

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

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**QUANTITY ASSESSMENT AND DIRECTIONS FOR IMPROVING THE EFFICIENCY OF FISCAL DECENTRALIZATION IN UKRAINE**

**КІЛЬКІСНА ОЦІНКА І НАПРЯМИ ПІДВИЩЕННЯ РЕЗУЛЬТАТИВНОСТІ ФІСКАЛЬНОЇ ДЕЦЕНТРАЛІЗАЦІЇ В УКРАЇНІ**

**Urgency of the research. Target setting.** Experience shows that industrialized countries are more successful in ensuring the efficiency and stability of the economy through effective fiscal policies.

It is expedient to study the best international developments regarding fiscal decentralization processes in order to optimize the efficiency of Ukraine's fiscal policy implementation under different scenarios of economic development.

**Actual scientific researches and issues analysis.** The significant contribution of domestic and foreign scientists to the development of the theory of fiscal decentralization should be noted, namely, it is advisable to distinguish significant scientific achievements of such scholars as: Dlugolsky O. V., Shamans'ka O. S., Demyanyshyn V.G., Bogdan T. P., T. Jenjeyevich, A. Alesina, F. Rocha, L. Lambertiini, engaged in research of problems on this subject.

**Uninvestigated parts of general matters defining.** The issue of optimizing the results of fiscal decentralization in Ukraine has not been efficiently developed by scientists.

**The research objective.** The purpose of the article is to improve the methodological approach to optimizing the quantitative parameters of the effectiveness of the implementation of fiscal policy.

**The statement of basic materials.** The article provides a cluster analysis of the regions of Ukraine in accordance with the GRP per person and the level of intergovernmental transfers in 2015 with the help of the toolkit of the Statistica package, on the basis of which an optimization model of the effectiveness of fiscal policy implementation in different scenarios of the economic development of Ukraine is proposed which is based on the definition of the target function of maximizing the fiscal decentralization index.

**Conclusions.** The implementation of the proposed optimization model will increase the independence and capacity of Ukraine's territories and reduce the level of intergovernmental transfers. This approach will allow a fair competition in the regions, providing favorable conditions for investors to place production in certain areas.

**Keywords:** fiscal decentralization; fiscal consolidation; region; budget; fiscal rules; revenues; expenditures; optimization model.

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**Urgency of the research.** The fiscal policy stance is significant for the formation of the financial basis for the provision of social processes in the state and becomes particularly acute during the current systemic crisis of the national economy of Ukraine when an increasing public debt and a permanent budget deficit

**Актуальність теми дослідження.** Досвід свідчить про те, що промислово розвинені країни є більш успішними у забезпеченні ефективності та стабільності економіки за допомогою ефективної фіскальної політики.

**Постановка проблеми.** Доцільним є вивчення кращих міжнародних напрацювань щодо процесів фіскальної децентралізації з метою оптимізації результативності реалізації фіскальної політики України за різних сценаріїв економічного розвитку.

**Аналіз останніх досліджень і публікацій.** Слід відзначити значний внесок вітчизняних та закордонних вчених у розвиток теорії фіскальної децентралізації, а саме доцільно виокремити істотні наукові здобутки таких вчених, як Длугопольський О. В., Шаманська О. С., Дем'янишин В. Г., Богдан Т. П., Єнджеєвич Т., Алесіна А., Роча Ф., Ламбертіні Л., що займалися дослідженням проблем з даної тематики.

**Виділення недосліджених частин загальної проблеми.** Науковцями ще недостатньо опрацьовані питання аргументації можливостей оптимізації результатів здійснення фіскальної децентралізації в Україні.

**Постановка завдання. Виклад основного матеріалу.** Метою статті є удосконалення методичного підходу до оптимізації кількісних параметрів результативності реалізації фіскальної політики.

У статті проведено кластерний аналіз регіонів України у відповідності до ВРП на одну особу та рівня міжбюджетних трансфертів у 2015 році за допомогою інструментарію пакету Statistica, на основі якого запропоновано оптимізаційну модель результативності реалізації процесів фіскальної політики за різних сценаріїв економічного розвитку України, яка базується на визначенні цільової функції максимізації індексу фіскальної децентралізації.

**Висновки.** Реалізація запропонованої оптимізаційної моделі сприятиме підвищенню самостійності та спроможності територій України, зниженню рівня міжбюджетних трансфертів. Такий підхід дозволить справедливо конкурувати регіонам, надаючи сприятливі умови для інвесторів у розміщенні виробництва на певних територіях.

**Ключові слова:** фіскальна децентралізація; фіскальна консолідація; регіон; бюджет; фіскальні правила; доходи; видатки; оптимізаційна модель.

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

takes place. That is, the formation of an effective fiscal policy is one of the defining elements of the country's anticrisis economic policy and requires the development of its theoretical basis in view of the current transformations in Ukraine.

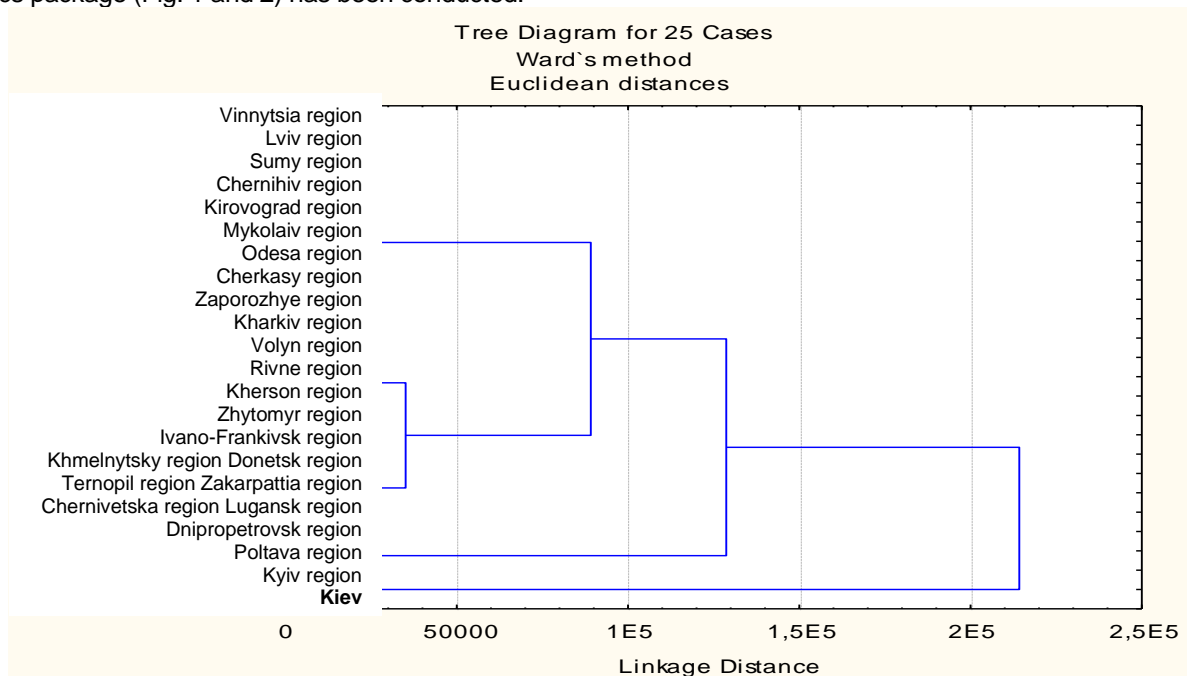
**Target setting.** It is advisable to make a meaningful study of the groundwork regarding the process of fiscal decentralization in order to optimize the efficiency of the implementation of fiscal decentralization in Ukraine.

**Actual scientific researches and analysis of issues.** The research of fiscal regulations, the institutional basis of fiscal policy has been undertaken by such leading domestic and foreign scholars as: Dlugolsky O. V., Shamans'ka O. S., Dem'yanyshyn V. G., Bogdan T. P., T. Jengeyevich [Jędrzejowicz, T.], Kitala M. [Kitala M.], Alesina A. [Alesina A.], Ahrend R., Rocha F., Lambertini L. and others, on the basis of studying their scientific achievements, as well as on the basis of their own groundwork on this topic, it is possible to improve the methodological approach in terms of optimizing the quantitative parameters of increasing the efficiency of fiscal decentralization in Ukraine.

**Unexplored parts of definition of general matters.** The methodical aspects of implementing the institutional practice of fiscal decentralization which will contribute to improving the fiscal decentralization and fiscal consolidation in Ukraine both at central and local levels, have not been sufficiently worked out by the researchers yet.

**The objective of the research.** The aim of the present article is to improve the methodological approach to fiscal decentralization in Ukraine which will enable the regions to compete and to provide favorable conditions for investors to allocate the production in specific areas.

**The statement of basic materials.** According to experts, the processes of fiscal decentralization have multiple-valued effects on economic growth and macroeconomic and regional stabilization. Another aspect that complicates the identification of an optimal level of fiscal decentralization in Ukraine is the multi-directional influence of the indicator of fiscal autonomy and fiscal significance on the gross regional product. In order to prove this author's conclusion, the cluster analysis of regions of Ukraine in accordance with the GRP per person and the level of intergovernmental transfers in 2015 with the help of the toolkit of the Statistics package (Fig. 1 and 2) has been conducted.



**Fig. 1. Dendrogram of the regions of Ukraine according to GRP per capita and the level of intergovernmental transfers (created by the author)**

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

Only the city of Kyiv, which has the highest GRP per capita, has joined the first class, with considerable amounts of medical and educational subventions. The second class is represented by the Kyiv, Dnipropetrovsk and Poltava regions which produce high GRP, pay reverse subsidies and have an average medical amount and low levels of educational subventions per person.

	the GRP 1 person	basic / reverse subsidies	educational subvention	medical subvention	class
Kiev	155904	0,00	729,89	1101,93	1,00
Kyiv region	60109	-21,13	118,78	524,53	2,00
Dnipropetrovsk region	65897	-99,60	157,41	524,75	2,00
Poltava region	66390	-56,40	192,01	532,03	2,00
Zhytomyr region	30698	46,55	200,37	529,54	3,00
Zakarpattia region	22989	91,94	167,31	512,40	3,00
Donetsk region	26864	-9,91	98,24	221,00	3,00
Ivano-Frankivsk region	33170	65,74	178,45	525,83	3,00
Khmelnysky region	31660	58,46	204,30	535,88	3,00
Ternopil region	24963	64,43	197,12	521,27	3,00
Lugansk region	10778	11,22	83,59	200,38	3,00
Chernivetska region	20338	96,41	173,83	513,74	3,00
Kherson region	30246	72,28	217,53	528,02	3,00
Odesa region	41682	4,28	153,74	522,17	4,00
Mykolaiv region	41501	28,52	274,55	522,19	4,00
Rivne region	30350	62,36	218,94	509,53	4,00
Sumy region	37170	7,56	166,41	536,68	4,00
Kirovograd region	39356	35,67	203,79	537,90	4,00
Kharkiv region	45816	-1,66	151,66	529,39	4,00
Zaporozhye region	50609	-8,51	272,14	545,89	4,00
Volyn region	30387	73,03	271,39	510,28	4,00
Cherkasy region	40759	29,17	191,40	553,83	4,00
Lviv region	37338	17,70	167,67	515,03	4,00
Chernihiv region	35196	43,92	223,54	561,95	4,00
Vinnysia region	37270	45,33	163,04	533,88	4,00

Fig. 2. Distribution of regions of Ukraine by clusters (created by the author)

The third class was joined by Zhytomyr, Zakarpattia, Donetsk, Ivano-Frankivsk, Khmelnytsky, Ternopil, Lugansk, Chernivetska and Kherson regions, the GRP per capita was the lowest in 2015, however, educational and medical subventions for these regions were insignificant at the rate per person. The fourth class which is represented by Odesa, Mykolaiv, Rivne, Sumy, Kirovograd, Kharkiv, Zaporozhye, Volyn, Cherkasy, Lviv, Chernihiv, Vinnytsia regions of Ukraine, produces the average GRP per capita and has rather high rates of medical and educational subventions.

Average values of GRP, basic / reverse subsidies, medical and educational subvention per person according to clusters are shown in Fig. 3

	class 1	class 2	class 3	class 4
the GRP 1 person	155904,0	64132,00	25182,50	38952,83
basic / reverse subsidies	0,0	-59,05	53,10	28,11
medical subvention	729,9	156,07	162,90	204,86
educational subvention	1101,9	527,10	445,00	531,56

Fig. 3. Average values of GRP, basic / reverse subsidy, medical and educational subvention per person according to clusters (calculated by the author)

## ФІНАНСИ. БАНКІВСЬКА СПРАВА

According to the data for the period of 2005-2015 (11 years), the GRP relationship per one person was created according to the classes based on indicators of fiscal autonomy and their significance (Tab. 1).

The performed analysis made it possible to identify: the negative impact of fiscal autonomy on the GRP, positive effect of fiscal significance on GRP, the relationship between fiscal decentralization and regional development is close and hence. So, the definition of optimal relations of fiscal autonomy and fiscal significance, will ensure both the development of regions and macroeconomic stabilization in Ukraine.

Table 1

**The dependence of the GRP on one person on the indicators of fiscal autonomy and the fiscal significance according to the classes**

Class and its composition	Regression equation	Determination factor
Class 1 - Kyiv	<b>GRP</b> 1=327732,773-632022,398*Ofa+171191,751*Ofs	R <sup>2</sup> = 0,8164
Class 2 - Kyiv, Dnipropetrovsk and Poltava regions	<b>GRP</b> 2=423708,328-815246,137*Ofa+205630,669*Ofs	R <sup>2</sup> = 0,8645
Class 3 - Zhytomyr, Zakarpattia, Donetsk, Ivano-Frankivsk, Khmelnytsky, Ternopil, Lugansk, Chernivtsi and Kherson regions	<b>GRP</b> 3=414823,244-965142,8371*Ofa+514982,617*Ofs	R <sup>2</sup> = 0,9101
Class 4 - Odessa, Mykolaiv, Rivne, Sumy, Kirovograd, Kharkiv, Zaporozhye, Volyn, Cherkasy, Lviv, Chernihiv, Vinnytsia regions.	<b>GRP</b> 4=1000300,572-1851883,259*Ofa+413065,092*Ofs	R <sup>2</sup> = 0,8317

In our opinion, the incorrectly built system of distribution of expenditures and income authorities of the central level and local self-government bodies, the lack of a single integrated approach to the regulation of macroeconomic indicators and regional development, the significant intergovernmental transfers complicate the achievement of sustainable positive results from decentralization policy. A survey of scientific sources made it possible to establish that in the national science almost there are no studies devoted to the methodology of fiscal decentralization practice in Ukraine and to the establishment of its optimal level that would facilitate both macroeconomic and regional development thus balancing the interests of the state and its territories.

It seems to be necessary to improve the methodical approach to optimizing the quantitative parameters of the efficiency of the implementation of fiscal decentralization in Ukraine by establishing a maximum level of autonomy of the territories by taking into account the fiscal rules of different levels and by identifying the optimal determinants of macroeconomic and regional development.

The purpose function of the proposed methodological approach is to provide the domestic fiscal decentralization policy with mathematically grounded forecast data in terms of fiscal consolidation scenarios and their potential macroeconomic changes.

It is offered that the objective function of the optimization model is to determine the maximization of the fiscal decentralization index, which is a geometric average between fiscal autonomy and fiscal significance:

$$Ifd = \sqrt{Ofa * Ofs} \rightarrow \max. \quad (1)$$

where Ifd – index of fiscal decentralization

Ofa –optimal level of fiscal autonomy;

Ofs –the optimal level of fiscal significance

The system should envisage the country's economic growth.

On the basis of the analysis of a number of foreign approaches to fiscal consolidation [1-6], O. Dlugopolsky highlights several areas for initiating actions to consolidate public finances:

## ФІНАНСИ. БАНКІВСЬКА СПРАВА

1) the assessment of the budget deficit:- the period of fiscal consolidation begins when the budget deficit is reduced by at least 1% of GDP;

- the period of fiscal consolidation begins when the budget deficit decreases by at least 1.5% of the potential GDP in the course of a year or two and thus does not increase in any of these two years;

- the fiscal consolidation period begins when the budget deficit decreases by at least 2% of the potential GDP in the course of three years and does not increase in any of these three years;

2) assessment of the cyclically-adjusted budget balance (ACBB):- the fiscal consolidation period begins when ACBB increases by at least 1% of potential GDP in the course of the year;

- the fiscal consolidation period begins when CAPB increases by at least 2% of potential GDP in the course of the year or by an average of 1.5% of GDP in the course of the next two years;

- the period of fiscal consolidation begins when ACBB exceeds 3% of potential GDP in the course of three years [7, p. 28].

The study offers to proceed from scenarios of annual GDP growth by 2%, 3% and 4%.

A regression equation is created based on the statistical data for 2005-2015 (Tab. 2) that determines the dependence of GDP on incomes and expenditures of the consolidated budget of Ukraine:

$$GDP^i = 39,8935 + 0,3789 * Rcb^i + 2,4966 * Ecb^i, \quad (2)$$

$$R^2 = 0,9935$$

where GDP- is the gross domestic product;

Rcb - revenues of the consolidated budget of Ukraine;

Ecb - expenditures of the consolidated budget of Ukraine.

Fischer's F-statistics analysis allowed to establish that the determination coefficient is statistically significant and the regression equation 2 is statistically reliable.

Table 2

### Retrospective data for creation of a regression equation that determines the relationship between GDP (resulting indicator) and revenues and expenditures of the consolidated budget

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP, billion UAH	457,3	565,0	751,1	990,8	947,0	1082,6	1302,1	1411,2	1454,9	1586,9	1988,5
Income of the consolidated budget UAH billion	134,2	171,8	219,9	297,9	273	314,5	398,5	445,5	442,8	456,1	652
Consolidated Budget Expenditures, UAH billion	141,7	175,3	226	309,2	307,4	377,84	416,8	492,4	505,8	523,1	679,9

The next relationship to be established is the relationship between consolidated budget revenues and local budget revenues, tax revenues, public debt. Retrospective data for creation of the regression equation are given in the table 3.

The regression equation is obtained:

$$Rcb^i = 20,9368 + 0,6563 * Rlb^i + 0,929TE^i + 0,04729 * SD^i, \quad (3)$$

$$R^2 = 0,9961$$

where Rcb –revenues of the consolidated budget of Ukraine;

Rlb - local budget revenues;

TE - tax earnings of the consolidated budget;

SD - State debt.

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**ФІНАНСИ. БАНКІВСЬКА СПРАВА**


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Fisher's F-statistic analysis also allowed to establish that the determination coefficient is statistically significant and the regression equation 3 is statistically reliable.

Table 3

**Retrospective data for creation of a correlation equation between consolidated budget revenues and revenues from local budgets, tax revenues, public debt**

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income of the consolidated budget UAH billion	134,2	171,8	219,9	297,9	273	314,5	398,5	445,5	442,8	456,1	652
Income of the local budgets UAH billion	30,3	41,8	62,4	78,3	72,4	81,6	86,6	100,9	105,2	101,1	120,3
Tax receipts of the consolidated budget, UAH billion	98,1	125,7	161,3	227,2	208,1	234,4	334,7	360,6	354	367,5	507,6
State debt, UAH billion	78,1	80,5	88,7	189,4	316,9	432,2	473,1	515,5	584,1	1100,8	1572,2

It is necessary to establish the relationship between the consolidated budget expenditures and local budget expenditures, public debt, current expenditures. Retrospective data for creating the model is given in the Tab. 4

The following regression equation is obtained:

$$Ecb^i = 17,89 + 1,0726 * Elb^i + 0,00507 * SD^i + 0,5095 * CC^i, \quad (4)$$

$$R^2 = 0,9953$$

where Ecb – expenditures of the consolidated budget of Ukraine

Elb – local budget expenditures;

SD – State debt

CC – Current Consolidated Budget Costs.

Table 4

**Retrospective data to create a correlation equation between consolidated budget expenditures and local budget expenditures, current expenditures, government debt**

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Consolidated Budget Expenditures, UAH billion	141,7	175,3	226	309,2	307,4	377,84	416,8	492,4	505,8	523,1	679,9
Expenditures of local budgets, UAH billion	53,3	75,8	104,8	139	136,2	159,8	181	222,6	219,8	225,6	280
Current expenditures of the consolidated budget, UAH billion.	123,4	150,8	187,3	268	287,3	347,2	374,9	451,7	476,5	502,9	633,1
State debt, billion hryvnias	78,1	80,5	88,7	189,4	316,9	432,2	473,1	515,5	584,1	1100,8	1572,2

Apart from that, a number of restrictions should be introduced to the optimization model.

Based on scenarios of GDP's annual growth of 2%, 3% and 4%, the amount of GDP will be governed by the following restrictions:

$$GDP^i = \beta^n * GDP^{i-1}, \quad (5)$$

where GDP is the gross domestic product;  $\beta^n$  is the GDP growth rate relative to the previous year in accordance with scenario n (1.02 in the first scenario, 1.03 in the first, 1.04 in the third scenario).

Adjusting of public debt is also a necessary fiscal consolidation tool. In 2016 the level of general government debt was 81% of the country's GDP. Therefore, the optimization model should include its annual decrease. The experience of individual European countries provides the basis for domestic debt restructuring

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

in a debt policy. Thus, in Poland, the Law on Public Finances provides for the introduction of measures for the automatic adjustment of the level of public debt [8]. The Hungarian Constitution envisages a target level of public debt in the amount of 50% of GDP. The "Debt Brake" rule in this country includes [9].

For domestic conditions, the annual reduction of the state debt is proposed at 5%, that is, for 2017, the limit will be at the level of 76% of GDP, for 2018 - at the level of 71% of GDP, for 2019 - 66% of GDP, for 2020 - 60% of GDP. That is, the debt fiscal rule we can determine as follows:

$$SD^j \leq \alpha^i * GDP^i, \tag{6}$$

where SD – State debt;

GDP – the gross domestic product;

$\alpha^i$  – the standard of the level of public debt of the corresponding year (2017 - 0,76, 2018 - 0,71, 2019 - 0,66, 2020 - 0,6).

In addition, according to the experience of European countries, the restrictions should relate to fiscal consolidation regarding the budget deficit. Taking into account the fact that to adopt the surplus budget is not feasible in terms of efficiency of state policy and European standards for limiting the level of budget deficit to 3%, we will present the identified disparity as follows:

$$-0,03 \leq \frac{Rcb^j - Ecb^j}{GDP^j} \leq 0. \tag{7}$$

where GDP is the gross domestic product;

Rcb - revenues of the consolidated budget of Ukraine;

Ecb - expenditures of the consolidated budget of Ukraine.

The fiscal rule of expenditures, as outlined in the previous section, envisages the limiting of the growth of current expenditures to GDP growth rates. That is, we get the following disparity :

$$CC^{j-1} \leq CC^j \leq CC^{j-1} * \beta^n. \tag{8}$$

Where CC – current consolidated budget expenditures.

The fiscal rule for budget revenues, as outlined in the preceding section, envisages the limiting the tax burden to GDP growth rates. We get the following disparity:

$$TE^{j-1} \leq TE^j \leq TE^{j-1} * \beta^n. \tag{9}$$

where TE –tax earnings of the consolidated budget

Thus, taking into account the fiscal rules, we can obtain the following optimization model (10), which, by mathematical simplification, is derived to the model (11):

$$\left[ \begin{array}{l} Ifd = \sqrt{Ofa * OfS} \rightarrow \max. \\ GDP^j = 39,8935 + 0,3789 * Rcb^j + 2,4966 * Ecb^j, \\ Rcb^j = 20,9368 + 0,6563 * Rib^j + 0,929 TE^j + 0,04729 * SD^j, \\ Ecb^j = 17,89 + 1,0726 * Elb^j + 0,00507 * SD^j + 0,5095 * TE^j, \\ GDP^j = \beta^n * GDP^{j-1}, \\ SD^j \leq \alpha^i * GDP^j, \\ -0,03 \leq \frac{Rcb^j - Ecb^j}{GDP^j} \leq 0, \\ CC^{j-1} \leq CC^j \leq CC^{j-1} * \beta^n, \\ TE^{j-1} \leq TE^j \leq TE^{j-1} * \beta^n. \end{array} \right. \tag{10}$$

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

$$\left\{ \begin{aligned}
 & lfd = \sqrt{Ofa * Ofs} \rightarrow \max. \\
 & \beta^n * GDP^{i-1} = 39,8935 + 0,3789 * Rcb^i + 2,4966 * Ecb^i, \\
 & Rcb^i = 20,9368 + 0,6563 * Rlb^i + 0,929 TE^i + 0,04729 * SD^i \\
 & Ecb^i = 17,89 + 1,0726 * Elb^i + 0,00507 * SD^i + 0,5095 * CC^i, \\
 & SD^i \leq \alpha^i * \beta^n * GDP^{i-1}, \\
 & -0,03 \leq \frac{Rcb^i - Ecb^i}{\beta^n * GDP^{i-1}} \leq 0. \\
 & CC^{i-1} \leq CC^i \leq CC^{i-1} * \beta^n. \\
 & TE^{i-1} \leq TE^i \leq TE^{i-1} * \beta^n.
 \end{aligned} \right. \tag{11}$$

Let's determine the input data for solving the optimization model in Tab. 5. The basic year was adopted as 2016, the first year of optimization of fiscal decentralization – 2017.

The solving of the optimization model was carried out by using the Excel Search Finder function. It was intended to search for optimal values of local incomes, expenditures, current expenditures of the consolidated budget, consolidated budget tax revenues and public debt, due to the function of maximizing the fiscal decentralization index.

Table 5

**Input data to solve the optimization model**

year	Scenario	$\beta^n$	GRD <sup>i-1</sup>	GRD <sup>i</sup>	$\alpha^i$	SD <sup>i</sup>
2017	Scenario 1	1,02	2383,10	2430,76	0,76	1847,38
	Scenario 2	1,03	2383,10	2454,59	0,76	1865,49
	Scenario 3	1,04	2383,10	2478,42	0,76	1883,60
2018	Scenario 1	1,02	2430,76	2479,38	0,71	1760,36
	Scenario 2	1,03	2454,59	2528,23	0,71	1795,04
	Scenario 3	1,04	2478,42	2577,56	0,71	1830,07
2019	Scenario 1	1,02	2479,38	2528,96	0,66	1669,12
	Scenario 2	1,03	2528,23	2604,08	0,66	1718,69
	Scenario 3	1,04	2577,56	2680,66	0,66	1769,24
2020	Scenario 1	1,02	2528,96	2579,54	0,60	1547,73
	Scenario 2	1,03	2604,08	2682,20	0,60	1609,32
	Scenario 3	1,04	2680,66	2787,89	0,60	1672,73

The conducted research allowed to establish the following optimal parameters of fiscal policy of Ukraine (Tab. 6).

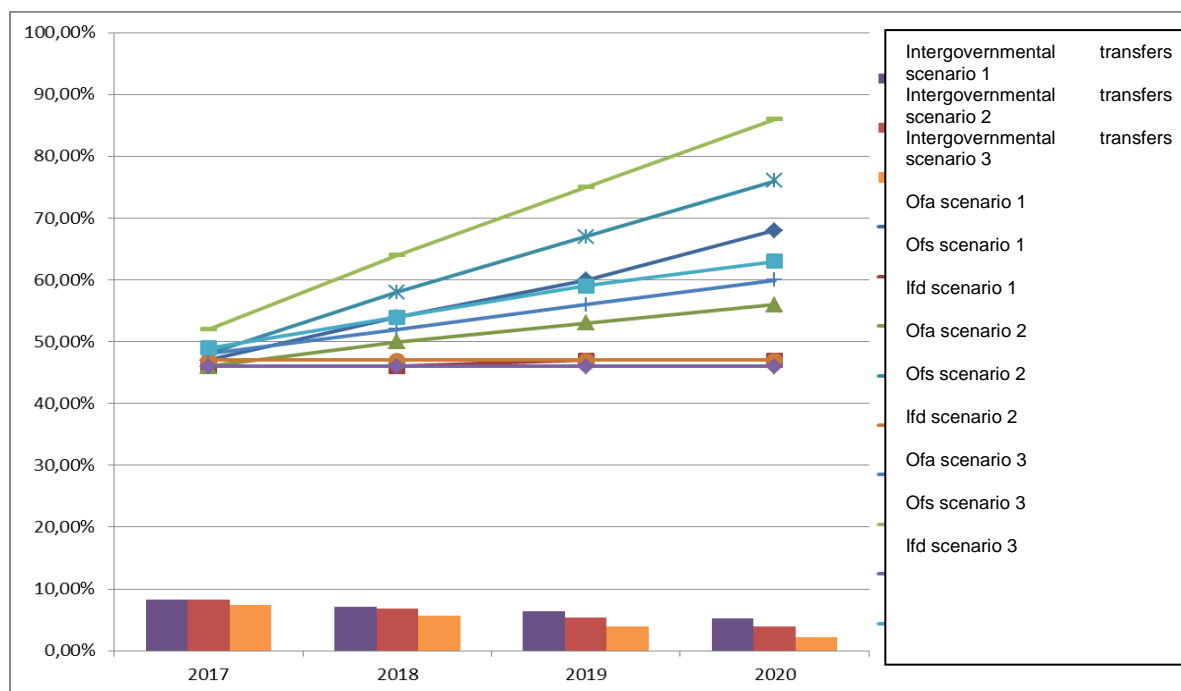
Table 6

**Forecast results of optimization of fiscal policy of Ukraine under conditions of decentralization**

year	Scenario	GRD <sup>i</sup>	Rcb <sup>i</sup>	Ecb <sup>i</sup>	SD <sup>i</sup>	Rlb <sup>i</sup>	Elb <sup>i</sup>	CC <sup>i</sup>	TE <sup>i</sup>	Ofa	Ofs	lfd
2017	Scenario 1	2430,76	831,23	831,23	1847,38	180,32	380,07	777,85	650,80	0,47	0,46	0,46
	Scenario 2	2454,59	839,80	839,80	1865,49	191,99	395,17	762,60	650,80	0,48	0,47	0,48
	Scenario 3	2478,42	848,03	848,03	1883,60	203,30	388,31	793,1	650,80	0,52	0,46	0,49
2018	Scenario 1	2479,38	848,13	848,13	1760,36	212,37	389,09	792,90	650,80	0,54	0,46	0,50
	Scenario 2	2528,23	865,35	865,35	1795,04	236,07	408,49	785,50	650,80	0,58	0,47	0,52
	Scenario 3	2577,56	882,49	882,49	1830,07	259,67	405,64	824,80	650,80	0,64	0,46	0,54
2019	Scenario 1	2528,96	865,61	865,61	1669,12	245,54	405,81	792,91	650,80	0,60	0,47	0,53
	Scenario 2	2604,08	891,73	891,73	1718,69	281,77	422,26	809,06	650,80	0,67	0,47	0,56
	Scenario 3	2680,66	918,37	918,37	1769,24	318,71	426,09	852,76	650,80	0,75	0,46	0,59
2020	Scenario 1	2579,54	883,20	883,20	1547,73	281,09	415,24	808,79	650,80	0,68	0,47	0,56
	Scenario 2	2682,20	918,90	918,90	1609,32	331,05	436,58	833,33	650,80	0,76	0,47	0,60
	Scenario 3	2787,89	955,66	955,66	1672,73	382,48	445,11	886,87	650,80	0,86	0,46	0,63



**ФІНАНСИ. БАНКІВСЬКА СПРАВА**



**Fig. 4. Indicators of fiscal decentralization according to scenarios**  
 (where *Ofa* – index of fiscal decentralization; *Ofs*– the optimal level of fiscal significance; *Ifd* – index of fiscal decentralization)

Solving the optimization model allowed to certify the following regulations which facilitate the implementation of a fiscal decentralization and fiscal consolidation at the central and local levels:

- GDP growth is related to an increase of the consolidated budget revenues and a less significant increase of expenditures (scenario 1 in the first year is even expected to decrease compared to the level of 2016 at the expense of current expenditures). The increase in consolidated budget revenues is optimal due to non-tax revenues, in particular due to the inflow from budget institutions, administrative fees and payments and the revenues on capital operations [10, p. 273-274]. Particular area to increase the non-tax revenues to the budget is possible by increasing the fines on budget spending units and local financial authorities for non-compliance with the fiscal discipline;

- the higher is the GDP's growth rate, the higher the revenue authorities should be transferred to the local level: if the first scenario sets the optimal increase in local incomes from 47.44% to 67.69% of local expenditures, the second - from 48.58% to 75 , 83%, then under the third scenario - from 52.35% to 85.93% of local expenditures. In this connection, the necessary gradual transition to the fiscal autonomy of the territories, depending on the rates of economic growth of the country, is to be applied;

- fiscal significance (the ratio of expenditures of local budgets to the consolidated budget expenditures) does not actually depend on GDP growth rates - the amount of expenditure authorities of local budgets is optimal at the level of 46% -47% of consolidated budget expenditures;

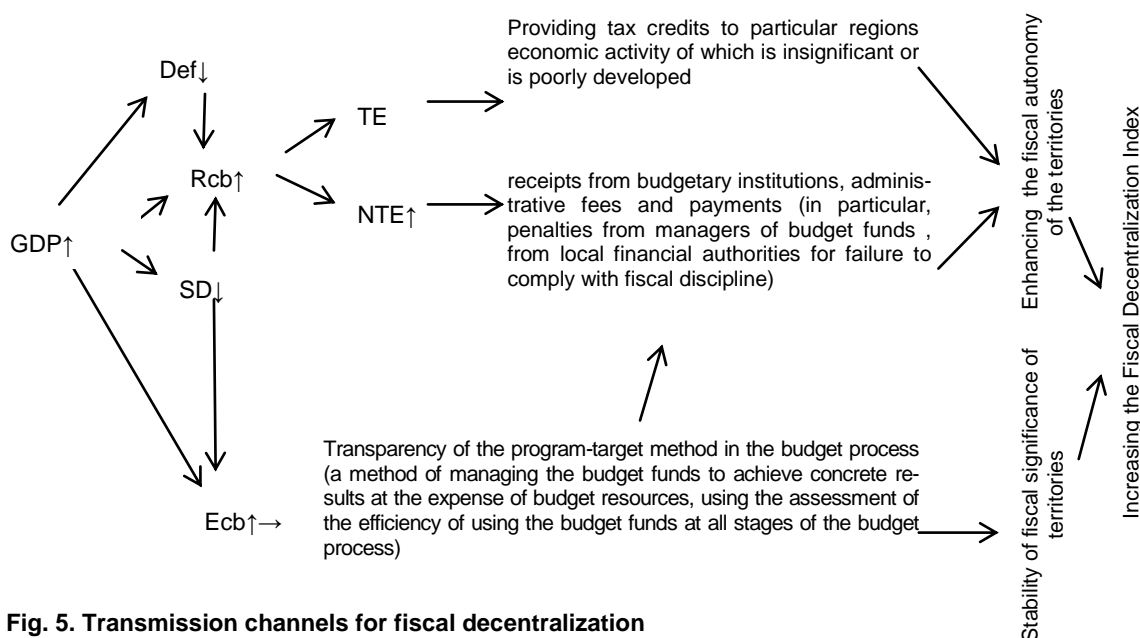
- the current budget expenditures in almost all scenarios increase in proportion to GDP growth rates. At the same time, their specific weight in the total amount of consolidated budget expenditures in the first and third scenarios is assumed to be at the level of 92% -93%, the second - at the level of 90%. Thus, the structure of the consolidated budget expenditures in elements does not need to be adjusted (in 2016, current expenditures accounted for 91% of the consolidated budget expenditures). Nevertheless, more transparent and efficient fulfillment of the program –purposeful method is extremely necessary due to the fact that only expenditures of the basic period should stipulate the budget income of the future periods;

**ФІНАНСИ. БАНКІВСЬКА СПРАВА**

- it is optimal to reduce the tax burden (the solving of the optimization system indicates the steadiness of tax revenues in the course of the forecast period) that can be realized (under the conditions of GDP growth): the granting of tax benefits to particular regions in which economic activity is insignificant or is poorly developed, by the introduction of a regressive tax rate on income and VAT, by taxes on personal income. Reducing of the tax burden will create more favorable conditions for entrepreneurship, will improve the investment climate and will allow business entities to improve their financial results, to raise wages for employees, to modernize their fixed assets, to develop and implement innovative projects;

- the implementation of this model will enhance the autonomy and capacity of the territories of Ukraine, will reduce the level of intergovernmental transfers (Fig. 4). From the State Budget, it is offered to pay only educational and medical subventions and to make horizontal equalization by differentiating tax privileges by regions. This approach will allow a fair competition in the regions providing favorable conditions for investors to place production in particular areas.

The conclusions which have been drawn may be presented in the form of fiscal transmission channels that transfer financial impulses into fiscal decentralization (Fig. 5).



**Fig. 5. Transmission channels for fiscal decentralization**

(where *GDP* – gross domestic product; *SD* – State Debt; *Def* – deficit; *Rcb* – revenues of the consolidated budget of Ukraine; *Ecb* – expenditures of the consolidated budget of Ukraine; *TE* – tax earnings of the consolidated budget; *NTE* – non-tax earnings)

As it can be seen from the above figure, from the author's point of view, the sections of the budget and tax system are interconnected, each subsequent link follows from the previous one.

**Conclusions.** Summing up, we will determine that the policy of fiscal decentralization has a positive effect on the efficiency of fiscal consolidation.

In its turn, the level of fiscal decentralization depends on the pace of economic growth - the larger it is, the wider powers must be transferred into the local level, but the intergovernmental transfers should be smaller. Moreover, expenditure authorities are relatively stable at 46-47% of consolidated budget expenditures, while fiscal autonomy will grow at a fast pace. An increase in consolidated budget revenues should be realized through increased non-tax revenues both at central and at local levels.

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