's level.

In the third stage, was been forming some alternative scenarios of the development management areas which aimed to eliminating or preventing of the identified structural imbalances, while a maintaining the overall positive path for the national economy. The content of this stage is generating some management decisions to elimination of any imbalances in the areas development; the formation of some alternative tax-budget policy; forecasting of the dynamics of the SED and choice of a variant for the fiscal policy (Klebanova and Yastrebova, 2009; Klebanova *et al.*, 2012). Formation of the alternative fiscal policy variants involves changing some parameters of the distribution of any investment transfers, in particular, the regional development fund between selected groups of the regions. Since at the cyclical downturn the state investment policy is aimed to increasing a speed of the investment flows, especially in the production of the high added value, then an adjustment of the distribution parameters of any investment transfers based on a resource recoil research of the industrial and economic systems (the IES) for any areas. For an analysis of the resource recoil in the IES using any manufacturing function on the panel data with or without regard a factor of the scientific progress (Klebanova *et al.*, 2009). Forecast results of the SEDR as a realisation result of the different variants for the fiscal policy underlying the formation of two alternative scenarios for the regions development: compensation and crisis. An alternative scenario involves an assessment of the compensation effects of the priority investment support for the donor-regions in the implementation of the pessimistic scenario for the dynamic tax revenue into a budget. Targeted towards the development of this scenario is an assessment of the forming possibility of a "compensatory" effect of reducing depth of the economic crisis by changing of the fiscal policy parameters. Alternative antirecessionary scenario is directing to modeling of the results of the phase-financial support for the recipient- and donor-regions. Financial supporting of the recipient-regions is reducing their level of subsidisation and depth of the economic crisis at the beginning stage of an implementation for the state stabilisation policy. Financial supporting of the donor-regions aims to promote inward investment in the production with the high additional value and preventing an effect of the "deferred" cyclical downturn in the forecast period. Select a fiscal policy variant based on the analysis of the parameters for the regional financial policies that align the SEDR's level, while maintaining the positive trend of the national economy is development.

The proposed development scheme of the management scenarios for the SEDR makes it possibility to assess a consistency of the fiscal, monetary and investment policies and to improve a quality of an information and analytical basis for any decision-makings with respect to stabilization policy. Formation any scenarios of the management development areas based on the simulation models of the budget system indicators and the socio-economic characteristics for the regions. The simulation models are some dynamic econometric and the panel data models. The variables of this

simulation model are including the following variables: the revenues of the consolidated budget; the health care expenses; the education expenses; the expenses on social protection and social security; the cost on the economic activities; the costs of the state budget, some donations and grants, any investment transfers to the regions. Simulation model of the socio-economic characteristics for the development regions makes it possible to carry out an analysis of any regional differences in some trends in external "shock" at an expense of the effectiveness of the strategy. It includes the following variables: a gross regional product, a total volume of any exports, an investment in the fixed assets, the level of employment, a total volume of import or innovative products, a value of any foreign investments, an average monthly salary, a wage income, a level of the economically active population, a provision of housing, a commission houses, a number of the university students. Sufficiently high forecasting accuracy of the characteristics for the regional development, derived from simulation models, allows use them to develop some scenarios for the development areas at any different variants of the fiscal policy. Implementation derived scenarios allows forming the following conclusions:

1) analysis of the forecasting dynamics for the SEDR in the case of an implementation of the optimistic scenario of the tax revenue to the budget demonstrates an effectiveness of the stabilization policy, which adopted to help prevent formation of crisis in some dynamics of the macroeconomic and regional development indicators, also this analysis can to prolong the growth phase by 2014 and to reduce a depth of the crisis in 2015;

2) at the pessimistic scenario of the development indicators for the budget system "compensatory" effect of reducing the capacity of the financial management for territory can be forming by changing the financing regional policy parameters; this policy should be designed to support the "problem"-regions and the regions-"leaders", which significantly slowing down rate of the economic growth at the "base" politics leveling of the SED;

3) analysis of the irregularity coefficients of the SEDR suggests a trend of convergence of some economic development levels of the territories under different development scenarios and at reducing the intergroup social and economic differentiation.

5. CONCLUSION

The paper discusses the conceptual fundamentals of the provisions and the model estimates of the irregularity and cyclical dynamics of the SED, the implementation of which is been aimed to reducing an interregional disparity, while ensuring sustainable economic growth. Also was proposed the complex of the classification models for the territorial development, which based on the modern methods modeling and forecasting and it gives an opportunity to assess the stability of the cluster formation regions at the SED's level, to analyze their structural dynamics. In additional, this complex allows establishing a system of the integrated indicators for the SEDR, allowing making an analysis of trends in the regions development. Besides that, it allows determining the asymmetry types of the regional development for the different regions; highlight the dominant type of asymmetry and the priority structural components of the SEDR for state regulation. As well, was proposed the

forecasting cyclical dynamics models of the economic development and the crisis in the SEDR, which opens up new possibilities in forming the strategic preventive measures; the scenario regulation models of the territorial development, which allow conduct multivariate projections of the regional economic development and the state dependence the adopted fiscal policy. Developed theoretical and methodological fundamentals of the estimation of the irregularity and cyclical dynamics for the SEDR can assess the degree of the interregional disparities and it can identify the regional disparities in the economic space development. Moreover, those fundamentals can determine the types of asymmetry of the regional development. On those fundamentals are doing the timely adjustment of the regional policies parameters, which to direct forming the holistic economic space.

Notwithstanding quite big interest to elaboration of the models of the balanced develop regions, some questions are not found a quite attention. Those question are linking with the following: with assessment of heterogeneity of the economic space, with detection of the factor-sources of the asymmetry development, with forecasting of a crisis dynamic of the territories, with analysis of the consequences of the resonance oscillations, with assessment of a consistency for the indicators of fiscal policy and dynamic of the investment processes.

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Fig-1. Diagram showing the relationship of the complex assessment models and an analyze of the irregular development of the territories

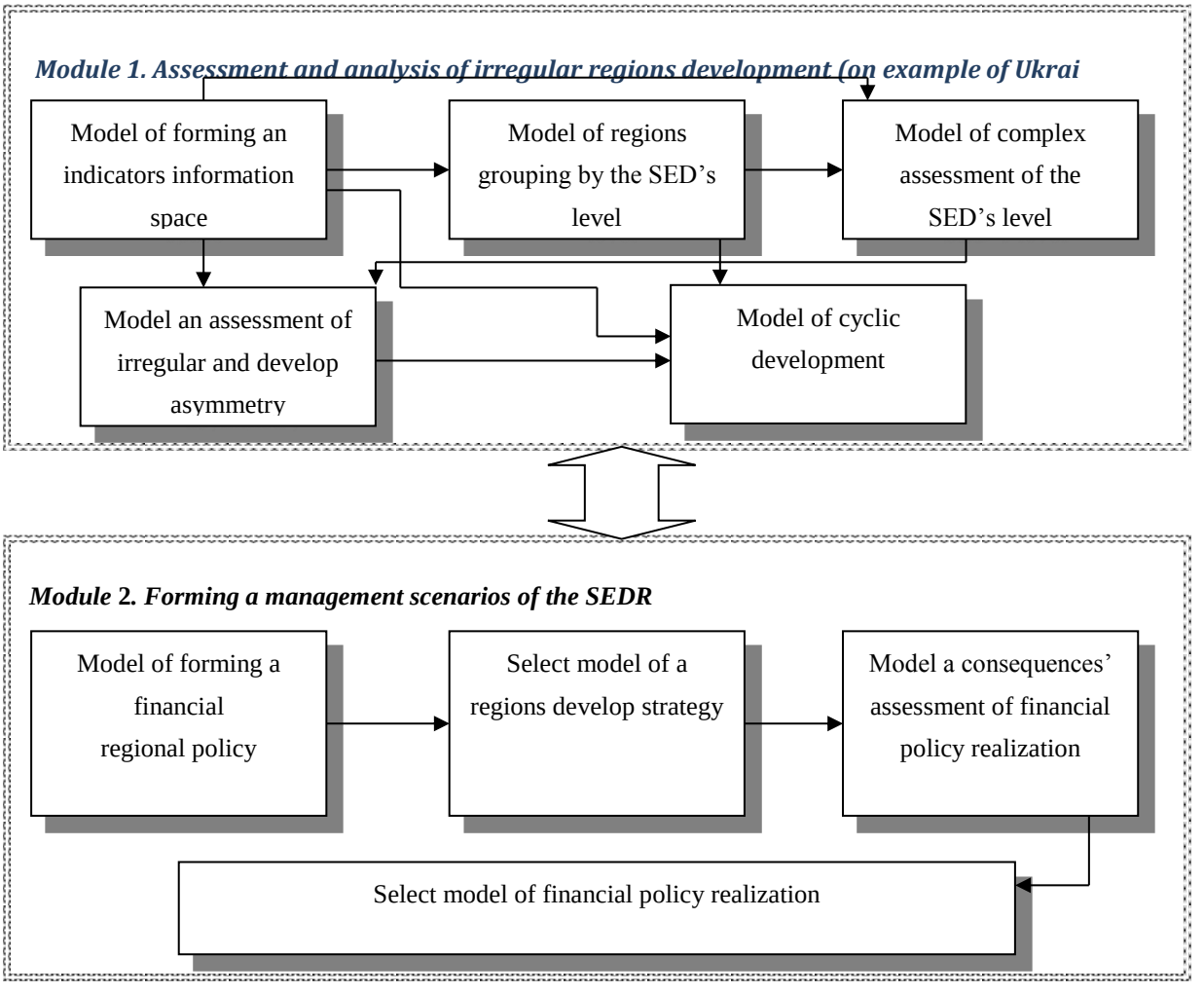


Fig-2. Changes in the level of a development of the regions of Ukraine for the period 2000-2009

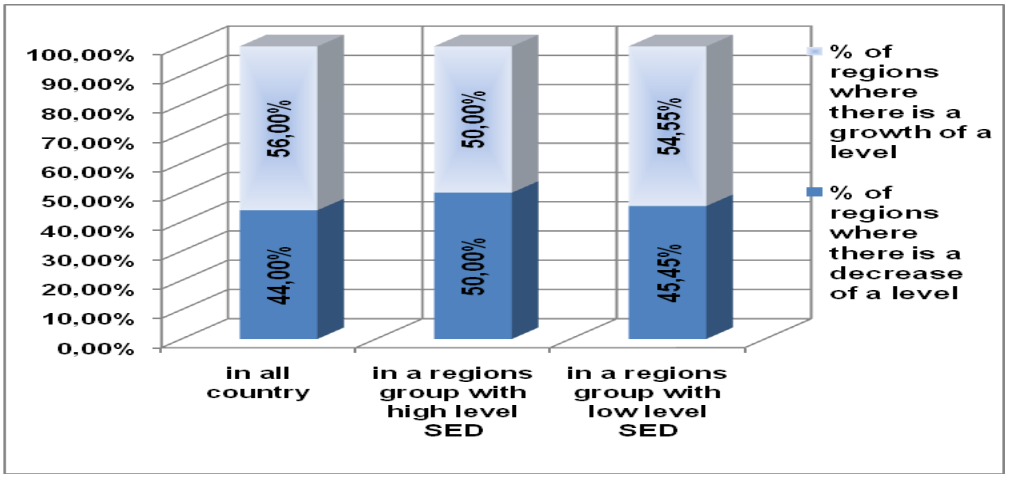


Fig-3. Changes in the level of a development of the Russian regions for the period 2000-2009

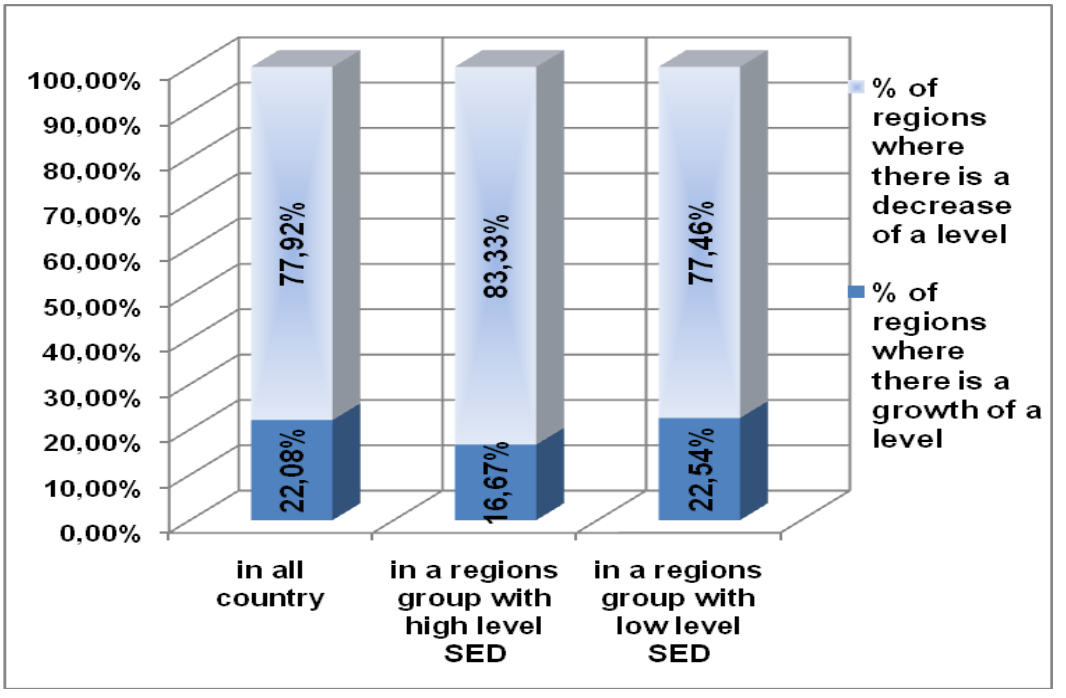


Fig-4. The map of the ranks of the SED (blue color it's the regions with the high level of the SED; yellow color – with the low level of the SED)

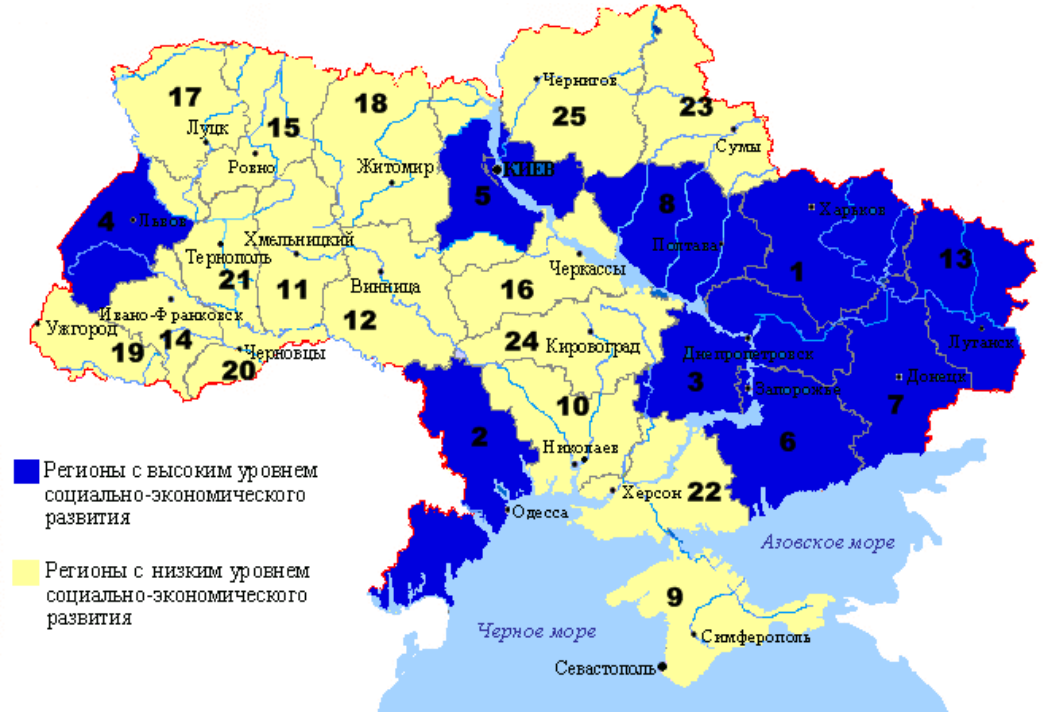
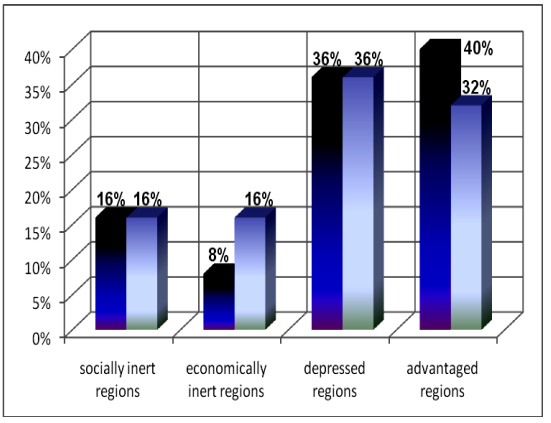
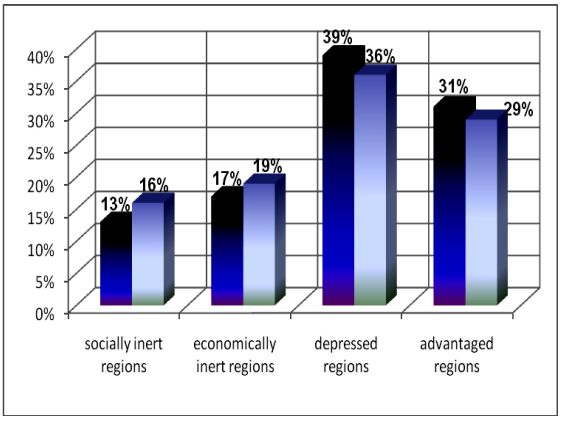


Fig-5. Region's share of each group in 2009 (outer circle) compared to 2000 (inner circle)



a) Ukraine



b) Russia

Table-1. Dynamics of the changes in the absolute value of (IT) and relative (E) ratio Theil entropy

	2001	2002	2003	2004	2005	2006	2007	2008	2009
IT	0,0148	0,0120	0,0123	0,0122	0,0166	0,0176	0,0194	0,0219	0,0204
E	0,0046	0,0037	0,0038	0,0038	0,0052	0,0055	0,0060	0,0068	0,0063

Table-2. Description of the inertial scenarios of the SEDR

Scenario	Unit designation scenario	Scenario description
optimistic inertial	scenario 1	Forecasting of the dynamic of the SEDR's development as a result of an implementation of the adopted tax-budget policies with some expansion of the tax base
pessimistic inertial	scenario 2	Forecasting of the dynamic of the SEDR's development as a result of an implementation of the adopted tax-budget policies without some expansion of the tax base