“An integrated approach to assessing the level of fiscal policy decentralization”

AUTHORS	Oleg Shevchuk https://orcid.org/0000-0002-3206-6966 Valentyna Martynenko https://orcid.org/0000-0001-9078-8345

ARTICLE INFO	Oleg Shevchuk and Valentyna Martynenko (2020). An integrated approach to assessing the level of fiscal policy decentralization. *Investment Management and Financial Innovations*, *17*(1), 49-63. doi:10.21511/imfi.17(1).2020.05
DOI	http://dx.doi.org/10.21511/imfi.17(1).2020.05
RELEASED ON	Wednesday, 12 February 2020
RECEIVED ON	Sunday, 15 December 2019
ACCEPTED ON	Friday, 31 January 2020

LICENSE	This work is licensed under a Creative Commons Attribution 4.0 International License

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
30	1	15

© The author(s) 2026. This publication is an open access article.

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Oleg Shevchuk (Ukraine), **Valentyna Martynenko** (Ukraine)

AN INTEGRATED APPROACH TO ASSESSING THE LEVEL OF FISCAL POLICY DECENTRALIZATION

Abstract

The main purpose of this study is to introduce an integrated approach to the methodology of assessing the level of fiscal policy decentralization. It is proposed to evaluate the fiscal policy decentralization of the state according to three functional components: decentralization of the process of local budget revenues formation (includes five indicators); decentralization of local budget structure (includes six indicators); decentralization of intergovernmental budgetary relations (includes five indicators). The expediency of forming an integral indicator of the level of fiscal policy decentralization as the geometric mean of three sub-indexes formed by its main functional components is substantiated. It has been proved that the level of fiscal decentralization in Ukraine decreased at the end of 2017, compared to 2004, but was medium with acceptable risks of fiscal policy modernization. Instead, in 2014, the lowest numerical value of the decentralization level was recorded, which corresponded to the critical level of the integral indicator with significant obstacles to the modernization of fiscal policy. The results obtained confirm the feasibility of implementing the decentralization reform in Ukraine, which started in 2014, and demonstrate its effectiveness.

Keywords integral indicator, sub-index, indicator, Ukraine, intergovernmental transfers, revenue, local budget

JEL Classification G28, E62, H72

Received on: 15th of December, 2019
Accepted on: 31st of January, 2020

© Oleg Shevchuk, Valentyna Martynenko, 2020

Oleg Shevchuk, First Vice-Rector, Doctor of Science, Professor, University of the State Fiscal Service of Ukraine, Ukraine.

Valentyna Martynenko, Ph.D., Associate Professor, Deputy Director, Institute of Accounting, Analysis and Audit, University of the State Fiscal Service of Ukraine, Ukraine.

This is an Open Access article, distributed under the terms of the Creative Commons Attribution 4.0 International license, which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Decentralization processes create the preconditions for changing fiscal policy priorities towards the successful modernization of its components at the local level. Local governments are involved in the implementation of fiscal policies, which enhances their accountability in fulfilling the delegated obligations. The decentralization reform, which started in Ukraine since 2014, has become a key area of development of domestic public administration, which is implemented in order to transfer the power and financial powers of the central government to the benefit of local self-government. Procedurally, territorial-administrative units are given the extension of powers regarding the independence and self-government of decision-making and the exercise of delegated powers.

Fiscal policy decentralization is of particular relevance, since it establishes fundamentally new principles for the formation and use of state financial resources at the level of territorial-administrative units. An important component of fiscal policy is the assessment of its level of decentralization. Researching the process of implementing the fiscal policy of the state in the context of the reform of decentralization of powers, it should be borne in mind that it is first necessary to assess the current state of financial independence of local budgets in three

directions. The first is to assess the impact of fiscal policy decentralization on local budget revenue generation. The second area is to assess the decentralization of fiscal policy by its impact on the structure of local budgets. The third area is to study the impact of intergovernmental transfers on the financial autonomy of local budgets.

1. LITERATURE REVIEW

The basic theoretical and methodological aspects of decentralization in general and fiscal policy decentralization in particular were explored by many economists. Thus, Oates (2005), one of the founders of the theory of fiscal federalism, author of the so-called decentralization theorem, proposed a "second-generation fiscal federalism theory" in which he substantiated the changes in the state activity of governmental fiscal institutions in the context of federalism. Dabla-Norris (2006) suggested the basic principles of fiscal policy decentralization based on an analysis of the implementation of decentralization in countries with economies in transition, and also identified the risks of the negative impact of decentralization on the effectiveness of the national economy. Freitag and Vatter (2008) examined the negative impact of fiscal policy decentralization on the budget arrears of Swiss territorial units, arguing that such an impact occurs only during a recession. Kyriacou, Muinelo-Gallo, and Roca-Sagalés (2013) examined how the quality of government power mediates the relationship between fiscal decentralization and regional imbalances. Volokhova (2014) summarized the theoretical foundations of the local finances decentralization, improved the method of assessing the fiscal decentralization state and financial support of own and fixed revenues, intergovernmental transfers of local budgets. Sydor (2014) identified and substantiated possible directions for strengthening the financial autonomy of local budgets in order to effectively execute local and national delegations of powers by local governments. Baskaran, Feld, and Schnellenbach (2016) analyzed the impact of fiscal federalism and decentralization on economic growth. Savy, Pauliat, and Senimon (2016) examined the decentralization processes in Europe, concluding that they are non-linear and different, depending on the size of the region, the traditions of self-government, the role of the central government, and other political, social, economic, and cultural characteristics. Bartolini, Stossberg, and Blöchliger (2016) have argued that fiscal policy decentralization reforms must be two-sided: the growth of local budget revenues should be matched by adjustment of intergovernmental transfers and fiscal equalization. Bartolini, Stossberg, and Blöchliger (2016) examined the relationship between regional inequality in the countries and the state of fiscal decentralization. The results of an analysis of 30 OECD countries in 1995–2011 have shown that in those countries where local government budgets are mainly financed by local taxes, local resources are used more effectively, and fiscal policy is stepping up territorial development. Krysovatyi and Desiatniuk (2016) formed the directions of tax policy of Ukraine in the context of fiscal decentralization and expansion of the tax base. Alonso and Andrews (2018) have argued that fiscal policy is more effectively implemented under decentralized conditions and found a negative relationship between socio-economic deprivation and efficiency. Bellofatto and Besfamille (2018) examined the optimal fiscal decentralization level in the countries with a federal system, according to the analysis of the administrative capacity and fiscal capacity of the regions. Melnyk, Sineviciene, Lyulyov, Pimonenko, and Dehtyarova (2018) examined how fiscal decentralization affects the stability of the economic system. Kim and Dougherty (2018) explore how intergovernmental budgetary relationships affect the economic growth and income distribution in the Netherlands, South Korea, India, and the United Kingdom. Vozniak (2019) explored the peculiarities of financial decentralization reform in the context of its impact on the sustainable growth of regions, etc.

Separate aspects of decentralization of power are devoted to the works of Shevchuk (2013), Martynenko (2015). However, the problem of integral assessment of the level of fiscal policy decentralization is insufficiently addressed and needs thorough research. So, the main purpose of the article is to improve the methodological support for assessing the level of fiscal policy decentralization based on an integrated approach.

http://dx.doi.org/10.21511/imfi.17(1).2020.05

2. DATA AND METHODS

In order to assess the level of fiscal policy decentralization in the dynamics, it is advisable to use a methodological apparatus of integrated assessment, which will allow us not only to comprehensively assess the fiscal policy decentralization, but also to carry out a comparative analysis of its components with the further development of measures that will solve the identified problems. The main source of estimates is the public statistics on official statistics posted on the official websites of CASE Ukraine (2019) and State Statistics Service of Ukraine (2019). In the course of the analysis, the necessary calculations will be made of the necessary single indicators, sub-indices and comprehensive integral indicator of diagnostics of the level of decentralization of fiscal policy of Ukraine. It is also advisable to define the critical boundaries and interpret the high, medium, low, and critical levels of fiscal policy decentralization.

To implement a methodological approach to the integrated assessment of the level of fiscal policy decentralization, first, the indicators will be identified and grouped (Table 1).

An important methodological apparatus for assessing the effectiveness of fiscal policy in the context of fiscal policy decentralization is an integrat-

Table 1. Identification and grouping of fiscal policy decentralization indicators

Source: Created and organized by the authors according to Cassette and Paty (2010, pp. 177-179), Ryabushka and Mershchii (2016, p. 159), Bondaruk and Vinnytska (2018, pp. 64-65), Boiko and Shirinyan (2018, p. 68), Chygryn, Petrushenko, Vysochyna, and Vorontsova (2018, p. 74), Tsymbaliuk (2018, p. 116), Shkolnyk, Melnyk, and Mershchii (2018, p. 15), Chernov, Guryanova, Dymchenko, and Labunska (2019, pp. 321-322).

Name of indicator	Method of calculation	Nature of influence*
1. Sub-index of the level of fiscal policy decentralization by the influence on the formation of local budget revenues ($\hat{I}_{DLBR}$)		
1. Revenue sharing ratio (R_{RS})	The ratio of local budget revenues to consolidated budget revenues	Stimulant
2. Ratio of provision own income (R_{POI})	The ratio of own revenues of local budgets (excluding transfers) to the revenues of the consolidated budget of Ukraine	Stimulant
3. Ratio of provision own income to GDP ($R_{POI/GDP}$)	The ratio of local budgets' own revenues (excluding transfers) to GDP at actual prices	Stimulant
4. Cost coverage ratio (R_{CC})	The ratio of local budget revenues (excluding transfers) to local budget expenditures	Stimulant
5. Ratio of financial autonomy (R_{FA})	Ratio of own local budget revenues (excluding transfers) to local budget revenues (including transfers)	Stimulant
2. Fiscal policy decentralization sub-index by structure of local budgets ($\hat{I}_{DSLB}$)		
1. Tax revenue ratio (R_{TR})	Ratio of local tax revenues to local budget revenues (including transfers)	Stimulant
2. Non-tax revenue ratio (R_{NTR})	The ratio of non-tax revenues to local budget revenues (including transfers)	Stimulant
3. Rate of official transfers (R_{OT})	The ratio of intergovernmental transfers to local budget revenues (including transfers)	Destimulator
4. Ratio of tax autonomy (R_{TA})	The ratio of local taxes to tax revenues of local budgets	Stimulant
5. Ratio of overall tax stability (R_{OTS})	The ratio of tax revenues of local budgets to expenditures of local budgets	Stimulant
6. Stability revenue base ratio (R_{SRB})	The ratio of local budget revenues to local budget expenditures	Stimulant
3. Sub-index of the level of decentralization of intergovernmental budget relations ($\hat{I}_{DIBR}$)		
1. Financial independence ratio (R_{FI})	The ratio of local budgets' own revenues (excluding transfers) to intergovernmental transfers	Stimulant
2. Coverage ratio of expenditure transfers (R_{CET})	The ratio of intergovernmental transfers to local budget expenditures	Destimulator
3. Budget sustainability ratio (R_{BS})	The ratio of intergovernmental transfers to own revenues of local budgets (excluding transfers)	Destimulator
4. Stability ratio of budget revenues (R_{SBR})	The ratio of tax revenues of local budgets to intergovernmental transfers	Stimulant
5. Local budget deficit ratio (R_{LBD})	The ratio of local budget deficits/surpluses to total local budget revenues (including transfers)	Stimulant

Note: * stimulant is an indicator whose effectiveness in increasing dynamics; destimulator is an indicator whose performance is in decreasing dynamics.

ed approach. The integrated approach involves the development of an integral indicator, which is the weighted average of sub-indices formed based on the functional principle of fiscal policy implementation in the context of fiscal decentralization.

We propose to calculate the integral indicator (I) by the formula of geometric mean:

$$I = \sqrt[n]{\hat{I}_{C_1} \cdot \hat{I}_{C_2} \cdot \hat{I}_{C_n}}, \quad (1)$$

where $\hat{I}_{C_1}, \hat{I}_{C_2}, \ldots, \hat{I}_{C_n}$ – sub-indexes that formalize one of the functional components of fiscal policy in a context of decentralization; n – number of sub-indexes.

Thus, the formula of the sub-index, which includes single indicators of fiscal policy effectiveness and level of fiscal decentralization, is as follows:

$$\hat{I}_{C_i} = w_1 Z_1 + w_2 Z_2 + \ldots + w_j Z_j = \sum_{j=1}^{m} w_j Z_j, \quad (2)$$

where $\hat{I}_{C_i}$ – integral indicator of the i-th component of the level of fiscal decentralization, $i = \overline{1;n}$; Z_1, Z_2, …, Z_j – single standardized indicators of the component of fiscal decentralization level; w_1, w_2, …, w_j – weighting coefficients of the j-th normalized single indicator, with

$$\sum_{j=1}^{m} w_j = 1. \quad (3)$$

Standardization of indicators is carried out, having previously determined which of them are stimulants (the indicator increase influences the improvement of the state of entrepreneurship) and destimulators (positive is the indicator's decrease). The formula used to standardize the stimulant indicator ($Z_{ij\uparrow}$), is as follows:

$$Z_{ij\uparrow} = \frac{X_{ij} - X_{\min}}{X_{\max} - X_{\min}}. \quad (4)$$

The formula for standardizing the destimulator indicator ($Z_{ij\downarrow}$) is as follows:

$$Z_{ij\downarrow} = \frac{X_{\max} - X_{ij}}{X_{\max} - X_{\min}}. \quad (5)$$

The standardization process, which is implemented according to formulae (4) and (5), ensures that all indicators are brought to one dimension in the range from 0 (the worst value) to 1 (the best value).

The methodological support of the weighting coefficients calculation is the most difficult stage of the integral assessment. If to consider the logic of calculating the weight of single indicators, the weight of an individual indicator is the degree of its influence on the integral index, which consists of several more indicators, so it can be argued that the most affecting integral indicator is the component that has the greatest influence on the rest of the components (Omelyanenko, Martynenko, Slatvinskyi, Povorozniuk, Biloshkurska, & Biloshkurskyi, 2019).

The impact of one indicator on another is measured by the value of the paired correlation coefficient, which expresses the degree of closeness (density) of the correlation relationship between a pair of indicators and can acquire the values of $r \in [-1; 1]$. In this case, the value $r = -1$ reflects the functional feedback, an increase of the value of one indicator leads to a corresponding decrease of the value of the second indicator; a value of $r = 1$ indicates a direct functional relationship (an increase of the value of one indicator leads to a corresponding increase of the value of the second indicator); $r = 0$ means that there is no complete relationship between the indicators as such. For other values of the paired correlation coefficient other than ±1 and 0, the value of the correlation relationship is determined – it will be larger when approaching ±1.

However, to determine the weight of each indicator introduced into the integral indicator, the direction of their action (inverse or direct effect) can be neglected. To do this, the modules of values of paired correlation coefficients will be taken. Paired correlation coefficients can be obtained by constructing a correlation matrix using statistical data processing software. To determine the degree of interaction of a particular indicator with other indicators, it is necessary to summarize the modules of all correlation coefficients associated with this indicator. By the sum of the modules of the pair correlation coefficients, it is possible to rank the indicators from the most to the least significant. This is also confirmed by research-

http://dx.doi.org/10.21511/imfi.17(1).2020.05

es of Ponomarenko, Prokopenko, Slatvinskyi, Biloshkurska, Biloshkurskyi, and Omelyanenko, (2019), Prokopenko, Slatvinskyi, Biloshkurska, Biloshkurskyi, and Omelyanenko (2019).

Following the proposed logic, it is possible to calculate the weighting coefficients for every single indicator within the relevant component of the level of fiscal decentralization (Prokopenko, Slatvinskyi, Biloshkurska, Biloshkurskyi, & Omelyanenko, 2019):

$$w_1 = \sum_{j=1}^{m} \left| r_{x_1 x_j} \right| \Big/ \sum_{i=1}^{n} \left| r_{x_i x_j} \right|, \quad (5)$$

where $r_{x_1 x_j}$ – is the coefficient of paired correlation between the indicator X_1 (the revenue sharing ratio) and the other j-th indicator; for X_2:

$$w_2 = \sum_{j=1}^{m} \left| r_{x_2 x_j} \right| \Big/ \sum_{i=1}^{n} \left| r_{x_i x_j} \right|. \quad (7)$$

And so on.

3. RESULTS

Using the data in Table 1, the single indicators will be calculated that will be introduced into the integral indicator of the level of fiscal policy decentralization within their groups (Tables 2-4).

Table 2 summarizes the indicators reflecting the impact of fiscal policy decentralization on local budget revenue generation. Thus, in the dynamics of 14 years, the revenue sharing ratio, calculated as the ratio of local budget revenues to consolidated budget revenues, interprets the share of local budgets in the consolidated budget, which increased by 7.8%. The ratio of provision own income, which is calculated by dividing the local budget's own revenues (excluding transfers) by the consolidated budget revenues of Ukraine, interprets the share of local budgets' own revenues in the consolidated budget, all the time being at the level of 20%, reaching a maximum of 23% in 2007, and a minimum of 16.7% in 2015.

Table 2. Fiscal policy decentralization indicators by the influence on the formation of local budget revenues

Source: Authors' calculations according to the data from CASE Ukraine (2019), State Statistics Service of Ukraine (2019).

Year	Revenue sharing ratio (R_{RS})	Ratio of provision own income (R_{POI})	Ratio of provision own income to GDP ($R_{POI/GDP}$)	Cost coverage ratio (R_{CC})	Ratio of financial autonomy (R_{FA})
2004	0.365	0.200	0.057	0.528	0.549
2005	0.352	0.191	0.060	0.515	0.541
2006	0.396	0.200	0.065	0.485	0.505
2007	0.439	0.232	0.073	0.519	0.528
2008	0.402	0.206	0.068	0.483	0.514
2009	0.401	0.199	0.066	0.460	0.497
2010	0.434	0.205	0.063	0.444	0.474
2011	0.397	0.176	0.056	0.420	0.445
2012	0.444	0.184	0.060	0.396	0.415
2013	0.431	0.191	0.061	0.420	0.444
2014	0.444	0.180	0.056	0.395	0.405
2015	0.409	0.167	0.061	0.430	0.409
2016	0.417	0.195	0.072	0.487	0.466
2017	0.443	0.202	0.077	0.489	0.455
Changes in 2017 (+/–) compared to 2004	+0.078	+0.002	+0.020	–0.039	–0.094
Min	0.352	0.167	0.056	0.395	0.405
Max	0.444	0.232	0.077	0.528	0.549

Table 3. Fiscal policy decentralization indicators by structure of local budgets

Source: Authors' calculations based on data from CASE Ukraine (2019).

Year	Tax revenue ratio (R_{TR})	Non-tax revenue ratio (R_{NTR})	Rate of official transfers (R_{OT})	Ratio of tax autonomy (R_{TA})	Ratio of overall tax stability (R_{OTS})	Stability revenue base ratio (R_{SRB})
2004	0.421	0.066	0.451	0.035	0.405	0.962
2005	0.401	0.077	0.459	0.029	0.382	0.952
2006	0.374	0.074	0.495	0.024	0.360	0.960
2007	0.389	0.068	0.472	0.018	0.382	0.984
2008	0.398	0.063	0.486	0.016	0.374	0.940
2009	0.398	0.066	0.503	0.016	0.368	0.926
2010	0.383	0.063	0.526	0.014	0.359	0.938
2011	0.365	0.064	0.555	0.041	0.345	0.944
2012	0.344	0.059	0.585	0.074	0.329	0.956
2013	0.376	0.058	0.556	0.093	0.357	0.947
2014	0.343	0.056	0.595	0.107	0.334	0.973
2015	0.334	0.068	0.591	0.275	0.351	1.051
2016	0.401	0.059	0.534	0.288	0.419	1.044
2017	0.399	0.052	0.545	0.262	0.428	1.075
Changes in 2017 (+/-) compared to 2004	–0.022	–0.014	+0.094	+0.227	+0.023	+0.113
Min	0.334	0.052	0.451	0.014	0.329	0.926
Max	0.421	0.077	0.595	0.288	0.428	1.075

In 2017, the ratio of provision own income to GDP reached its maximum, reaching 7.7% of GDP at actual prices. Cost coverage ratio (ratio of own revenues of local budgets (without transfers) to expenditures of local budgets) and ratio of financial autonomy (ratio of own revenues of local budgets (without transfers) to revenues of local budgets (including transfers)) reached maximum values in 2004, and minimum – in 2014, but during 2015–2017, they showed positive dynamics.

Table 3 summarizes the indicators reflecting the state of fiscal policy decentralization by the structure of local budgets. Thus, during 2004–2017, the tax and non-tax revenue ratios, which interpret the share of tax and non-tax revenues in total lo-

Table 4. Indicators of decentralization of intergovernmental relations

Source: Authors' calculations based on data from CASE Ukraine (2019).

Year	Financial independence ratio (R_{FI})	Coverage ratio of expenditure transfers (R_{CET})	Budget sustainability ratio (R_{BS})	Stability ratio of budget revenues (R_{SBR})	Local budget deficit ratio (R_{LBD})
2004	1.217	0.434	0.822	0.934	–0.039
2005	1.181	0.436	0.847	0.876	–0.051
2006	1.020	0.475	0.981	0.756	–0.041
2007	1.118	0.464	0.894	0.823	–0.016
2008	1.057	0.457	0.946	0.818	–0.063
2009	0.986	0.466	1.014	0.790	–0.080
2010	0.900	0.494	1.111	0.728	–0.066
2011	0.801	0.524	1.249	0.658	–0.059
2012	0.709	0.559	1.411	0.589	–0.046
2013	0.797	0.527	1.254	0.677	–0.056
2014	0.682	0.579	1.467	0.576	–0.027
2015	0.692	0.621	1.444	0.565	0.049
2016	0.873	0.557	1.145	0.752	0.042
2017	0.835	0.585	1.197	0.732	0.069
Changes in 2017 (+/–) compared to 2004	–0.382	+0.151	+0.375	–0.202	+0.108
Min	0.682	0.434	0.822	0.565	–0.080
Max	1.217	0.621	1.467	0.934	0.069

http://dx.doi.org/10.21511/imfi.17(1).2020.05

cal budget revenues, showed negative dynamics –2.2% and –1.4%, respectively. Also, the rate of official transfers, which shows their share in local budget revenues, increased by 9.4%, which is a negative trend due to the modernization of fiscal policy in the context of fiscal decentralization. However, the ratio of overall tax stability and revenue base stability ratio in 2017 reached a historical high and had a positive effect on fiscal policy decentralization.

Table 4 summarizes the indicators reflecting the impact of intergovernmental transfers on the fiscal decentralization of local governments. Thus, in the dynamics of 14 years, there was a reduction of the financial independence ratio (the ratio of own revenues of local budgets (without transfers) to intergovernmental transfers) by 0.38 points. The coverage ratio of expenditure transfers increased by 0.15 points, the budget sustainability ratio increased by 0.38 points, which is a negative trend and reflects the increased role of intergovernmental transfers in financing the revenue side of local budgets. This is also pointed out by a 0.2 percentage point decrease in the stability ratio of budget revenues section. However, the local budget deficit ratio during 2015–2017 was a positive figure, reaching a maximum of 0.07 in 2017, which makes it possible to conclude on the overall local budget surplus.

Thus, to assess the level of fiscal policy decentralization in Ukraine, its main components were formalized, which revealed the main tendencies in three key areas that contributed to or hindered the modernization of fiscal policy in Ukraine. It should be noted that unambiguous conclusions can be drawn about the level of fiscal policy decentralization, and, therefore, there is a need for an integrated assessment.

The integral assessment of the level of fiscal policy decentralization starts by constructing correlation matrices for each component of fiscal policy decentralization in order to calculate the weighting coefficients according to formulae (6) and (7). One can build a correlation matrix using the MS Excel "Data Analysis," the function "Correlation." As a result, the impact of fiscal decentralization on the formation of local budget revenues is shown in Table 5.

Table 5. Correlation matrix of indicators of the level of fiscal policy decentralization by influence on the formation of local budget revenues

Source: Authors' calculations.

	R_{RS}	R_{POI}	$R_{POI/GDP}$	R_{CC}	R_{FA}
R_{RS}	1				
R_{POI}	0.112	1			
$R_{POI/GDP}$	0.337	0.641	1		
R_{CC}	–0.528	0.667	0.484	1	
R_{FA}	–0.644	0.686	0.222	0.892	1

From the data given in Table 5, it can be seen that the closest correlation between five indicators of the fiscal policy decentralization by the influence on the formation of local budget revenues between the ratio of provision own income and ratio of provision own income to GDP ($r = 0.641$), the ratio of provision own income and the ratio of financial autonomy ($r = 0.686$), the cost coverage ratio and the ratio of financial autonomy ($r = 0.892$). In this case, the smallest correlation is between the revenue sharing ratio and the ratio of provision own income ($r = 0.112$).

A correlation matrix of 6 individual indicators of the level of component of fiscal policy decentralization was constructed according to the structure of local budgets (Table 6).

Table 6. Correlation matrix of fiscal policy decentralization indicators by local budget structure

Source: Authors' calculations.

	R_{TR}	R_{NTR}	R_{OT}	R_{TA}	R_{OTS}	R_{SRB}
R_{TR}	1					
R_{NTR}	0.144	1				
R_{OT}	–0.831	–0.601	1			
R_{TA}	–0.204	–0.462	0.530	1		
R_{OTS}	0.803	–0.100	–0.509	0.378	1	
R_{SRB}	–0.081	–0.343	0.317	0.921	0.527	1

As can be seen from Table 6, the closest is the direct correlation between the tax revenue ratio and the ratio of overall tax stability ($r = 0.803$), the inverse correlation coefficient between the tax revenue ratio and the rate of official transfers ($r = –0.831$) and also the direct correlation of the ratio of tax autonomy and the stability revenue base ratio ($r = –0.921$). The least dense is the inverse correla-

tion between the tax revenue ratio and the stability revenue base ratio (r = –0.081).

A matrix of partial coefficients of paired correlation of five single indicators of decentralization of intergovernmental relations is constructed (Table 7).

Table 7. Correlation matrix of indicators of decentralization of intergovernmental relations

Source: Authors' calculations.

	R_{FI}	R_{CET}	R_{BS}	R_{SBR}	R_{LBD}
R_{FI}	1				
R_{CET}	–0.912	1			
R_{BS}	–0.987	0.913	1		
R_{SBR}	0.970	–0.861	–0.974	1	
R_{LBD}	–0.310	0.667	0.314	–0.232	1

Among the partial coefficients of paired correlation given in Table 7, the highest level of inverse correlation density (r = –0.987) is available between the financial independence ratio and the budget sustainability ratio. The lowest level of inverse stochastic coupling (r = –0.232) is presented between the stability ratio of budget revenues and the local budget deficit ratio.

The calculation of the weighting coefficients of individual indicators of the level of the fiscal policy decentralization by influence on local budget revenues formation is presented in Table 8.

As can be seen from the data in Table 8, the most significant single indicator in the component of fiscal policy decentralization by influence on local budget revenues formation was the fourth one – the cost coverage ratio (w_4 = 0.247), and the least significant one – the revenue sharing ratio (w_1 = 0.155). The sum of the weighting coefficients of five single indicators of the component of the level of fiscal policy decentralization by the influence on the formation of local budget revenues was one. Therefore, the calculations made are correct and will be used in the formation of the sub-index of the level of fiscal policy decentralization by the influence on the formation of local budget revenues.

Similarly, Table 9 and Table 10 are built to calculate the weighting coefficients of single indicators of the component of the level of fiscal policy decentralization for the structure of local budgets (Table 9) and the weighting coefficients of single indicators the component of the level of decentralization of intergovernmental budget relations (Table 10).

As can be seen from the data in Table 9, the most significant single indicator in the component of fiscal policy decentralization for the structure of local budgets was the third one – the rate of official transfers (w_3 = 0.201), and the least significant one was the non-tax revenue ratio (w_2 = 0.119). The sum of the weighting coefficients of six individual indicators of the component of fiscal policy decentralization for the structure of local budgets was one. Therefore, the calculations made are correct and will be used in the formation of the fiscal policy decentralization sub-index by structure of local budgets.

Table 8. Calculation of the weighting coefficients of individual indicators of the component of the level of fiscal policy decentralization by influence on local budget revenues formation

Source: Authors' calculations.

R_{RS}	R_{POI}	$R_{POI/GDP}$	R_{CC}	R_{FA}	Total
$\lvert r_{x_1x_j} \rvert$	$\lvert r_{x_2x_j} \rvert$	$\lvert r_{x_3x_j} \rvert$	$\lvert r_{x_4x_j} \rvert$	$\lvert r_{x_5x_j} \rvert$	
0.112	0.112	0.337	0.528	0.644	x
0.337	0.641	0.641	0.667	0.686	x
0.528	0.667	0.484	0.484	0.222	x
0.644	0.686	0.222	0.892	0.892	x
$\sum_{j=1}^{m} \lvert r_{x_1x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_2x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_3x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_4x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_5x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_ix_j} \rvert$
1.621	2.106	1.684	2.572	2.444	10.427
w_1 = 0.155	w_2 = 0.202	w_3 = 0.162	w_4 = 0.247	w_5 = 0.234	$\sum w_j$ = 1

http://dx.doi.org/10.21511/imfi.17(1).2020.05

Table 9. Calculation of the weighting coefficients of the component of the level of fiscal policy decentralization for the structure of local budgets

Source: Authors' calculations.

R_{TR}	R_{NTR}	R_{OT}	R_{TA}	R_{OTS}	R_{SRB}	Total
$\lvert r_{x_1x_j} \rvert$	$\lvert r_{x_2x_j} \rvert$	$\lvert r_{x_3x_j} \rvert$	$\lvert r_{x_4x_j} \rvert$	$\lvert r_{x_5x_j} \rvert$	$\lvert r_{x_6x_j} \rvert$	
0.144	0.144	0.831	0.204	0.803	0.081	x
0.831	0.601	0.601	0.462	0.100	0.343	x
0.204	0.462	0.530	0.530	0.509	0.317	x
0.803	0.100	0.509	0.378	0.378	0.921	x
0.081	0.343	0.317	0.921	0.921	0.527	x
$\sum_{j=1}^{m} \lvert r_{x_1x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_2x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_3x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_4x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_5x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_6x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_ix_j} \rvert$
2.064	1.650	2.788	2.495	2.712	2.189	13.897
$w_1 = 0.148$	$w_2 = 0.119$	$w_3 = 0.201$	$w_4 = 0.180$	$w_5 = 0.195$	$w_6 = 0.158$	$\sum w_j = 1$

Table 10. Calculation of the weighting coefficients of the single indicators of the component of the level of decentralization of intergovernmental budgetary relations

Source: Authors' calculations.

R_{FI}	R_{CET}	R_{BS}	R_{SBR}	R_{LBD}	Total
$\lvert r_{x_1x_j} \rvert$	$\lvert r_{x_2x_j} \rvert$	$\lvert r_{x_3x_j} \rvert$	$\lvert r_{x_4x_j} \rvert$	$\lvert r_{x_5x_j} \rvert$	
0.912	0.912	0.987	0.970	0.310	x
0.987	0.913	0.913	0.861	0.667	x
0.970	0.861	0.974	0.974	0.314	x
0.310	0.667	0.314	0.232	0.232	x
$\sum_{j=1}^{m} \lvert r_{x_1x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_2x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_3x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_4x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_5x_j} \rvert$	$\sum_{j=1}^{m} \lvert r_{x_ix_j} \rvert$
3.179	3.353	3.188	3.037	1.524	14.281
$w_1 = 0.223$	$w_2 = 0.235$	$w_3 = 0.223$	$w_4 = 0.213$	$w_5 = 0.107$	$\sum w_j = 1$

As can be seen from the data in Table 10, the most important single indicator in the component of the level of decentralization of intergovernmental relations is the second one – the coverage ratio of expenditure transfers ($w_2 = 0.235$), and the least significant one is the local budget deficit ratio ($w_5 = 0.107$). The sum of the weighting coefficients of five single indicators of the component of the level of decentralization of intergovernmental relations was one. Therefore, the calculations are correct and will be used in the formation of the sub-index of the level of decentralization of intergovernmental budget relations.

The standardized values of single indicators of the component of the level of fiscal policy decentralization by influence for the formation of local budget revenues in 2004–2017 are presented in Table 11.

As can be seen from the data in Table 11, the highest values of the standardized indicators of the component of the level of fiscal policy decentralization for influence on the formation of local budget revenues, namely, two, appeared in 2004. This means that in 2004, the highest level of the cost coverage ratio and the ratio of financial autonomy was fixed. The ratio of provision own income to GDP purchased a maximal value in 2017, and revenue sharing ratio twice – in 2012 and 2014. Thus in 2014, simultaneously three indexes – the ratio of provision own income to GDP,

Table 11. Standardized single indicators of the component of the level of fiscal policy decentralization for influence on the formation of local budget revenues in 2004–2017

Source: Authors' calculations.

Year	$Z_{RRS\uparrow}$	$Z_{R_{POI\uparrow}}$	$Z_{RPOI/GDP\uparrow}$	$Z_{RCC\uparrow}$	$Z_{RFA\uparrow}$
2004	0.141	0.508	0.048	1	1
2005	0	0.369	0.190	0.902	0.944
2006	0.478	0.508	0.429	0.677	0.694
2007	0.946	1	0.810	0.932	0.854
2008	0.543	0.600	0.571	0.662	0.757
2009	0.533	0.492	0.476	0.489	0.639
2010	0.891	0.585	0.333	0.368	0.479
2011	0.489	0.138	0	0.188	0.278
2012	1	0.262	0.190	0.008	0.069
2013	0.859	0.369	0.238	0.188	0.271
2014	1	0.200	0	0	0
2015	0.620	0	0.238	0.263	0.028
2016	0.707	0.431	0.762	0.692	0.424
2017	0.989	0.538	1	0.707	0.347

the cost coverage ratio, and the ratio of financial autonomy purchased the least values for investigated period.

It should be noted that standardization of indicators is carried out in order to reduce their numerical values to one unit of measure, which greatly facilitates the development of an appropriate integral indicator.

Similar calculations are carried out for the other component of the level of fiscal policy decentralization (Tables 12 and 13).

The result of calculations in Table 14 is the result of a methodological approach to the integrated assessment of the level of fiscal decentralization.

Table 14 summarizes the sub-index equations of the components of the fiscal decentralization level and the integrated integral indicator. It should be noted that an integral indicator of the level of fiscal decentralization is proposed as the geometric mean of three sub-indexes (see Formula (1). In the authors' opinion, the main advantage of the statistical tool "geometric mean" is the limits within which the integral indicator can be: $I_{LFPD} \in [1;0]$.

Table 12. Standardized single indicators of the component of fiscal policy decentralization for the structure of local budgets in 2004–2017

Source: Authors' calculations.

Year	$Z_{RTR\uparrow}$	$Z_{RNTR\uparrow}$	$Z_{ROT\downarrow}$	$Z_{RTA\uparrow}$	$Z_{ROTS\uparrow}$	$Z_{RSRB\uparrow}$
2004	1	0.56	1	0.077	0.768	0.242
2005	0.770	1	0.944	0.055	0.535	0.174
2006	0.460	0.88	0.694	0.036	0.313	0.228
2007	0.632	0.64	0.854	0.015	0.535	0.389
2008	0.736	0.44	0.757	0.007	0.455	0.094
2009	0.736	0.56	0.639	0.007	0.394	0
2010	0.563	0.44	0.479	0	0.303	0.081
2011	0.356	0.48	0.278	0.099	0.162	0.121
2012	0.115	0.28	0.069	0.219	0	0.201
2013	0.483	0.24	0.271	0.288	0.283	0.141
2014	0.103	0.16	0	0.339	0.051	0.315
2015	0	0.64	0.028	0.953	0.222	0.839
2016	0.770	0.28	0.424	1	0.909	0.792
2017	0.747	0	0.347	0.905	1	1

http://dx.doi.org/10.21511/imfi.17(1).2020.05

Table 13. Standardized single indicators of the component of the level of decentralization of intergovernmental relations in 2004–2017

Source: Authors' calculations.

Year	$Z_{RFI\uparrow}$	$Z_{RCET\downarrow}$	$Z_{RBS\downarrow}$	$Z_{RSBR\uparrow}$	$Z_{RLBD\uparrow}$
2004	1	1	1	1	0.275
2005	0.933	0.989	0.961	0.843	0.195
2006	0.632	0.781	0.753	0.518	0.262
2007	0.815	0.840	0.888	0.699	0.430
2008	0.701	0.877	0.808	0.686	0.114
2009	0.568	0.829	0.702	0.610	0
2010	0.407	0.679	0.552	0.442	0.094
2011	0.222	0.519	0.338	0.252	0.141
2012	0.050	0.332	0.087	0.065	0.228
2013	0.215	0.503	0.330	0.304	0.161
2014	0	0.225	0	0.030	0.356
2015	0.019	0	0.036	0	0.866
2016	0.357	0.342	0.499	0.507	0.819
2017	0.286	0.193	0.419	0.453	1

The size of the interval is defined to break the levels of fiscal policy decentralization into 4 groups, using the following formula:

$$i = \frac{X_{\max} - X_{\min}}{n} = \frac{1-0}{4} = 0.25, \qquad (8)$$

where i – the size of the interval, $X_{\max}$ – the highest value of the indicator, $X_{\min}$ – the lowest value of the indicator, n – number of groups.

After calculations, we get the following levels of fiscal decentralization:

- $0 \le I_{LFPD} < 0.25$ – the critical level of fiscal decentralization, at which the degree of obstacles to the development of the fiscal policy of the state is maximum;
- $0.25 \le I_{LFPD} < 0.5$ – low level of fiscal decentralization, at which the degree of obstacles to the development of fiscal policy of the state is significant;
- $0.5 \le I_{LFPD} < 0.75$ – the average level of fiscal decentralization, at which the degree of obstacles to the development of fiscal policy of the state is acceptable;
- $0.75 \le I_{LFPD} \le 1.0$ – high level of fiscal decentralization, at which the degree of obstacles to the development of fiscal policy of the state is minimal.

Thus, for economic interpretation of the numerical value of both the sub-index of the appropriate

Table 14. Sub-index equation and integral indicator of the level of fiscal decentralization

Source: Authors' calculations.

Name of indicator	Sub-index / integral indicator equation
1. Sub-index of the level of fiscal policy decentralization by the influence on the formation of local budget revenues ($\hat{I}_{DLBR}$)	$\hat{I}_{DLBR} = 0.155 Z_{RRS\uparrow} + 0.202 Z_{RPOI\uparrow} + +0.162 Z_{RPOI/GDP\uparrow} + 0.247 Z_{RCC\uparrow} + 0.234 Z_{RFA\uparrow}$
2. Fiscal policy decentralization sub-index by structure of local budgets ($\hat{I}_{DSLB}$)	$\hat{I}_{DSLB} = 0.148 Z_{RTR\uparrow} + 0.119 Z_{RNTR\uparrow} + 0.201 Z_{ROT\downarrow} + +0.180 Z_{RTA\uparrow} + 0.195 Z_{ROTS\uparrow} + 0.158 Z_{RSRB\uparrow}$
3. Sub-index of the level of intergovernmental budget relations decentralization ($\hat{I}_{IBRD}$)	$\hat{I}_{IBRD} = 0.223 Z_{RFI\uparrow} + 0.235 Z_{RCET\downarrow} + 0.223 Z_{RBS\downarrow} + +0.213 Z_{RSBR\uparrow} + 0.107 Z_{RLBD\uparrow}$
4. Integral indicator of the level of fiscal policy decentralization (I_{LFPD})	$I_{LFPD} = \sqrt[3]{\hat{I}_{DLBR} \cdot \hat{I}_{DSLB} \cdot \hat{I}_{IBRD}}$

component and the integral indicator of the level of financial decentralization, the division at levels – from critical to high – is presented. It is clear that, at a critical level of fiscal policy decentralization, obstacles to fiscal policy modernization will be maximal and, at a high level, obstacles will be kept to a minimum.

4. DISCUSSION

According to the calculations, using the equations given in Table 14, the integral indicator of the level of fiscal decentralization is calculated, and its economic interpretation and validation in the dynamics of the last 14 years are carried out (Table 15).

Table 15 shows that during 2004–2017, the minimum level of fiscal policy decentralization was fixed in 2014 (I_{LFPD} = 0.143), including the sub-index of the level of fiscal policy decentralization by impact on local budget revenue generation was critically low ($\hat{I}_{DLBR}$ = 0.196), as well as the sub-index of the level of decentralization of fiscal policy by the structure of local budgets ($\hat{I}_{DSLB}$ = 0.155) and the sub-index of the level of decentralization of intergovernmental relations ($\hat{I}_{IBRD}$ = 0.097). The maximum level of fiscal policy decentralization was in 2007 (I_{LFPD} = 0.71), which is at the average level, with sub-indices of the level of fiscal policy decentralization in terms of influencing local budget revenues and local budgets on intergovernmental fiscal transfers reached a high level. That is, it can be concluded that the level of decentralization of fiscal policy in Ukraine during the studied period fluctuated from the critical to the average (Figure 1).

Figure 1 shows that the largest steady decline in the integral indicator of the level of fiscal policy decentralization in Ukraine occurred during 2004–2012 – from the average to the critical one. It is also clear from the graph that the decision to implement the decentralization reform was delayed, but forced, as the level of fiscal policy decentralization reached a minimum in 2014. As a result, over the next three years, the level of decentralization of fiscal policy in Ukraine has been raised to the average (I_{LFPD} = 0.58). Therefore, in pursuing the modernization of fiscal policy in Ukraine, it is necessary to find the levers to minimize obstacles and risks that hinder the fiscal policy decentralization.

Table 15. Calculation of the integral indicator of the level of fiscal policy decentralization for the 2004–2017

Source: Authors' calculations.

Year	Sub-index of the level of fiscal policy decentralization by the influence on the formation of local budget revenues ($\hat{I}_{DLBR}$)	Fiscal policy decentralization sub-index by structure of local budgets ($\hat{I}_{DSLB}$)	Sub-index of the level of intergovernmental budget relations decentralization ($\hat{I}_{IBRD}$)	Integral indicator of the level of fiscal policy decentralization (I_{LFPD})
2004	0.613	0.617	0.923	0.704
2005	0.549	0.564	0.854	0.642
2006	0.576	0.416	0.630	0.532
2007	0.910	0.510	0.771	0.710
2008	0.639	0.418	0.700	0.572
2009	0.529	0.382	0.608	0.497
2010	0.514	0.304	0.477	0.421
2011	0.215	0.234	0.315	0.251
2012	0.257	0.135	0.147	0.172
2013	0.356	0.284	0.321	0.319
2014	0.196	0.155	0.097	0.143
2015	0.206	0.428	0.105	0.210
2016	0.590	0.714	0.466	0.581
2017	0.680	0.696	0.405	0.577
Changes in 2017 (+/–) compared to 2004	+0.066	+0.079	–0.517	–0.128

http://dx.doi.org/10.21511/imfi.17(1).2020.05

Source: Authors' calculations.

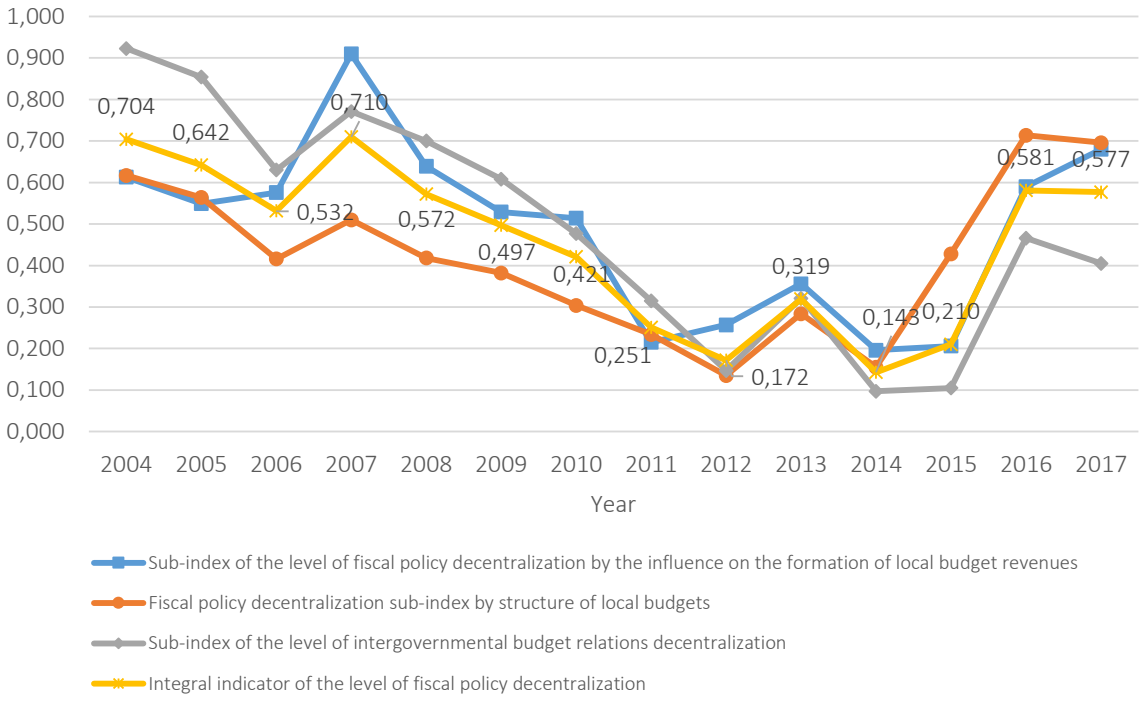

Figure 1. Dynamics of the integral indicator of the level of fiscal policy decentralization in Ukraine

Given the results obtained, it should be noted that the problem of introducing an integrated approach to assessing the level of fiscal policy decentralization, the solution of which this article is devoted to, is new and is being implemented by the authors for the first time. The proposed integral indicator of the level of fiscal policy decentralization is a universal tool that can be used in many ways. In particular, it can be used to rank the regions of the same country or to rank the different countries in terms of fiscal policy decentralization.

CONCLUSION

Thus, in implementing the methodological approach to assessing the level of fiscal policy decentralization in Ukraine, an integral indicator of the level of fiscal policy decentralization was constructed as a geometric mean of three sub-indices: the level of fiscal policy decentralization by influence on the formation of local budget revenues, the level of fiscal policy decentralization on the structure of local budgets, the level of decentralization of intergovernmental relations. As a result, at the end of 2017, compared to 2004, the level of fiscal policy decentralization in Ukraine declined but remained at an average level for which the risks of fiscal policy modernization were acceptable, compared with the lowest numerical value in 2014, which corresponded to critical level of the integral indicator with significant obstacles to the fiscal policy modernization.

Thus, the level of fiscal policy decentralization in Ukraine decreased by five times during 2004–2014, including the level of fiscal policy decentralization by the influence on the formation of local budget revenues decreased by three times, the level of fiscal policy decentralization by structure of local budgets decreased by four times, the level of intergovernmental budget relations decentralization decreased by 5 times. The level of fiscal policy decentralization in Ukraine increased by four times during 2014–2017, including the level of fiscal policy decentralization by the influence on the formation of local budget revenues increased by three and a half times, the level of fiscal policy decentralization by structure of

local budgets increased by four and a half times, the level of intergovernmental budget relations decentralization increased by four times.

The proposed and tested methodological approach should be at the forefront of government regulation and modernization of fiscal policy in Ukraine. The results obtained during its development lay the foundations for finding the effective ways of enhancing the financial independence of local authorities, forecasting the trends, and developing the scenarios for the further development of fiscal policy, as well as ensuring the effectiveness of its modernization in the uncertain environment.

REFERENCES

1. Alonso, J. M., & Andrews, R. (2018). Fiscal decentralization and local government efficiency: Does relative deprivation matter? *Environment and Planning C: Politics and Space, 37*(2), 360-381. https://doi.org/10.1177%2F2399654418784947
2. Bartolini, D., Stossberg, S. & Blöchliger, H. (2016). *Fiscal decentralization and regional disparities* (OECD Economics Department Working Papers No. 1330) (47 p.). Paris: OECD Publishing. https://doi.org/10.1787/5jlpq7v3j237-en
3. Baskaran, T., Feld, L. P., & Schnellenbach, J. (2016). Fiscal federalism, decentralization, and economic growth: a meta-analysis. *Economic Inquiry, 54*(3), 1445-1463. https://doi.org/10.1111/ecin.12331
4. Bellofatto, A. A., & Besfamille, M. (2018). Regional state capacity and the optimal degree of fiscal decentralization. *Journal of Public Economics, 159,* 225-243. https://doi.org/10.1016/j.jpubeco.2017.12.010
5. Boiko, S. V., & Shirinyan, L. V. (2018). Horyzontalne vyrivniuvannia oblasnykh biudzhetiv u systemi mizhbiudzhetnoho finansovoho zabezpechennia rehioniv Ukrainy [Horizontal equalization of regional budgets in the system of interbudget financial provision of regions of Ukraine]. *Ekonomichni horizonty – Economic Horizons, 3*(6), 65-77. (In Ukrainian). http://dx.doi.org/10.31499/2616-5236.3(6).2018.156318
6. Bondaruk, T., & Vinnytska, O. (2018). Otsinka stanu detsentralizatsii mistsevykh biudzhetiv Ukrainy [Assessment of the status of decentralization of Ukraine's local budgets]. *Ekonomika Ukrainy – Economy of Ukraine, 7*(680), 59-75. (In Ukrainian). Retrieved from http://irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=2&I21DBN=UJRN&P21DBN=UJRN&IMAGE_FILE_DOWNLOAD=1&Image_file_name=PDF/EkUk_2018_7_6.pdf
7. CASE Ukraine. (2019). *Budget of Ukraine*. Kyiv: The Price of the State. Retrieved from http://old.cost.ua/en/budget/
8. Cassette, A., & Paty, S. (2010). Fiscal decentralization and the size of government: A European country empirical analysis. *Public Choice, 143*(1/2), 173-189. Retrieved from http://www.jstor.org/stable/40661010
9. Chernov, S., Guryanova, L., Dymchenko, O., & Labunska, S. (2019). Complex of models of financial decentralisation analysis and assessment. *Financial and Credit Activity: Problems of Theory and Practice, 3*(30), 315-326. http://dx.doi.org/10.18371/fcaptp.v3i30.179646
10. Chygryn, O., Petrushenko, Yu., Vysochyna, A., & Vorontsova, A. (2018). Assessment of fiscal decentralization influence on social and economic development. *Montenegrin Journal of Economics, 14*(4), 69-84. http://dx.doi.org/10.14254/1800-5845/2018.14-4.5
11. Dabla-Norris, E. D. (2006). The challenge of fiscal decentralization in transition countries. *Comparative Economic Studies, 48*(1), 100-131. https://doi.org/10.1057/palgrave.ces.8100063
12. Freitag, M., & Vatter, A. (2008). Decentralization and fiscal discipline in sub-national governments: evidence from the Swiss federal system. *The Journal of Federalism, 38*(2), 272-294. https://doi.org/10.1093/publius/pjm038
13. State Statistics Service of Ukraine. (2019). *Valovyi vnutrishnii product u 2019 rotsi [Gross domestic product in 2019]*. (In Ukrainian). Retrieved from http://www.ukrstat.gov.ua/operativ/operativ2019/vvp/vvp_kv/vvp_kv_u/vvpf_kv2019u.htm
14. Kim, J., & Dougherty, S. (Eds.) (2018). *Fiscal decentralization and inclusive growth* (254 p.). OECD Fiscal Federalism Studies, Seoul, Korea. Retrieved from http://www.oecd.org/tax/federalism/fiscal-decentralisation-and-inclusive-growth.pdf
15. Krysovatyi, A. I., & Desiatniuk, O. M. (Eds.) (2016). *Napriamy formuvannia podatkovoi polityky Ukrainy v konteksti fiskalnoi detsentralizatsii ta rozshyrennia bazy opodatkuvannia [The directions of tax policy formation of Ukraine in the context of fiscal decentralization and expansion of the tax base]* (182 p.). TNEU, Ternopil, Ukraine. (In Ukrainian). Retrieved from http://dspace.tneu.edu.ua/handle/316497/22521
16. Kyriacou, A. P., Muinelo-Gallo, L., & Roca-Sagalés, O. (2013). Fiscal decentralization and regional disparities: The importance

http://dx.doi.org/10.21511/imfi.17(1).2020.05

of good governance. *Papers in Regional Science, 94*(1), 89-108. Retrieved from https://rsaiconnect.onlinelibrary.wiley.com/doi/abs/10.1111/pirs.12061

17. Martynenko, V. V. (2015). Makroekonomichnyi analiz vplyvu sotsialnoekonomichnoho rozvytku na riven ekonomichnoi bezpeky Ukrainy [Macroeconomic analysis of socioeconomic development impact on economic security level in Ukraine]. *Aktualni Problemy Ekonomiky – Actual Problems of Economics, 6*(168), 402-409 (In Ukrainian). Retrieved from http://nbuv.gov.ua/UJRN/ape_2015_6_48

18. Melnyk, L., Sineviciene, L., Lyulyov, O., Pimonenko, T., & Dehtyarova, I. (2018). Fiscal decentralization and macroeconomic stability: the experience of Ukraine's economy. *Problems and Perspectives in Management, 16*(1), 105-114. http://dx.doi.org/10.21511/ppm.16(1).2018.10

19. Oates, W. E. (2005). Toward a second-generation theory of fiscal federalism. *International Tax and Public Finance, 12,* 349-373. https://doi.org/10.1007/s10797-005-1619-9

20. Omelyanenko, V. A., Martynenko, V. V., Slatvinskyi, M. A., Povorozniuk, I. M., Biloshkurska, N. V., & Biloshkurskyi, M. V. (2019). Methodological bases of sectoral innovation priorities evaluation within security-based strategies. *International Journal of Civil Engineering and Technology, 10*(2), 1217-1226. Retrieved from http://www.iaeme.com/MasterAdmin/uploadfolder/IJCIET_10_02_118/IJCIET_10_02_118.pdf

21. Ponomarenko, T. V., Prokopenko, O. V., Slatvinskyi, M. A., Biloshkurska, N. V., Biloshkurskyi, M. V., & Omelyanenko, V. A. (2019). National investment and innovation security assessment methodology. *International Journal of Mechanical Engineering and Technology, 10*(2), 847-857. Retrieved from http://www.iaeme.com/MasterAdmin/uploadfolder/IJMET_10_02_088/IJMET_10_02_088.pdf

22. Prokopenko, O. V., Slatvinskyi, M. A., Biloshkurska, N. V., Biloshkurskyi, M. V., & Omelyanenko, V. A. (2019). Methodology of national investment and innovation security analytics. *Problems and Perspectives in Management, 17*(1), 380-394. http://dx.doi.org/10.21511/ppm.17(1).2019.33

23. Ryabushka, L. B., & Mershchii, B. E. (2016). Vplyv finansovoi detsentralizatsii na sotsialno-ekonomichnyi rozvytok terytorii [The influence of financial decentralization on socio-economic development of the territory]. *Naukovyi visnyk Khersonskoho derzhavnoho universytet. Seriia Ekonomichni nauky – Saintific Herald of Kherson State University. Series Economic Sciences, 18*(2), 158-161. (In Ukrainian). Retrieved from http://www.ej.kherson.ua/journal/economic_18/2/42.pdf

24. Savy, R., Pauliat, H., & Senimon, M. (2016). The process of decentralization in Europe. In J. Ruano, & M. Profiroiu (Eds.), *The Palgrave handbook of decentralization in Europe* (pp. 1-14). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-32437-1_1

25. Shevchuk, O. A. (2013). Taxation forms and methods of tax control. *Economic Annals-XXI, 1-2*(1), 73-76. Retrieved from http://soskin.info/en/ea/2013/1-2/contents_20.html

26. Shkolnyk, I., Melnyk, T., & Mershchii, B. (2018). Transparency of the budget process as a prerequisite for financial decentralization in Ukraine. *Public and Municipal Finance, 7*(1), 12-20. http://dx.doi.org/10.21511/pmf.07(1).2018.02

27. Sydor, I. (2014). Vlasni i zakripleni dokhody mistsevykh biudzhetiv: problemy formuvannia ta rezervy zrostannia [Own and fixed incomes of local budgets: the problem of the formation and reserves of growth]. *Visnyk Ternopilskoho Natsionalnoho Ekonomichnoho Universytetu – Herald of Ternopil National Economic University, 3,* 20-29. (In Ukrainian). Retrieved from http://visnyk.tneu.edu.ua/images/docs/journal/vtneu_2014_3/4.pdf

28. Tsymbaliuk, I. (2018). Financial Decentralization in Ukraine: Liability of Local Budget Expenditure for their Financial Support. *Economic Journal of Lesia Ukrainka Eastern European National University, 4*(16), 114-122. https://doi.org/10.29038/2411-4014-2018-04-114-122

29. Volokhova, I. S. (2014). *Mistsevi finansy ta perspektyvy pohlyblennia finansovoi detsentralizatsii v Ukraini [Local finance and prospects for deepening the fiscal decentralization in Ukraine]* (462 p.). Odesa: Atlant. (In Ukrainian). Retrieved from http://dspace.oneu.edu.ua/jspui/handle/123456789/3983

30. Vozniak, H. (2019). Finansova detsentralizatsiia ta stale endohenne zrostannia rehioniv: formalizatsiia napriamiv vplyvu [Financial decentralization and sustainable endogenous growth of regions: formalization of impact directions]. *Svit Finansiv – World of Finance, 2*(59), 49-59. (In Ukrainian). Retrieved from http://sf.tneu.edu.ua/index.php/sf/article/view/1225