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COMPLEX OF MODELS OF FINANCIAL DECENTRALISATION ANALYSIS AND ASSESSMENT

Abstract. It is a problem of a financial decentralization mechanism modelling to be considered in the paper. It introduces a methodical approach to the construction of models of financial decentralization assessment and analysis complex, that, basing on the methods of factor, canonical analysis, cluster analysis, development level method, Kohonen neural networks, panel data models, allows to create diagnostic classes of the financial decentralization level, choose an «etalon» model of development and assess the impact of the financial decentralization level on indicators of socio-economic development of territories. The methodological approach proposed includes the following stages: classification of countries according to the level of socio-economic development and competitiveness, the formation of a comparable research base; the formation of an indicators system and diagnostic classes of the level of financial decentralization; development of models for assessing the impact of financial decentralization on socio-economic indicators of territories development. To build a set of models Statistica, R, Deductor Studio, EVIEWS were used. The simulation results showed that a high level of financial decentralization is typical for countries with high level of economic development, where there is a high quality of the institutional environment and administrative decentralization, this leads to increase in the efficiency of the public sector operation and economic growth as consequence. Income decentralization is bounded to a stronger effect on economic growth than expenditure decentralization. The result of the strengthening of federalism aligning and tax autonomy is a slowdown in economic growth. Meanwhile, the negative effect of tax autonomy is stronger than the effect of aligning federalism. There is a gap between the growth rates of income and expenditure powers of budgets of different levels and the GDP growth rates in countries with a high level of competitiveness and socio-economic development, that reduces the level of fiscal and debt security. Therefore, a promising area of research is assessing the systemic risk of financial policy and stability of the financial system to the impact of external «shocks».

Keywords: financial decentralization, socio-economic development, assessment, methods of multivariate analysis, Kohonen neural networks, panel data.

JEL Classification C38, H61, H72

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КОМПЛЕКС МОДЕЛЕЙ ОЦІНКИ ТА АНАЛІЗУ ФІНАНСОВОЇ ДЕЦЕНТРАЛІЗАЦІЇ

Анотація. Розглянуто проблему моделювання механізму фінансової децентралізації. Запропоновано методичний підхід до побудови комплексу моделей оцінки і аналізу фінансової децентралізації, який на основі методів факторного, канонічного аналізу, кластерного аналізу, методу рівня розвитку, нейронних мереж Кохонена, моделей панельних даних дозволяє сформулювати діагностичні класи рівня фінансової децентралізації, обрати «еталонну» модель розвитку і оцінити вплив рівня фінансової децентралізації на показники соціально-економічного розвитку територій. Запропонований методичний підхід включає такі етапи: класифікація країн за рівнем соціально-економічного розвитку та конкурентоспроможністю, формування порівнянної бази дослідження; формування системи індикаторів і діагностичних класів рівня фінансової децентралізації; розробка моделей оцінки впливу децентралізації на соціально-економічний розвиток територій. Для побудови комплексу моделей використовувалися Statistica, R, Deductor Studio, EViews. Результати моделювання показали, що високий рівень фінансової децентралізації характерний для країн з високим рівнем економічного розвитку, в яких спостерігається висока якість інституційного середовища і рівень адміністративної децентралізації, що призводить до зростання ефективності функціонування державного сектору і як наслідок — економічного зростання. Децентралізація за доходами пов'язана з більш сильним ефектом для економічного зростання, ніж децентралізація за видатками. Посилення вирівнювального федералізму і податкової автономії призводить до уповільнення темпів економічного зростання. Причому негативний ефект податкової автономії сильніший, ніж ефект вирівнювального федералізму. Спостерігається розрив між темпами зростання доходних і видаткових повноважень бюджетів різних рівнів і темпами зростання ВВП у країнах з високим рівнем конкурентоспроможності та соціально-економічного розвитку, що знижує рівень бюджетної і боргової безпеки. Тому перспективним напрямом дослідження є оцінка системного ризику фінансової політики і стійкості фінансової системи до впливу зовнішніх «шоків».

Ключові слова: фінансова децентралізація, соціально-економічний розвиток, оцінка, методи багатовимірної аналізу, нейронні мережі Кохонена, панельні дані.

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КОМПЛЕКС МОДЕЛЕЙ ОЦЕНКИ И АНАЛИЗА ФИНАНСОВОЙ ДЕЦЕНТРАЛИЗАЦИИ

Аннотация. Рассматривается проблема моделирования механизма финансовой децентрализации. Предложен методический подход к построению комплекса моделей оценки и анализа финансовой децентрализации, который на основе методов факторного, канонического анализа, кластерного анализа, метода уровня развития, нейронных сетей Кохонена, моделей панельных данных позволяет сформировать диагностические классы уровня финансовой децентрализации, выбрать «эталонную» модель развития и оценить влияние уровня финансовой децентрализации на показатели социально-экономического развития территорий. Предложенный методический подход включает следующие этапы: классификация стран по уровню социально-экономического развития и конкурентоспособности, формирование сопоставимой базы исследования; формирование системы индикаторов и диагностических классов уровня финансовой децентрализации; разработка моделей оценки влияния уровня децентрализации на социально-экономическое развития территорий. Для построения комплекса моделей использовались Statistica, R, Deductor Studio, EViews. Результаты моделирования показали, что высокий уровень финансовой децентрализации характерен для стран с высоким уровнем экономического развития, в которых наблюдается высокое качество институциональной среды и административная децентрализация, что приводит к росту эффективности функционирования государственного сектора и как следствие — экономическому росту. Децентрализация по доходам связана с более сильным эффектом для экономического роста, чем децентрализация по расходам. Следствием усиления выравнивающего федерализма и налоговой автономии является замедление темпов экономического роста. При этом негативный эффект налоговой автономии сильнее, чем эффект выравнивающего федерализма. Наблюдается разрыв между темпами роста доходных и расходных полномочий бюджетов различных уровней и темпами роста ВВП по странам с высоким уровнем конкурентоспособности и социально-экономического развития, что снижает уровень бюджетной и долговой безопасности. Поэтому перспективным направлением исследования является оценка системного риска финансовой политики и устойчивости финансовой системы к воздействию внешних «шоков».

Ключевые слова: финансовая децентрализация, социально-экономическое развитие, оценка, методы многомерного анализа, нейронные сети Кохонена, панельные данные.

Формул: 0; рис.: 2; табл.: 3; библи.: 34.

Introduction. In the context of increasing financial systems instability that is associated with globalization processes and appearance of new specific threats, the improvement of financial management systems at various levels of the hierarchy (including state and regional) is of the particular importance, aimed to control risks, form of financial support for sustainable economic growth and early warning of crisis and catastrophic socio-economic situations. Among the ways to improve such systems is development of effective mechanisms of fiscal federalism and financial decentralization, ensuring a balanced development of fiscal (tax and budget) systems to improve the coherence of the functional and financial capabilities of local governments, improve the quality of life of the region's population, ensure sustainable development, both of individual regions and the state as a whole.

It worth to note that along with the positive effects of financial decentralization, which are manifested in time reduce of decision-making regarding the strategies of socio-economic development of regions that meet the expectations of society; openness and transparency of decision-making procedures; increasing initiatives and responsibility for decision-making, fiscal federalism carries certain risks. Primarily, such risks include autonomization and confrontation of goals of socio-economic development of individual territorial entities and the state as a whole; disintegration of activity that is related to the provision of public services; coordination difficulties; increased risks of decision-making, etc. Therefore, the relevant direction of the study is the development of models for assessing the impact of financial decentralization on the indicators of socio-economic development of territories.

Literature review and the problem statement. The investigations of such authors are devoted to the problem of the mechanisms of financial decentralization simulation: Aldasoro I., Seiferling M. (2014), Asatryan Z., Feld L. (2014), Bartolini D., Stossberg S., Blöchliger H. (2016), Baskaran T., Feld L. P., Schnellenbach J. (2016), Bloch D. (2016), Hughes G., Smith S. (1991), Oates W. E. (1999, 2002, 2008), Stegarescu D. (2005), Tanzi Vito (2007), Voigt S. (2011), Weingast B. R. (2007), Guryanova L., Klebanova T., Gvozdytskiy V. (2015), Brunnik R., Klebanova T., Guryanova L., Kavun S., Trydid O. (2014), Baltina A. M. (2010), Volokhova I. S. (2016), Peshina E., Strekalova A. (2016) and others. Thus, in a paper of Aldasoro I., Seiferling M. (2014), the influence of vertical fiscal imbalances on the level of debt security is considered. The investigations of Bloch D. (2016), Hughes G., Smith S. (1991), Oates W. E. (1999, 2002, 2008), Tanzi Vito (2007), Weingast B. R. (2007), Peshina E., Strekalova A. (2016) are devoted to the analysis of trends in the development of mechanisms for financial decentralization, the formation of topological characteristics of models of financial decentralization. In the papers of Stegarescu D. (2005), Voigt S. (2011), Volokhova I.S. (2016) the problem of constructing a system of indicators for assessing the level of financial decentralization and monitoring trends in its development is considered. The papers of Asatryan Z., Feld L. (2014), Bartolini D., Stossberg S., Blöchliger H. (2016), Baskaran T., Feld L. P., Schnellenbach J. (2016), Stossberg S., Blöchliger H. (2017) involve the modelling problems of the level of financial decentralization impact on the rate of economic growth, uneven regional development. One considers various aspects of production-fiscal and social effects of tax and budget policy modeling that are at different levels of management in the works of Guryanova L., Klebanova T., Gvozdytskiy V. (2015), Brunnik R., Klebanova T., Guryanova L., Kavun S., Trydid O. (2014). Noting the unconditional effectiveness of the approaches proposed by the authors, we note that the papers does not fully investigate the issues of building a comprehensive assessment of financial decentralization level and analysis of its impact on the economic growth of countries with developing economies, the choice of a «reference» model of financial decentralization, taking into account the level of competitiveness and socio-economic development of territories.

The purpose of the study is to form a set of models for assessing and analyzing financial decentralization, which, based on the methods of factor, canonical, cluster analysis, development level method, Kohonen neural networks, panel models, this allows to form diagnostic classes of the financial decentralization level, choose a «reference» model of development and assess the impact of the level of financial decentralization on indicators of socio-economic development of territories.

Research results. The methodological approach to the development of a set of models for the assessment and analysis of financial decentralization proposed includes the following main stages:

Stage 1: countries classification according to the level of socio-economic development and competitiveness, the formation of a comparable research base;

Stage 2: formation of indicators system and diagnostic classes of the financial decentralization level;

Stage 3: development of models for assessing the impact of decentralization on socio-economic indicators of territories development.

It should be noted that the level of financial decentralization and the level of socio-economic development are categories that are characterized by a bilateral causal relationship. Thus, the level of financial decentralization depends on the level of economic development, the scale of the territory, the degree of uniformity of the economic space. At the same time, the effectiveness of financial decentralization mainly determines the pace of economic growth and the life quality of the population in the regions. Therefore, the target direction of the *first stage* is the formation of a comparable investigation base of the relationship between the level of financial decentralization and the pace of socio-economic development. On the first stage the following tasks are solved: *task 1.1* — formation of indicators system of socio-economic development and competitiveness of territories; *task 1.2* — countries grouping according to the level of socio-economic development and competitiveness.

To find a solution of *task 1.1* a variety of methods can be used: methods based on the criteria of autoinformation; methods focused on assessing the informativity-based analysis of causality Heyets V. M., Kusym M. O., Klebanova T. S., Chernyak O. I. and others, 2006; Edited by N. A. Kusym, T. S. Klebanova T. S., 2007; Guryanova Lidiya S., Tamara S. Klebanova, Tetiana N. Trunova, 2017; Guryanova L. S., Klebanova T. S., Milevskiy S. V., Nepomnyaschiy V. V., Rudachenko O. A., 2017). The first group of methods allows to assess the information significance of indicators, to reveal hidden properties and patterns in large volumes of raw data when the structure of the input and output data set is unknown. The advantage of the second group of methods is the possibility of reducing the dimension of the information space of features based on the analysis of cause-effect relationships of the set of input and output indicators. The choice of the method is determined by the full or incomplete provision of information, sample size, the structure of the set of input and output indicators, the presence of a training sample. Taking into account the limitations on the type of data, the structure of groups of indicators developed a block diagram of the filter system of indicators, a detailed description of which is given in (Guryanova L. S., 2013). The proposed approach is based on the methods of canonical analysis and principal components.

To solve the *task 1.2* — grouping of countries by the level of socio-economic development (SED) and competitiveness, the methods of cluster analysis (methods of classification without training) and self-organizing maps of Kohonen are used (Guryanova Lidiya, Milevskiy Stanislav, Bogachkova Lyudmila, Lytovchenko Iryna, Polyanskiy Vladislav, 2018).

The implementation of the first stage of the proposed methodological approach was carried out on the data of socio-economic development indicators and competitiveness of more than 100 objects (macro regions). To implement the models, we used Statistica, R, Deductor Studio.

The initial system of indicators is formed based on the analysis of the literature sources devoted to a problem of an assessment of social and economic development level and competitiveness of territories (Klebanova T. S., Guryanova L. S., Sergienko E. A., 2009; ed. by prof., Ph. D. in Economics Y. K. Persky, Assoc., Ph. D. in Economics N. Y. Kalyuzhnova, 2003, etc.). Such indicators, in particular, include both quantitative indicators-GDP per capita, unemployment rate, consumption per capita, inflation, as well as qualitative indicators — Global competitiveness index (GCI), Global innovation index (GII), Human development index (HDI), ICT development index (ICTDI), Index of economic freedom (IoEF). 108 macro regions data were considered for the period 2014—2018.the Initial data set included 3888 elements.

Based on the method of the main components and canonical correlations, the evaluation of the information content of the initial system of indicators is carried out, the system of diagnostic indicators is formed. The resulting system was the basis for building a group of macro regions in terms of socio-economic development and competitiveness. The optimal number of clusters was determined using GAP statistics, the «elbow» method, the silhouette method (Guryanova Lidiya, Milevsky Stanislav, Bogachkova Lyudmila, Lytovchenko Iryna, Polyansky Vladislav, 2018).

Fig. 1 shows the results of macro regions grouping by the level of socio-economic development and competitiveness on the basis of hierarchical agglomerative methods of cluster analysis (Ward's method) (Fig. 3a) and self-organizing Kohonen maps (Fig. 3b).

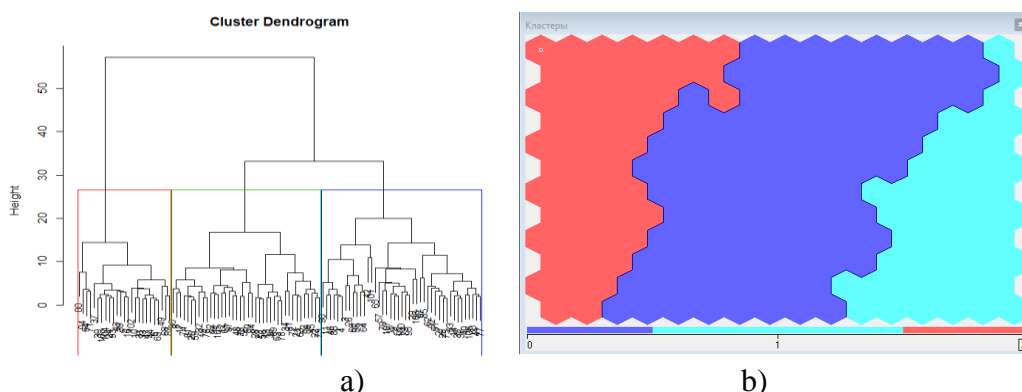


Fig. 1. Results of objects grouping (macro regions) based on Ward's method and Kohonen's self-organizing maps

One sees in fig. 1, the initial set of objects is divided into three classes according to the level of SED and competitiveness: a cluster of macro regions with high, medium, low level of socio-economic development. Composition analysis of the clusters (Tabl. 1) allow to conclude that the cluster of objects with the low level of socio-economic development formed 37 macro regions (34% of the total), of the average level — 46 macro regions (43%), of the high level — 25 macro regions (23%)

Data from table 1 show that 27 of the 28 EU countries are countries clusters with high and medium levels of socio-economic development and competitiveness in the world coordinate system. The exception is Romania, which belongs to the cluster of countries with a low level of SED. Ukraine is in the same cluster. However, a comparison of the classification results based on the Ward method and Kohonen self-organizing maps makes it possible to say that Ukraine belongs to the group of macro regions that apt for migration to the cluster of regions with an average level of SED and competitiveness. Czech Republic, Estonia, Italy, Malta are also apt for moving to a higher cluster (a cluster of regions with a high level of socio-economic development)

Table 1

Countries grouping by level of socio-economic development and competitiveness

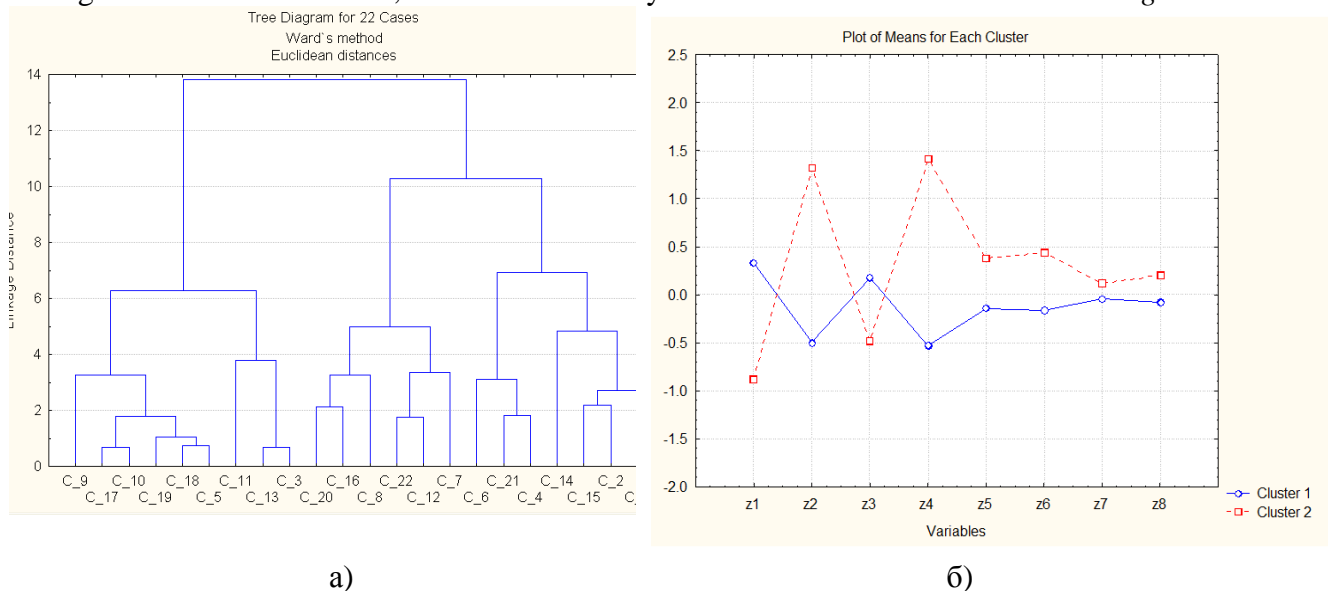
Cluster	Country
Countries with a low socio-economic development (37 countries — 34%)	Algeria, Argentina, Bangladesh, Cambodia, Cameroon, Dominican Republic, Egypt, Salvador, Ethiopia, Guatemala, Honduras, India, Indonesia, Kyrgyzstan, Madagascar, Mali, Morocco, Mozambique, Namibia, Nepal, Nigeria, Pakistan, Paraguay, Philippines, Rwanda, Senegal, Sri Lanka, Tanzania, Uganda, Zambia, Zimbabwe, Iran, Moldova, Mongolia, Romania* , Ukraine , Vietnam
Countries with a medium level of socio-economic development (46 countries — 43%)	Albania, Armenia, Azerbaijan, Bahrain, Botswana, Brazil, Bulgaria , Chile, China, Colombia, Costa Rica, Croatia , Cyprus , Georgia, Greece , Hungary , Jamaica, Kazakhstan, Kuwait, Latvia , Lithuania, Malaysia, Mauritius, Mexico, Montenegro, Oman, Panama, Peru, Poland , Portugal , Russia, Saudi Arabia, Serbia, Slovakia , Slovenia , South Africa, Spain , Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, Czech Republic , Estonia , Italy , Malta .
Countries with a high level of socio-economic development (25 countries — 23%)	Australia, Austria , Belgium , Canada, Denmark , Finland , France , Germany , Hong Kong, Iceland, Ireland , Israel, Japan, South Korea, Luxembourg , Netherlands , New Zealand, Norway, Qatar, Singapore, Sweden , Switzerland, UAE, UK , USA.

* through italics countries-objects of investigations are highlighted (EU countries and Ukraine)

Thus, the EU countries belong mainly to the group of macro regions with a high and medium level of socio-economic development and competitiveness. Ukraine is a macro region, which tends to migrate from the group of regions with a low level of SED in the group of regions with an average level of SED, which includes countries of Eastern Europe: Czech Republic, Slovakia, Hungary, Poland, etc., this allows to conclude about the comparability of these countries data while investigating trends of financial decentralization development level.

At the *second stage*, a system of research indicators and diagnostic classes of the financial decentralization level was formed. The construction of a diagnostic indicators system of financial decentralization level was carried out in accordance with the flowchart shown above. While forming diagnostic classes of financial decentralization level, standardized values of indicators of financial decentralization by expenditure, financial decentralization by income, indicators of the level of economic development and uniformity of economic space, scale indicators of the territory were used.

Hierarchical agglomerative (Ward's method) and iterative (k-means method) cluster analysis procedures, as well as two-input unification were used to construct diagnostic classes. Grouping was carried out on the data of more than 20 countries (macroregions) of the European Union. 22 macro-regions data were considered for the period of 2005—2016. The initial data set included 2816 elements. The classification dendrogram obtained is shown in Fig. 2a. The variables average values of each cluster, that are obtained by the k-mean» method are shown in Fig. 2b.



- * The legend of indicators:
- z1 — share of state budget expenditures in GDP (%),
 - z2 — share of local budget expenditures in GDP (%),
 - z3 — share of state budget revenues in GDP (%);
 - z4 — share of local budget expenditures in GDP (%);
 - z5 — GDP per capita (Euro),
 - z6 — area (km²),
 - z7 — economic density (Euro/km²);
 - z8 — number of population (thousand people).

Fig. 2. Classification dendrogram and graph of average values of indicators in clusters of EU countries in terms of financial decentralization

As one sees from fig. 2, the original set should be divided into two clusters, the composition was determined by the k-means clustering method. The grouping results allow to conclude that a high level of financial decentralization is typical for countries with a high level of economic development and high quality of the institutional environment and administrative decentralization, which leads to an increase in the public sector efficiency and, as a consequence, economic growth.

At the *third stage*, one assessed the impact of the level of financial decentralization on the economic indicators of the territories development. The main tasks of this stage are: *task 3.1* — formation of integrated indicators system of the financial decentralization level; *task 3.2* — development of models for assessing the impact of the financial decentralization level on the economic development of the territories.

To solve the *task 3.1*, we used one of the methods of reference object constructing — a

taxonomic indicator of the development level (ed. N. A. Kyzima, T. S. Klebanova, 2007; Guryanova L. S., Klebanova T. S., Milevsky S. V., Nepomnyaschiy V., Rudachenko O. A., 2017). A necessity to build a system of complex (throughout the system of indicators) and local (individual components) integrated assessments of financial decentralization level is a consequence of the indicators multi-vector change, this makes their analysis complicated and requires presentation in the form of a synthetic assessment, which is the result of the convolution of indicators.

Task 3.2 was solved using methods of panel data analysis. One considered the usual model of panel data, a model with a fixed effect, a model with a random effect. The choice of the specification model was based on the tests of Fisher, Breush-Pagan, Hausman. A detailed description of the algorithm for constructing the model is given in (Guryanova L. S., 2013).

Calculation of integrated indicators was conducted on the data of the indicators of fiscal decentralization on income, fiscal decentralization on expenditure, the federalism alignment and fiscal federalism of 22 macro-regions of the European Union. The values of the complex integral indicator of the level of financial decentralization (I_i) are presented in Table. 2.

Table 2

Values of the integral indicator of financial decentralization level

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	0,35	0,35	0,35	0,35	0,33	0,33	0,26	0,27	0,26	0,28	0,27	0,34
Belgium	0,49	0,49	0,49	0,48	0,48	0,46	0,35	0,35	0,34	0,36	0,35	0,53
Czech Republic	0,24	0,24	0,24	0,23	0,19	0,18	0,21	0,21	0,22	0,23	0,23	0,26
Denmark	0,57	0,55	0,54	0,53	0,53	0,52	0,40	0,43	0,40	0,44	0,43	0,54
Estonia	0,17	0,16	0,16	0,17	0,13	0,13	0,10	0,10	0,09	0,11	0,11	0,17
Finland	0,68	0,68	0,67	0,66	0,64	0,62	0,62	0,62	0,59	0,61	0,61	0,63
France	0,39	0,39	0,40	0,40	0,40	0,37	0,40	0,40	0,39	0,43	0,41	0,41
Germany	0,64	0,64	0,65	0,65	0,62	0,61	0,62	0,64	0,62	0,67	0,65	0,70
Greece	0,03	0,06	0,06	0,06	0,12	0,11	0,20	0,20	0,21	0,22	0,22	0,13
Hungary	0,36	0,36	0,35	0,34	0,33	0,33	0,36	0,34	0,31	0,32	0,35	0,23
Ireland	0,20	0,19	0,20	0,21	0,20	0,21	0,21	0,22	0,20	0,20	0,18	0,21
Italy	0,55	0,54	0,55	0,54	0,52	0,52	0,59	0,60	0,59	0,61	0,60	0,49
Latvia	0,42	0,44	0,47	0,49	0,46	0,46	0,51	0,50	0,49	0,53	0,51	0,46
Luxembourg	0,20	0,18	0,18	0,19	0,18	0,17	0,29	0,28	0,27	0,27	0,28	0,18
Netherlands	0,33	0,31	0,31	0,30	0,28	0,27	0,23	0,24	0,24	0,26	0,26	0,30
Poland	0,47	0,49	0,50	0,51	0,48	0,48	0,51	0,52	0,51	0,55	0,55	0,47
Portugal	0,23	0,23	0,24	0,24	0,22	0,21	0,21	0,22	0,23	0,25	0,26	0,24
Slovak Republic	0,20	0,19	0,18	0,17	0,18	0,18	0,16	0,16	0,16	0,16	0,14	0,17
Slovenia	0,32	0,32	0,33	0,34	0,34	0,35	0,45	0,46	0,45	0,46	0,44	0,33
Spain	0,56	0,57	0,58	0,57	0,55	0,57	0,45	0,44	0,42	0,47	0,46	0,58
Sweden	0,83	0,83	0,84	0,85	0,82	0,80	0,86	0,87	0,85	0,90	0,89	0,85
United Kingdom	0,32	0,32	0,32	0,31	0,30	0,30	0,27	0,26	0,25	0,27	0,27	0,29

The above given data indicate a significant heterogeneity of the EU countries in terms of financial decentralization. The peak value of the complex indicator of the financial decentralization level is typical for Sweden and is 0.85 at the end of the analyzed period. The minimum value is observed in Greece and is 0.13. The values variation coefficient of the complex level of financial decentralization indicator is 50%, this indicates significant fluctuations in the aggregate.

Similarly, local integral indicators of decentralization by expenses, decentralization by income, level of development of equalizing federalism, level of tax autonomy (I_{1i} , I_{2i} , I_{3i} , I_{4i}) are found. Let us note, that the coefficients of variation for the indicators I_{1i} , I_{2i} , I_{3i} , I_{4i} are respectively

19,69%; 23,8%; 10,34%; 21,38%. That is, in terms of the development level of aligning federalism, the sample is homogeneous. The most significant differences are observed in indicators of financial decentralization level in income and tax autonomy. Among the EU countries with indicators values which are the closest to the «standard» point coordinates, are Czech Republic, Spain, Italy, Sweden.

The system of integrated indicators of the financial decentralization level for the above given components formed was considered as an information base in the construction of models of panel data. Data processing was conducted using Eviews. The results of models evaluation are given in Table 3.

Table 3

Evaluation results of panel data models

Designated purpose of the model (Convention)	Type of model, criteria of statistical significance
Assessment of the impact of financial decentralization on economic development (model 1)	$\log(GDP)_{it} = \mu_i + 0.434847 \cdot I_{it} + \varepsilon_{it}$ $R^2 = 0.99, t_{a_1} = 1.799$
Assessment of the impact of financial decentralization level on the indicators of socio-economic development in the group of countries with a low level of development (model 2) and in the group of countries with a high level of development and competitiveness (model 3)	for countries with low level of socio-economic development and competitiveness: $\log(GDP)_{it} = \mu_i + 0.411711 \cdot I_{it} + \varepsilon_{it}; R^2 = 0.9993,$ $t_{a_1} = 1.5639$ for countries with high level of socio-economic development and competitiveness: $\log(GDP)_{it} = \mu_i + 0.450786 \cdot I_{it} + \varepsilon_{it};$ $R^2 = 0.99935, t_{a_1} = 1.470742$
Assessment of the impact of decentralization on income, expenses, level of tax autonomy, level of development of aligning federalism on indicators of socio-economic development of territories (model 4)	$\log(GDP)_{it} = 1,010445 + 0,025574 \cdot I_{1it} +$ $+0,047655 \cdot I_{2it} - 0,110214 \cdot I_{3it} -$ $-0,114436 \cdot I_{4it} + v_{it} + \varepsilon_{it}$ $R^2 = 0.9093, t_{a_0} = 27.659, t_{a_1} = 2.2604$ $t_{a_2} = 1.83049, t_{a_3} = -3.412081, t_{a_4} = -8.076292$

It is seen from the *table 3*, that the values of the determination coefficient (R-squared), varying in the range from 0.9093 to 0.9995, the values of Student's statistics make to conclude on the statistical models significance and their parameters with 93—99% confidence level. According to the evaluation results, the higher economic effect of the financial decentralization development is observed in countries with a high level of competitiveness. Thus, when the integral indicator of the of financial decentralization level experience 1% — change, the indicator of socio-economic development (GDP per capita, Euro per person) in the group of countries with a high level of competitiveness, changes on 0.017%, while for the group of countries with an average level of socio-economic development this indicator is 0.013%. The evaluation results indicate the positive effect of financial decentralization to be achieved primarily due to decentralization of income — the growth of the resource base of the regions; decentralization on expenditure — improving the efficiency of the public sector, the effective provision of public services and the growth of the welfare of the population at the levels of decentralization.

Summary and Concluding Remarks. Thus, the analysis results of the relationship between the level of financial decentralization and indicators of socio-economic development of the territories allow to draw the following conclusions:

the high level of financial decentralization is mainly inherent to the countries with high level of economic development and economic density. The positive relationship between the level of financial decentralization and economic growth is primarily due to the quality of the institutional environment that allows successfully implement decentralization policies and mitigate the impact of «shocks» on the regional economy;

the connection between decentralization and growth is stronger for countries with a high

level of development and competitiveness than for countries with an average level of SED and competitiveness. It is nominally possible to highlight two basic vectors of the financial decentralization development: the reduction of the vertical gaps and ensuring balance of revenue and expenditure powers of budgets of different levels, budgets autonomization, the sources expansion of revenue base of local budgets; development of the aligning federalism, regulation and coherence rise of the interbudget, intergovernmental agreements. The first development vector is mainly typical for countries with an average level of competitiveness. The second vector of development is supported mainly by countries with a high level of competitiveness and SED;

decentralization of income is associated with a stronger effect for economic growth than the decentralization of expenditure. Aligning federalism and tax autonomy lead to a slowdown in economic growth. Furthermore, the negative effect of tax autonomy is stronger than the effect of equalizing federalism;

there is a gap between the growth rates of income and expenditure powers of budgets of different levels and the growth rates of GDP in countries with a high level of competitiveness and SED, which reduces the level of budget and debt security. Therefore, a upcoming trend of research is to assess the systemic risk of financial policy and the stability of the financial system as a whole to the impact of external «shocks».

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