
SOME ASPECTS OF COMPARATIVE ANALYSIS OF BANKS FUNCTIONING

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Abstract: *General problems of carrying out the comparative analysis of the banks functioning and development are considered. The essence of a microsituation for carrying out the comparative analysis of the banks functioning and development is revealed. Various types of microsituations are generalized when carrying out the banks functioning comparative analysis. The approach to comparison of the banks functioning and development based on Wilcoxon criterion is offered.*

Key words: *bank, analysis, microsituation, statistical conclusion, Wilcoxon criterion.*

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Introduction

When considering directions of solving different aspects of analysis of the market economy objects spatial-temporal dynamics the necessity arises, in any event, to carry out the comparison between the characteristics of the subjects being studied. The performance of such analysis is related, first of all, to elucidation of the arisen situation in the estimation of the economic entity functioning being studied and comparison of such object development with other similar market objects development. As a whole, this contributes not only to revealing of the reasonable approaches to the arising problems solution, but to the possibility to justify look-ahead actions in decision-making relating to the stable functioning and development of the economic entity being studied.

In this work the banks are chosen as an example of the specific economic entities. This is motivated by the fact that the stable and systematic development of the banking sector has a profound impact on the reproduction structure of economy, as through the banking the flow and reallocation of monetary resources and capital funds are organized. At the same time, the analysis of the finance flows both of the banking system, as a whole, and individual banks, in particular, is one of the key components of building of the adequate economic security system of the economic entity operating in the market economy [1, 2]. Eventually, it is precisely this that defines the urgency of the given direction of the investigation, the importance and utility of its consideration as far as the banks is concerned.

Justification of the investigation purpose

The basis for performance of the banks functioning comparative analysis involves, as a rule:

- the models based on generalization and consideration of the normative indices, coefficients of economic agents activity standards with the subsequent estimation of their rating [3, 4];
- the methods of statistical conclusion based on econometric models and methods having in their origin the game theory approaches [5, 6];
- the methods of the fuzzy sets theory [1, 7].

In this case the prevalent approaches of the comparative analysis, as a rule, are:

- either relative generalization of dynamics of the corresponding activity indices of the economic entity being analyzed [8],
- or construction of cluster models which allow to rank the degree of development of the objects being compared [9, 10].

But in any case the mathematical basis of investigations consists, mainly, of the probabilistic methods for data analysis. In this case the solution key aspect consists in determination of the analyzed data distribution parameters with a view to obtain an adequate model, often this is connected with violation of the distribution normality law of the data sampling involving such objects. At the same time, the main problem, arising when constructing an adequate model of the banking comparative analysis, is connected with that the economic development laws assume the presence of such interaction between different subject of the market and account for the action on these interactions of various surroundings manifestations, not having a definite statistical nature in the classical meaning. Solution of the given problem is reached, in a way, through introduction of different aspects of information saturation, banking indices being considered, into the problem treatment. But in the given case another problem arises associated with the necessity to consider the procedure of various manifestations ranking of information saturation of one or other banking indices.

Thus, openness of the problem of construction or choice of the model for comparative analysis of the banks functioning and development stimulates the performance of investigations directed to its solution.

Some methodological aspects of comparative analysis of banks functioning

Classical approach to solution of the formulated problem is the use of the finance flows, which makes it possible to give the most complete description of the banking on the basis of multiple presentation of the initial data (separate indices of activity) x_t^γ of their sets of γ at a certain temporal interval t in terms of the finance flows – $\{x_t^\gamma\}$.

This is associated with that the basis of the flow approach comprises the possibility to realize the structuring of data for complex dynamic systems, it is precisely the structuring that opens different directions for carrying out the necessary analysis [11].

At the same time, the flow processes involve all spheres of the market economy, this is rather important as far as the banks is concerned as the centers of redistribution of monetary and reallocation of capital. This also allows taking into account the degree of various environment factors action, governing thereby the information saturation of the indices being considered.

It should be noted in this case that the flow approach can serve not only as the set of instruments for the banks functioning and development, but also act as the combining center of various approaches applications for carrying such analysis.

At the same time one of the shortages of the flow approach consists in performance of the banks generalizing comparative analysis as the financial flow concept assumes only consideration of some sets of such flows while their structuring is also significant. Therefore, the following part of the given investigation is just devoted to the processes of more precise bank finance flows structuring.

Microsituation concept as the foundation for performance of the banks functioning comparative analysis and development

Some problems of finance flows structuring for carrying out of the economical processes dynamics comparative analysis were considered in [1]. Nevertheless, the problematic aspects concerning comparison of special and general finance flows for their further structuring and analysis remain beyond the scope of investigations. First and foremost, such a generalization concerns, first of all, the problems of description of the situation of functioning of the banks as a complex system and the banks taken individually.

One of the specified problem solution directions can be the use of the microsituation concept which found the proper application when solving a number of problems arising in emergency situations [12].

In the given aspect, to perform the comparative analysis of the banks functioning and development based on the flow approach, by the microsituation, variety of the banking description with the help of the corresponding parameters and indices should be meant.

In this case the concrete microsituation S^L can be described in the form of a separate finance flow or some set of them being defined with a set of data $\gamma, (\gamma = \overline{1, m})$, characterizing the banking of some bank $L, (L = \overline{1, n})$:

$$S^L = (\{x_t^{k1}\}^L, k1 \in \gamma, \quad (1)$$

$$S^L = (\{x_t^{k1}\}, \{x_t^{k2}\}, \{x_t^{k3}\})^L, k1, k2, k3 \in \gamma. \quad (2)$$

Thus, comparing banks between themselves we, first of all, compare the micro situations which in the given case describe the state of the banks functioning and development in terms of some parameter or their totality:

$$S^1 = (\{x_t^{k1}\}, \{x_t^{k2}\}, \{x_t^{k3}\})^1 \approx S^2 = (\{x_t^{k1}\}, \{x_t^{k2}\}, \{x_t^{k3}\})^2, 1, 2 \in L, \quad (3)$$

where S^1 – is the microsituation describing the first of the banks being analyzed, S^2 – is the microsituation describing the second of the banks being analyzed.

At the same time it is possible to carry out comparison of the banks development and functioning as a whole fixing parameter t . Then, in the given case, variation of some of the banking parameters being analyzed x_{tp}^γ for a

fixed date tp in terms of the whole variety of banks– $\{x_{tp}^\gamma\}^L, L, (L = \overline{1, n})$ is considered as a finance flow.

In this case the concrete microsituation can be presented in the following form:

$$S_{tp}^L = (\{x_{tp}^\gamma\}^L, tp \in t, \gamma, (\gamma = \overline{1, m}), \quad (4)$$

or

$$S_{tp}^L = (\{x_{tp}^\gamma\}, \{x_{tp}^\gamma\}, \{x_{tp}^\gamma\})^L, tp \in t, \gamma, (\gamma = \overline{1, m}). \quad (5)$$

Then the comparison consists in performance of the analysis between the microsituations describing the state of the banking system functioning as a whole at some fixed dates of time:

$$S_{tp1}^L = (\{x_{tp1}^\gamma\}, \{x_{tp1}^\gamma\}, \{x_{tp1}^\gamma\})^L \approx S_{tp2}^L = (\{x_{tp2}^\gamma\}, \{x_{tp2}^\gamma\}, \{x_{tp2}^\gamma\})^L, tp1, tp2 \in t. \quad (6)$$

Ultimately, we receive some set of microsituations $\Omega = \{S^L, S_{tp}^S\}$, completely describing functioning and development of the banking system. Since, as mentioned above, not all microsituations can have the normal distribution, then we shall consider nonparametric tests to verify the hypothesis for coincidence of the microsituations being investigated. In the given case it is expedient to use the test Wilcoxon for bound samplings [13], which answers the question: whether some event essentially changing the microstructure hierarchy took place in the analyzed data which characterize different samplings.

In other words, when carrying out the comparative analysis of banks functioning and development the analyzed microsituations distinguishability is studied. Then the value of the Wilcoxon test can be used as the measure of distinction (agreement) of the microsituations being considered. The greater is the value of the test being considered, the more distinguishable as a whole are the microsituations being considered and vice versa, the less is the value of the test being considered the closer are the microsituations being considered.

The initial data and results of the comparative analysis of banks functioning in Ukraine

The foregoing approach is being considered as an example of the banking in Ukraine in terms of such index as a share of the granted credits in the overall totality of bank assets. The paramount importance of consideration of such banking values is associated with that just the credits

- on the one hand, constitute a considerable part of bank operations and, respectively, operating profits in total gains of a bank from such operations,
- on the other hand, the granted credits growth results in credit risks and, consequently, in the banks development destabilization.

Thus the problem associated with the succession of the development dynamics of relation between the granted credits and total volume of banks assets both for the banking system as a whole, and in terms of separate banks functioning is rather significant. The more so the generalized dynamics of the relation between the granted credits and total volume of banks assets as a whole is indicative of the rise in the banks preferred weight with the increased part of the granted credits in their assets volume (Fig.1, generalized using the site www.finance.ua).

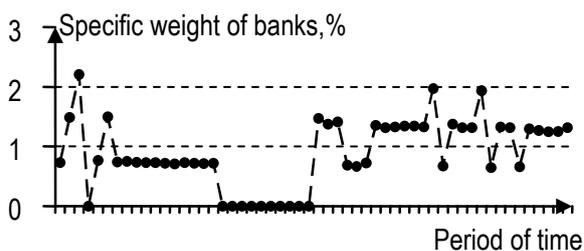
Hence the essence of the first question as to carrying out the comparative analysis of the banking activity consists in estimation of the succession in variation of the granted credits preferred weight in their assets volume during each year of the period being investigated. To analyze such a succession is possible on the basis of investigation of the microsituations each of them describes the state of the banking system functioning as a whole for the fixed date of time t_p in terms of the banking activity index x_{tp}^y – the credits preferred weight in the banks assets (see Eq.7). The results of such investigation obtained within the periods of 2004, 2005, 2006 and 2007 years in section of each month represent a separate microsituation shown in Figs.2-5 (generalized on the basis of the above approach and data of the site www.finance.ua). In this case the black circles mark the microsituations the most consistent between themselves, the microsituations less consistent are not shown at all.

The dimension of each circle represents the degree of correspondence (consistency) of microsituations being investigated in section of every month of the years covered. The smaller is the circle, the greater is the consistency between the microsituations.

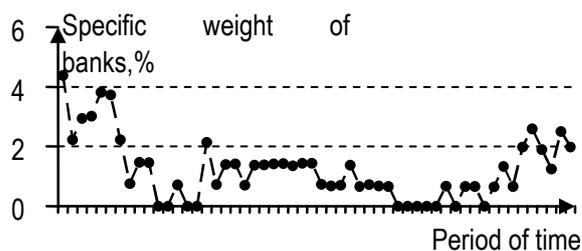
As can be seen from the data in Fig.2 the corresponding consistency between microsituations in the banking system development of Ukraine by the results of 2004 in terms of the credits specific weight in the banks assets is the least one.

At the same time the analysis of data from Fig.2-Fig.5 testifies that year after year the consistency between the microsituations becomes stronger. This is apparent both from the increase in the microsituations number and from the increase in such consistency, the decrease in the circles dimensions demonstrates this. Hence a dangerous situation forms in the banking system development in Ukraine as a whole, which is marked by the rise in the credits specific weight in the banks assets structure, this can cause the rise in credits risk level. Moreover, continuity in such development is observed.

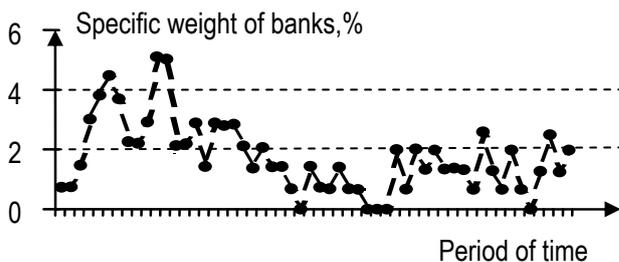
In other hand the analysis performed according to the above methods of consistency in development of separate banks is not less interesting in the considered aspect. To perform such an analysis let us consider a group of 12 banks representing those representing and operating in the same region that makes it possible to consider indirectly the action of various factors on their functioning and development. For the microsituations, their comparison will represent consistency of separate banks development, generalization of their finance flows appears, this represents the specific weight of credits in the structure of such banks assets. Further comparison is carried out on the basis of Wilcoxon criterion according to Eq.3. Fig.6 shows results of such consistency.



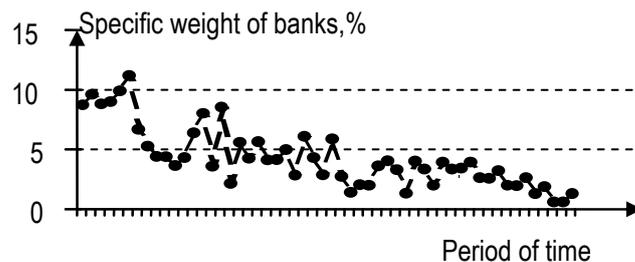
a) specific weight within 0%-10%



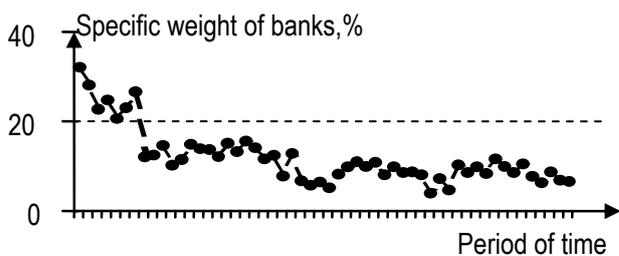
b) specific weight within 10%-20%



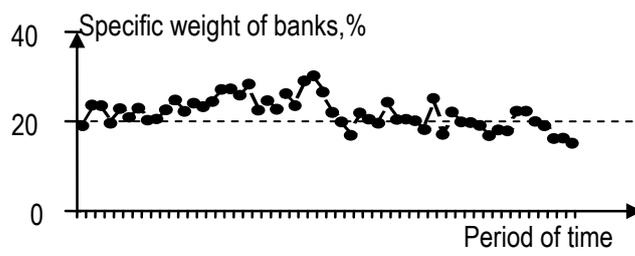
c) specific weight within 20%-30%



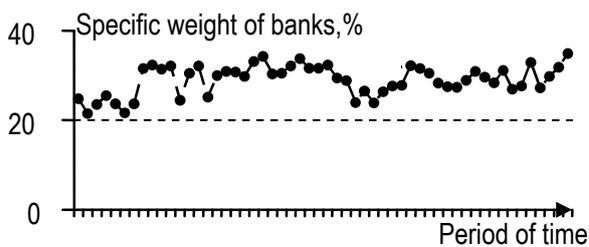
d) specific weight within 30%-40%



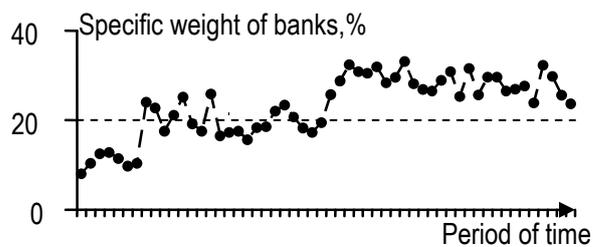
e) specific weight within 40%-50%



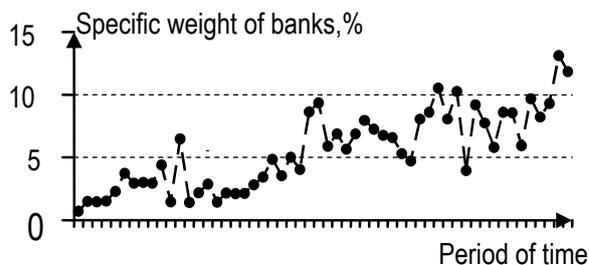
g) specific weight within 50%-60%



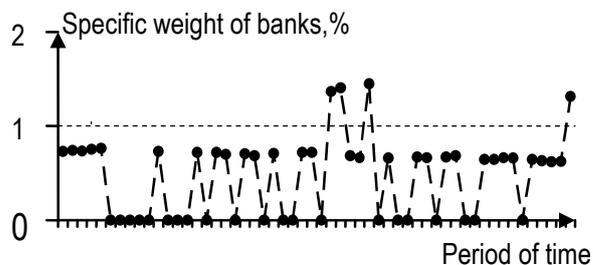
f) specific weight within 60%-70%



g) specific weight within 70%-80%



h) specific weight within 80%-90%



i) specific weight within 90%-100%

Fig.1 The specific weight dynamics of the granted credits to the total assets volume in the banking system as a whole during the period from 01.01.2004 till 01.05.2008

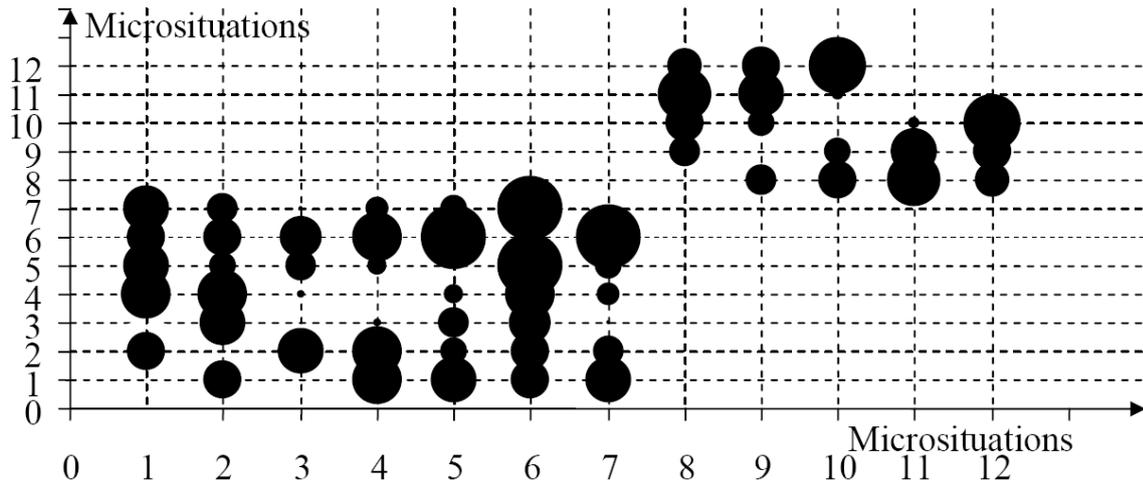


Fig.2 Consistency of microsituations representing variation of the credits specific weight in the banks assets volume according to the results of the banking system work in 2004.

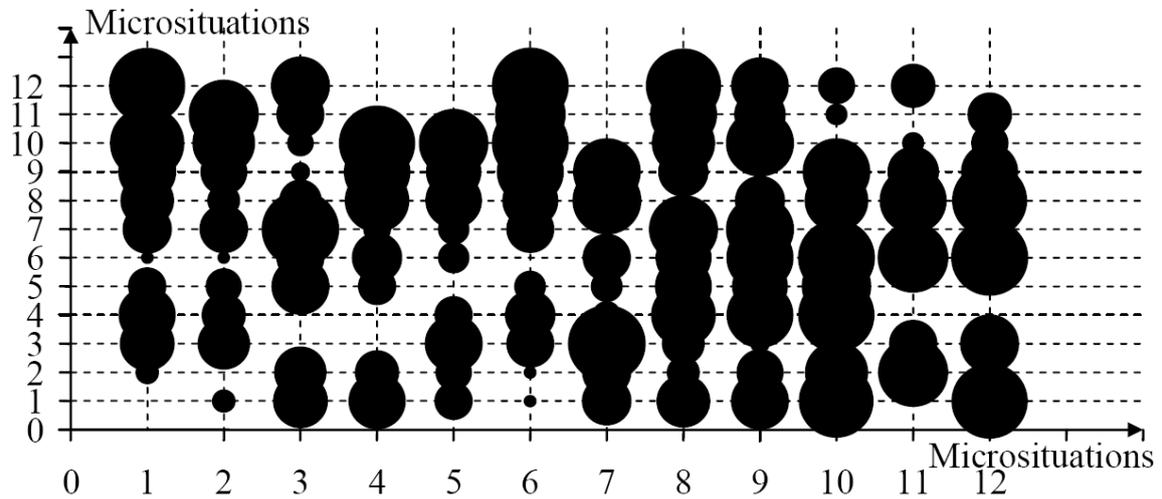


Fig.3 Consistency of microsituations representing variation of the credits specific weight in the banks assets volume according to the results of the banking system work in 2005

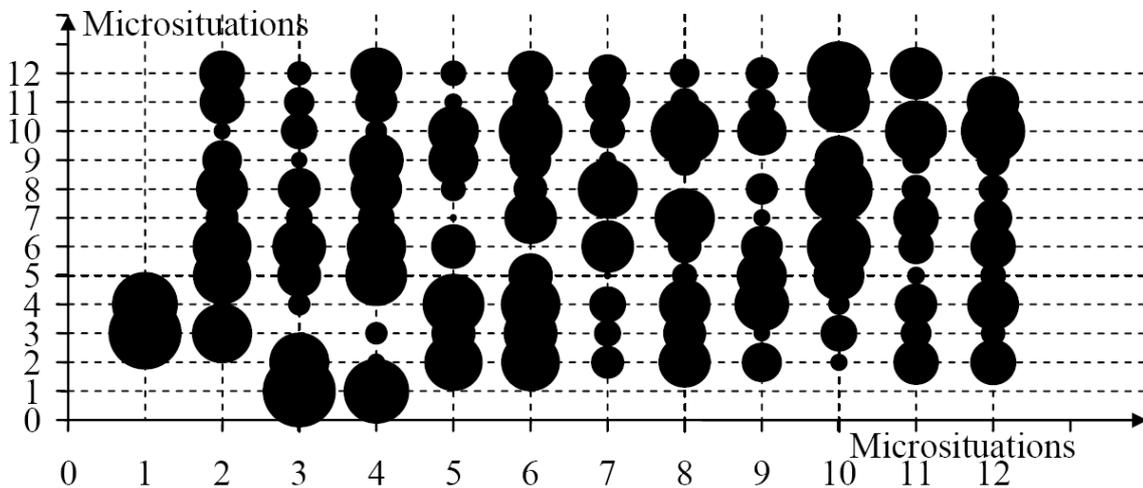


Fig.4 Consistency of microsituations representing variation of the credits specific weight in the banks assets volume according to the results of the banking system work in 2006.

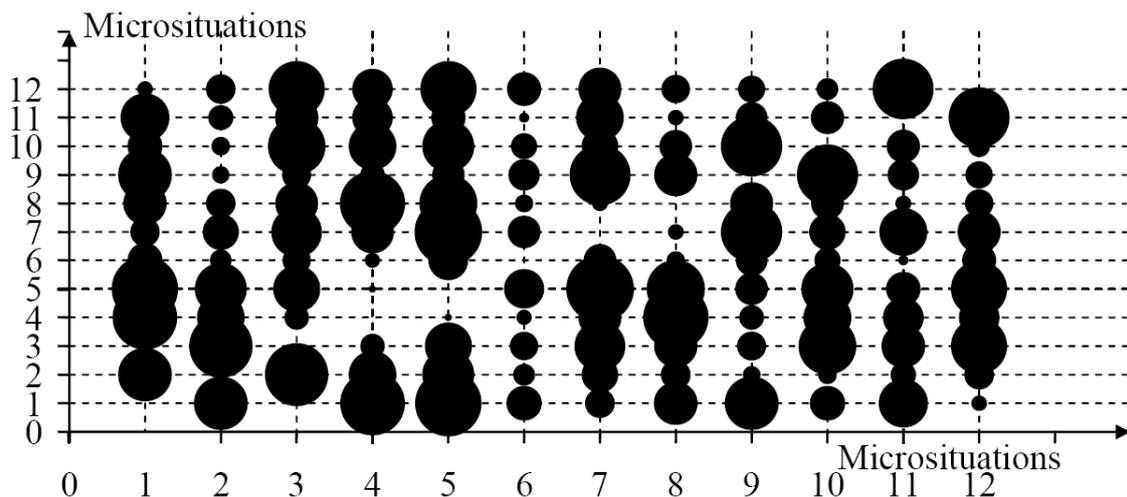


Fig.5 Consistency of microsituations representing variation of the credits specific weight in the banks assets volume according to the results of the banking system work in 2007

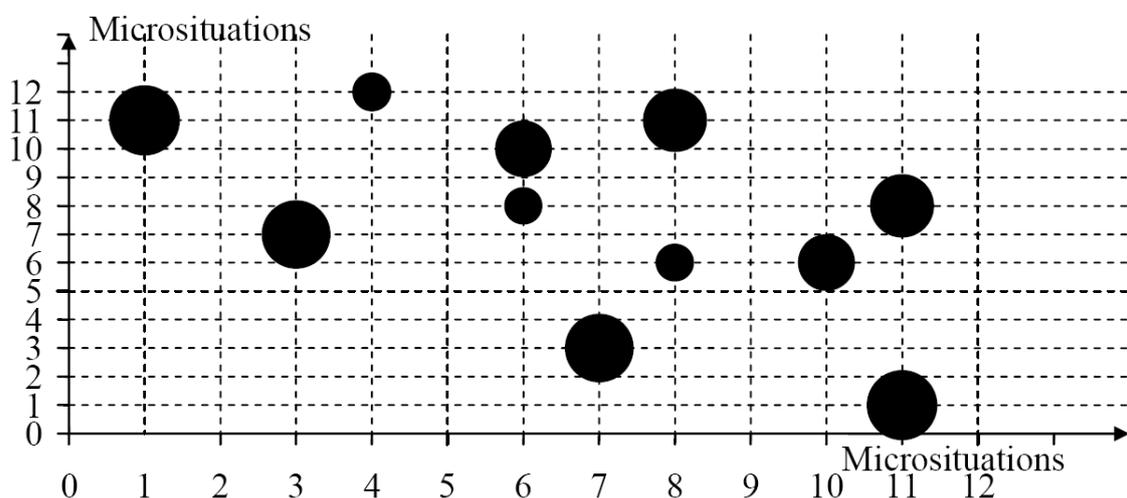


Fig.6 Consistency of microsituations representing variation of the credits specific weight in the banks assets volume according to separate banks of the group being studied by the results of their work within the period from 01.01.2004 till 01.05.2008

As evident from the data in Fig.6 the microsituations consistency in the considered aspect is not observed for the group of banks under study. Thus it may be concluded that each of the banks chooses its own strategy of increase of the credits being granted. Nevertheless, according to the data from Figs.2-5 such a strategy as a whole is aimed at increasing the credits specific weight in the banks assets structure. Consequently, the problem of the credit risk rise remains an urgent one.

Conclusions

Hence the methods for performing the comparative analysis of functioning and development of both the banking system as a whole, and separate banks in particular are offered in the given work. The essence of such methods consists in presentation of the banking activity in the form of a set of microsituations, each of them characterizing such activity based on definite finance flows which in turn reflect one or another index of separate banks activities. In this case non-parametric tests based on Wilcoxon criterion are used for the microsituations comparison. Adequacy and efficiency of the offered methods are approved using the real data concerning one of the banking activity directions. This makes it possible to use the given methods for carrying out the extended comparative analysis of various directions of both separate banks, and banking system as a whole.

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Bibliography

1. Kuzemin A., Lyashenko V. Fuzzy set theory approach as the basis of analysis of financial flows in the economical security system // International Journal "INFORMATION THEORIES & APPLICATIONS" – 2006. – Vol. 13, Num. 1. – P. 45–51.
2. Kuzemin A., Lyashenko V. Analysis of Spatial-temporal Dynamics in the System of Economic Security of Different Subjects of Economic Management // International Journal "Information Technologies and Knowledge" – 2008. – Vol. 2, Num. 3. – P. 234–238.
3. Kuzmenko E.S. Methods for banks safety rating estimation// Urgent problems of economics. – 2007. – № 1. – P. 164–175.
4. Indicators of financial stability. Instruction manual. – Washington, Columbia District, USA: International Monetary Fund, 2007. – 326 p.
5. Azarenkova G.M. Models and methods for financial flows analysis. – KharkovX: ВКФ "Grif", 2005. – 119 p.
6. Watshem T.G., Parramaw K. Quantitative methods in finances. – M.: Finances, ЮНИТИ, 1999. – 527 p.
7. Nedosekin A.O. Application of fuzzy models to banks finances management // <http://sedok.narod.ru>.
8. E.V. Comparative analysis of the banking systems of Russia and Czech Republic under condition of the transitional period in economics // Materials of the V International scientific-practical conference "Countries with transitional economy under conditions of globalization". – M.: РУДН, 2006.
9. Golovan' S.V., Karminsky A.M., Kopylov A.V., Peresetsky A.A. Models of the Russian banks default probability. Preliminary banks partitioning into clusters // Preprint # 2003 XXX. – M.: ПЭШ, 2003. – 49 p.
10. Snityuk V. Evolutionary clusterization of complex objects and processes // XI-th International Conference «Knowledge-Dialogue-Solution» – Varna, 2005. – Vol. 1. – P. 232–237.
11. Kuzemin A., Lyashenko V., Bulavina E., Torojev A. Analysis of movement of financial flows of economical agents as the basis for designing the system of economical security (general conception) // Third international conference «Information research, applications, and education». 27-30 June. Varna, Bulgaria. – Sofia: FOI-COMMERCE – 2005. – P. 204–209.
12. Kuzemin A., Lyashenko V. Conceptual Foundations of Construction of the Models and Procedures for Prediction of the Avalanche-dangerous Situations Initiation // International Journal INFORMATION THEORIES & APPLICATIONS. – 2008. – Volume 15. – №2. – P. 153–158.
13. General theory of statistics: Manual// T.V. Ryabushkin, M.R. Efimova, I.M. Ipatova, N.I. Yakovleva. — M.: Finance and statistics, 1981.

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