

Strengthening Fiscal Decentralization to Reduce the Heterogeneity of Russia's Economic Space



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Abstract. According to a number of strategic documents, Russia's economic space is characterized by high heterogeneity. To reduce it, Russian and foreign researchers propose to strengthen fiscal decentralization. The study aims to find out whether using this method in Russia will allow achieving the desired result. An answer can be obtained by conducting a regression analysis of the dependence of the scale of heterogeneity of the economic space on the degree of concentration of budget revenues and expenditures at the federal level. In the course of the research, we develop a new method for quantifying the level of heterogeneity of the economic space of a territory; the method requires constructing a figure in a rectangular coordinate system and finding its area. The advantage of this method for assessing the scale of heterogeneity of Russia's economic space is that it allows us to take into account both major indicators – the volume of GRP and the volume of GRP per capita, since so far it has not been

For citation: Pyankova S.G., Kombarov M.A. (2023). Strengthening fiscal decentralization to reduce the heterogeneity of Russia's economic space. *Economic and Social Changes: Facts, Trends, Forecast*, 16(2), 52–68. DOI: 10.15838/esc.2023.2.86.3

determined which of them is a numerical indicator of a region's economic development level. Having assessed the scale of heterogeneity of Russia's economic space for the period from 2000 to 2021 with the help of the above method, we conclude that strengthening fiscal decentralization will reduce the heterogeneity of Russia's economic space. In particular, a 1% decrease in the concentration of budget expenditures at the federal level may lead to a 12.6% decrease in heterogeneity. Proceeding from this conclusion, we put forward some ways to reduce the share of federal budget expenditures in the total volume of the expenditure part of the consolidated budget.

Key words: heterogeneity of economic space, geometric method of estimation, concentration of budget expenditures, federal level, fiscal decentralization.

Introduction

According to Paragraph 20 of the National Security Strategy of the Russian Federation, approved by Presidential Decree 400, dated July 2, 2021, the socio-economic problems in Russia cause unfriendly countries to impose various sanctions against it. In accordance with Item 24 Paragraph 12 of the Economic Security Strategy of the RF for the period through to 2030, approved by Presidential Decree 208, dated May 13, 2017, one of such problems is a high heterogeneity of the economic space, which explains the relevance of the research topic.

The purpose of the work is to identify, if the strengthening of fiscal decentralization weakens the heterogeneity of Russia's economic space. To achieve it, we should solve the following tasks:

- a) to consider the scientists' opinion concerning the heterogeneity of Russia's economic space in general and the strengthening fiscal decentralization as a way to reduce its scale in particular;
- b) to analyze the dependence of the extent of heterogeneity scales on the degree of concentration of budget revenues and expenditures at the federal level;
- c) to suggest possible directions for strengthening fiscal decentralization in the country.

The working hypothesis for the research is the hypothesis that weakening the heterogeneity of Russia's economic space is possible by strengthening of fiscal decentralization, i.e. decreasing the share

of revenues and expenditures of the federal budget in the total volume of revenues and expenditures of the consolidated budget.

Literature review

Heterogeneity of economic space is understood as an inherent feature of any economic system (country, region, etc.), which consists in the fact that each constituent administrative territorial unit (hereinafter – ATU) is characterized by an individual economic development level. This feature has been studied by scientists for almost 200 years. The scientists can be divided into three groups: a) considering the reasons why the economic space of each country and its regions is heterogeneous; b) studying the impact of this factor on the economic development of the country (region); c) reviewing the relationship between the federal, regional and local authorities of a country in a heterogeneous economic space.

The main representative of the first group is the German economist J. von Thünen. Using the example of the so-called “isolated state”, which economy is an absolutely unified closed-type economy and is represented by agriculture, he showed that the ATU of a country and its regions are differentiated by the economic development level due to the fact that the most profitable economic specialization for each of them is individual. For instance, for one, horticulture can bring the maximum profit, for another – forestry, for a third – dairy cattle breeding, etc. (Thünen, 1910). (Thünen, 1910).

One of the first economists who considered the effects of the heterogeneity of the economic space of a country and its regions for the state of the corresponding economic system was the Swedish scientist G. Myrdal. According to his conclusions, the heterogeneity of economic space increases over time, as ATUs, initially more developed, act as attractors for resources of less developed ATUs (Myrdal, 1957). As a result, the integrity and unity of the country's (region's) economic space is violated, which slows down the development of the economic system. A somewhat different opinion was expressed by A. Hirschman. Being interested in such economic category as competition, he has defined that each lagging ATU has potential reserves, mobilizing which they enter the competition with more successful ATU contributing to the economic development of the corresponding country and its regions (Hirschman, 1958). Such a competitive struggle took place, for example, in the United States in the 20th and early 21st century. For example, in 1930, when the U.S. economy was in deep crisis, the share of its geographical regions such as the Northeast and Midwest in the GDP volume was 39.4 and 31.3% respectively, while the South and West accounted for 17.1 and 11.2%, respectively, and by 2018, when the country gained global economic power status, the shares of the latter two regions increased to 33.2 and 25.3%, respectively, bringing the shares of the Northeast and the Midwest down to 20.7 and 19.7%, respectively (Khan, Siddique, 2021).

A logical continuation of the theory of A. Hirschman's becomes a theory of growth poles. Its authors include French economists F. Perroux and P. Pottier. According to this theory, one of the key potential reserves of lagging ATUs is the development of transport infrastructure, since the movement of goods between developed ATUs, referred to in this theory as growth poles, takes place through their territory (Perroux, 1961; Pottier, 1963). According to recent studies, an increase in cargo traffic by road transport in particular Russia's

region by 1 million tons leads to an increase in GRP volume by an average of 47.6 million rubles (Kataeva, 2013).

In order for lagging ATUs to successfully realize all their potential reserves, a competent construction of relations between federal, regional and local authorities, which is the object of attention of representatives of the third group of scientists, is required. One type of such relationship is fiscal decentralization, the advantages and disadvantages of which are actively discussed in academic circles.

The advantages of fiscal decentralization are mentioned, for example, by Ch. Tiebout, J. Bruckner, N. Akai, M. Sakata, D. Cantarero, P.P. Gonzalez, A.O. Yushkov, N.Y. Oding, L.I. Savulkin, M.A. Pechenskaya-Polishchuk. We also note them in our studies. Ch. Tiebout, in particular, stated a wealth of practical experience in the use of fiscal decentralization, emphasizing that the expenditures of regional and local budgets are often higher than the federal budget, and their structure is determined by the people's desire of the respective ATU. In addition, many of the benefits that attract population, such as schools, roads, parking lots, etc., are created at the expense of regional and local budgets. Consequently, a region or municipality's lack of funds for creating benefits, which can occur if fiscal decentralization is abandoned, will lead to an outflow of population from it (Tiebout, 1956).

H. Akai, M. Sakata, D. Cantarero, P.P. Gonzalez, and J. Bruckner conduct studies aimed at establishing the presence and nature of the impact of fiscal decentralization on the economic growth of the country and its ATU. For instance, N. Akai and M. Sakata conclude on the positive impact of fiscal decentralization on the economic growth of the U.S. states (Akai, Sakata, 2002), D. Cantarero and P. P. Gonzalez on the economic growth of Spanish regions (Cantarero, Gonzalez, 2009), and J. Brueckner – on the economic growth of a hypothetical country where the entire population is divided into two generations – young and old

people, and the latter should receive public good at a higher level (Brueckner, 2006). We have found that the strengthening of fiscal decentralization in Russia will increase the GRP of its constituent regions and the country's real GDP volume (Pyankova, Kombarov, 2023), the dynamics of which are nothing other than the economic growth rate.

A.O. Yushkov, N.Yu. Oding and L.I. Savulkin review three possible levels of fiscal decentralization strengthening in Russia: conservative, moderate and optimal. At the conservative level, they propose to transfer to the regional budgets tax revenues from excise taxes on tobacco products at a rate of 50% and on alcohol products with a volume fraction of ethyl alcohol over 9% at a rate of 100%, at the moderate level – in addition to these excises revenues from corporate income tax calculated at the rate of 3%, i.e. the federal component of this tax, at 100% rate, and at the optimal level – taxes transferred at the moderate level and also 30% of mineral oil tax, except for the budget of Khanty-Mansi Autonomous Okrug – Ugra. According to the calculations carried out by the researchers, when fiscal decentralization is strengthened to the optimal level, the additional revenues volume of regional budgets will exceed the volume of drop-out funds from the federal budget by more than 2.5 times (Yushkov et al., 2017).

According to M.A. Pechenskaya-Polishchuk, the strengthening of fiscal decentralization in Russia will eliminate the current negative trend associated with the enormous outflow of tax revenues collected from the budgets of regional and local levels and, consequently, increase the interest of regional and local authorities in the economic development of the relevant ATU. As an example of this trend, the researcher cites the situation in one of the cities of the Leningrad Oblast, Pikalyovo, which has only 9% of the total amount of taxes collected remaining in its budget (Pechenskaya-Polishchuk, 2021).

J. Martinez-Vazquez and R. McNab consider the disadvantages of increasing fiscal decentralization. The researchers conclude that the appli-

cation of this method of support to lagging ATUs creates a favorable environment for the development of corruption (Martinez-Vazquez, McNab, 1997).

Summarizing the scientists' opinions, we can state that the heterogeneity of the economic space of a country and its regions can have both positive and negative impact on the development of the corresponding economic system depending on the severity of this factor. For instance, at a low level of heterogeneity, when all lagging ATUs have mobilized their potential reserves, this influence is positive, and at a high level, typical of Russia – negative. One of the ways to reduce the scale of the heterogeneity in economic space is to strengthen fiscal decentralization. Below, we will discuss the feasibility and possible directions of its use in Russia.

Materials and methods

The first stage of the study requires a quantitative assessment of the heterogeneity of Russia's economic space. Currently, scientists use several different indicators to make such an assessment. The most common include the polarity gap coefficient (Lavrikova, Suvorova, 2020; Manshin, Moiseeva, 2022), the Theil index (Moroshkina, 2018; Khan, Siddique, 2021) and the coefficient of variation (Turovskii, Dzhavatova, 2019). Having noted their shortcomings in a previous paper, we have assessed the heterogeneity of Russia's economic space using another indicator, called the Svetunkov index (Pyankova, Kombarov, 2022). Its application requires information about the number of ATUs forming the economic system and the economic development rate of each of them. If the first parameter is very simple, then the second one may cause certain difficulties, as there are active discussions in scientific circles as to which indicator is its numerical indicator – the nominal GRP volume or the GRP volume per capita. For example, A.K. Gubanova believes that it is the nominal GRP volume because the GRP volume per capita may not reflect the true situation due to the small number of individual ATU (Gubanova,

2019). P.A. Bulochnikov and K.B. Smirnov hold a similar position (Bulochnikov, Smirnov, 2019). According to other researchers, in particular, A.G. Granberg¹, N.V. Zubarevich (Zubarevich, 2009), T.V. Uskova (Uskova, 2018), etc., the GRP volume per capita indicates the economic development rate of a particular ATU. In this regard, it seems very appropriate to assess the heterogeneity of Russia's economic space using methods that allow taking into account both parameters simultaneously.

In the course of the research, we will carry out the assessment using a method, which can be called a geometric method of assessing the heterogeneity of the economic space of a country and its regions, which we have developed. At the first stage, it is necessary to construct in a rectangular coordinate system a point diagram of the economic development rate of ATUs, forming an economic system, the heterogeneity of which space is assessed by plotting on the abscissa axis the values of the indicator, which is a valid measure of this level, in nominal terms, and on the ordinate axis – its values per capita. At the second stage, the outermost points of the diagram should be used to construct a figure so that all other points are inside it. At the third and final stage we have to find an area of the figure (heterogeneity figure) which will be a quantitative measure of heterogeneity of the evaluated economic space. If the obtained figure turns out to be different from the basic geometrical figures, in order to find the area, it is necessary to divide it into several such figures. For example, if the heterogeneity figure is divided into several triangles, the formula for determining its area will look as follows:

$$S_{hg} = \sum S_{\Delta}, \quad (1)$$

where:

S_{hg} – area of heterogeneity figure;

S_{Δ} – area of the triangles forming heterogeneity figure.

¹ Granberg A.G. (2004). *Fundamentals of Regional Economics: Study Aid for Universities. 4th Edition*. Moscow: Izd. dom GU VShE.

In turn, the area of the triangle placed in a rectangular coordinate system is calculated as follows:

$$S_{\Delta} = \frac{|(x_2-x_1)(y_3-y_1)-(x_3-x_1)(y_2-y_1)|}{2}, \quad (2)$$

where:

$x_1, y_1; x_2, y_2; x_3, y_3$ – coordinates of the vertices of the triangle.

The disadvantage of the geometric method of assessing the heterogeneity of the economic space of the country and its regions is that it cannot be used when the indicators change strictly proportionally, as in this case the diagram described above will represent a straight line. However, due to the fact that such a situation is unlikely in practice, this drawback cannot be considered essential and detract from the main advantage of the method, which consists in taking into account both indicators used by representatives of scientific circles as numerical indicators of the level of economic development of ATUs, which form a particular economic system.

The information, necessary to assess the heterogeneity of Russia's economic space using the geometric method, is available on the official website of the Federal State Statistics Service². After assessing the heterogeneity of the space for the period from 2000 to 2021³, it is possible to conduct a regression analysis of the dependence of this value on the degree of concentration of budget revenues and expenditures at the federal level, which is a quantitative measure of the current level of fiscal decentralization; it means that its decrease indicates an increase in fiscal decentralization and vice versa. This degree is calculated as a share of federal budget revenues and expenditures in the total amount of the consolidated budget expenditures (hereinafter – $d_{rev. fed.}$ and $d_{exp. fed.}$ respectively) on the basis of the information presented on the official website of the Ministry of Finance of the Russian

² National accounts. Federal State Statistics Service. Available at: <https://rosstat.gov.ru/statistics/accounts> (accessed: March 14, 2023).

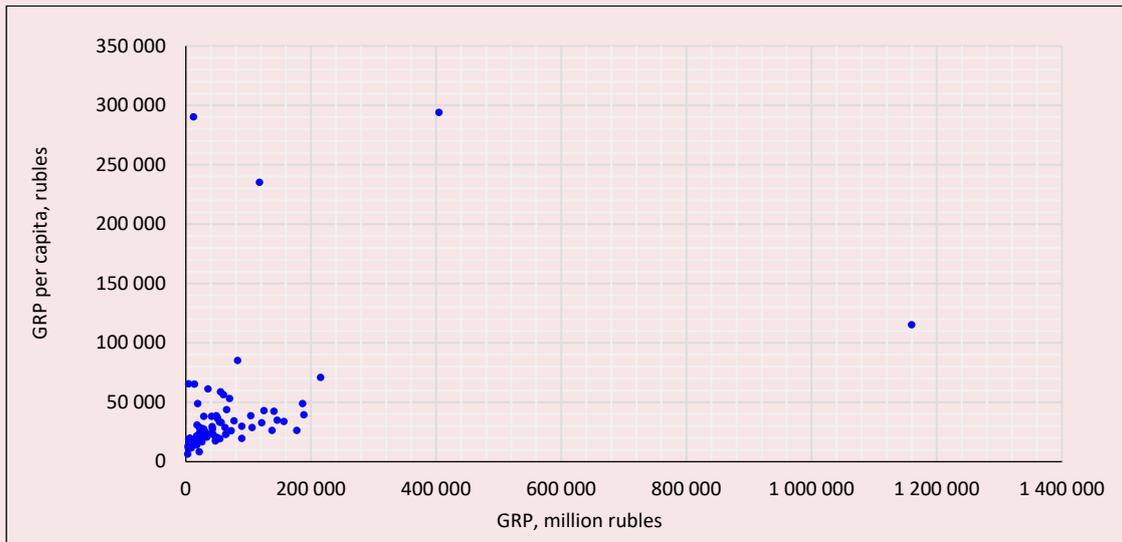
³ No data for 2021 and 2022 available as of today.

Federation⁴. After the completion of the analysis, in case its results show the need to strengthen fiscal decentralization in Russia, i.e. the need to reduce $d_{rev. fed.}$ and $d_{exp. fed.}$, we will say about the possible directions of implementation of such a policy.

Results

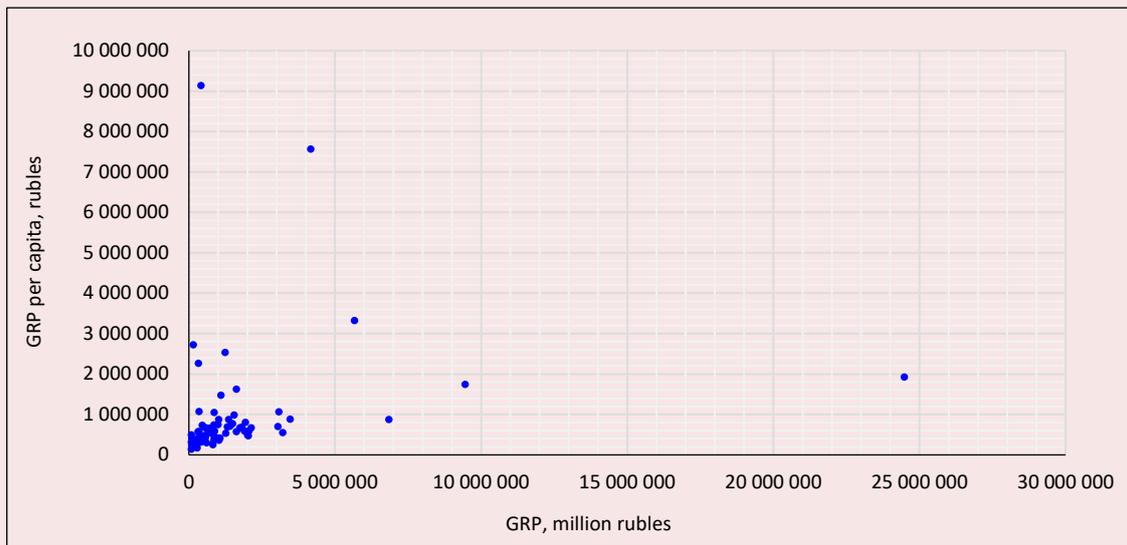
Figures 1 and 2 present point diagrams of the economic development rate of Russian regions, based on data on GRP and GRP per capita for 2000 and 2021.

Figure 1. Point diagram of economic development rate of Russian regions in 2000



Source: own compilation.

Figure 2. Point diagram of economic development rate of Russian regions in 2021



Source: own compilation.

⁴ Ministry of Finance of Russia. Statistics. Available at: <https://minfin.gov.ru/ru/statistics/> (accessed: March 14, 2023).

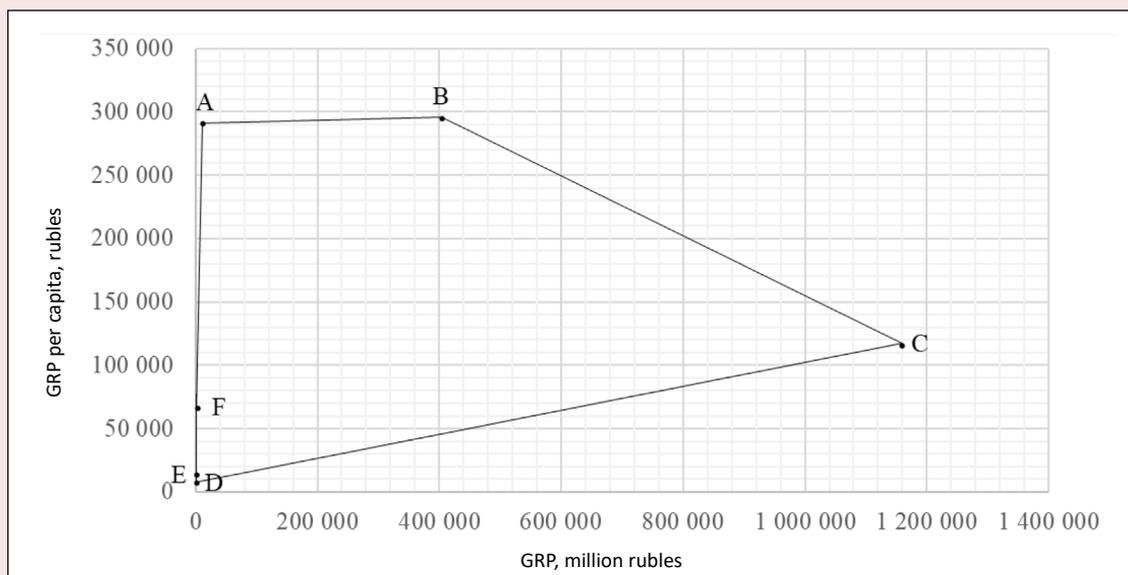
The extreme points of the point diagram of the economic development rate of Russian regions in 2000 are such constitute entities as KhMAD – Yugra (it has the highest GRP per capita), Moscow (it has the highest GRP) and the Republic of Ingushetia (it has the lowest values of both indicators). Besides them, the vertices of the figure of heterogeneity of Russia's economic space in 2000 are the points denoting Nenets Autonomous Okrug, Chukotka Autonomous Okrug and the Republic of Altai, as they are outside the plane bounded by the lines connecting the extreme points of the diagram. After 21 years, Nenets Autonomous Okrug became the constitute entity with the highest GRP volume per capita, Moscow retained its position, and the Republic of Ingushetia, retaining the lowest GRP volume per capita, gave way to the lowest position in the rating of Russian regions by the GRP volume to the Republic of Altai. Also, the top of the figure of heterogeneity of Russia's economic space for 2021 is the point denoting Chukotka Autonomous Okrug.

Comparing the diagram in Figure 1 with the diagram in Figure 2, we can hypothesize that the

heterogeneity of Russia's economic space has grown rapidly over the entire period under consideration. For instance, whereas the ordinate of the upper-most point of the diagram for 2000 does not reach 300,000 and the abscissa of the rightmost point does not reach 1.2 million, the coordinates of the diagram for 2021 exceed 9 million and 24 million, respectively, whereas the positions of the lowermost and leftmost points have not changed much. Based on these diagrams, let us plot the figures of heterogeneity of Russia's economic space for 2000 and 2021 (Fig. 3, 4).

The figures of heterogeneity of Russia's economic space for 2000 and 2021 are polygons, which are divided into several triangles. The figures for the other years of the period under consideration have a similar appearance. This means that the calculation of the level of heterogeneity of the Russian economic space for 2000–2021 can be performed using formulas (1) and (2). The results of the calculation are presented in Table 1, where we also give the information necessary for the regression analysis on the concentration degree of budgetary revenues and expenditures at the federal level.

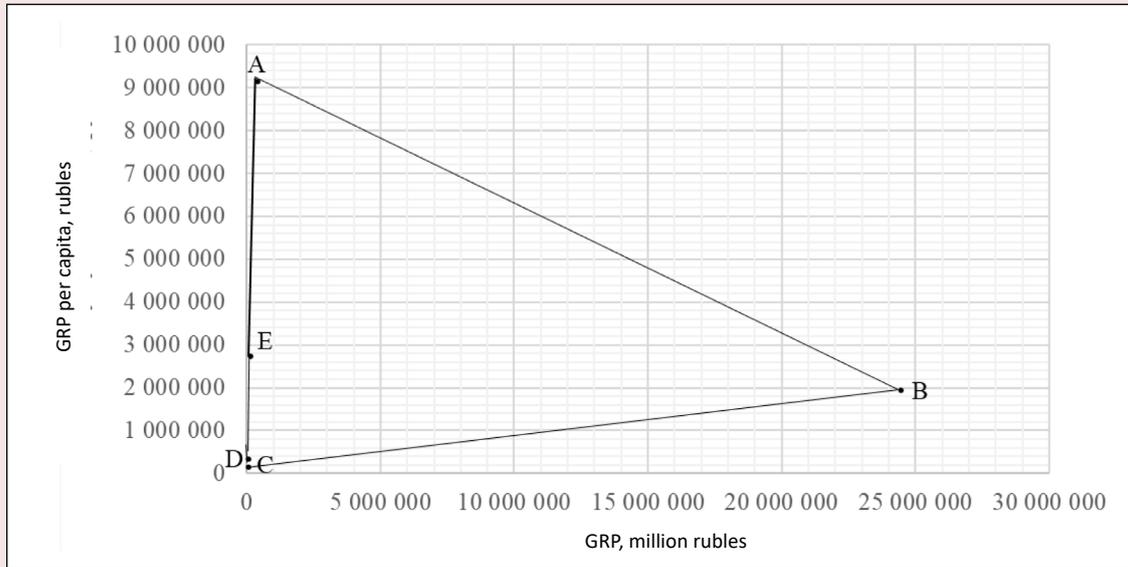
Figure 3. Figure of the heterogeneity of Russia's economic space for 2000



Note: A – Nenets Autonomous Okrug, B – KhMAO – Yugra, C – Moscow, D – Republic of Ingushetia, E – Republic of Altai, F – Chukotka Autonomous Okrug.

Source: own compilation.

Figure 4. Figure of heterogeneity of Russia’s economic space for 2021



Note: A – Nenets Autonomous Okrug, B – Moscow, C – Republic of Ingushetia, D – Republic of Altai, E – Chukotka Autonomous Okrug.

Source: own compilation.

Table 1. Heterogeneity of Russia’s economic space in 2000–2021 and concentration of budget revenues and expenditures at the federal level

Year	Area of heterogeneity figure, c.u.	$d_{rev. fed.}$	$d_{exp. fed.}$
2000	200 207 472 785,6	-	-
2001	286 195 545 481,9	-	-
2002	391 926 242 783,4	-	-
2003	663 874 223 570,2	-	-
2004	1 321 832 924 232,2	-	-
2005	2 157 664 354 703,9	-	-
2006	4 138 520 591 900,4	72.64	65.81
2007	7 642 343 349 126,6	70.94	65.56
2008	8 746 822 350 350,4	71.82	67.29
2009	10 810 636 983 849,5	74.80	77.52
2010	14 159 318 223 785,5	76.50	79.25
2011	19 073 420 372 919,5	75.60	74.79
2012	19 190 279 411 460,4	80.61	79.30
2013	23 244 909 026 881,4	79.64	77.14
2014	27 047 402 986 242,6	77.17	75.65
2015	34 383 655 760 012,3	77.26	78.81
2016	43 993 857 597 305,5	73.62	77.29
2017	48 757 126 799 077,8	74.12	75.49
2018	66 956 692 764 222,0	73.64	72.15
2019	72 770 619 359 658,8	72.56	70.52
2020	53 361 858 096 803,4	75.00	76.77
2021	109 664 682 849 975,0	73.80	74.90

Source: own compilation.

The data in Table 1 testify that the heterogeneity of Russia's economic space during 2000–2021 showed rapid and almost monotonous growth. They confirm the hypothesis we put forward and agrees with positions of normative-legal acts, in particular, Strategies of economic security of the Russian Federation for the period through to 2030. Considering dynamics of this indicator in details, it is easy to notice, that its fastest growth has come to 2003–2007 and it has been noted by results of 2021. This state of affairs may indicate that the Russian economy growth observed during almost the entire first decade of the 21st century and in 2021 took place only in some regions: Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug – Yugra, YNAO, Moscow, as well as the Moscow Oblast and Saint Petersburg. A slight de-heterogenization of Russia's economic space at the end of 2020 is an effect of circumstances such as the COVID-19 pandemic and oil production decline. The six above-mentioned constitute entities suffered the greatest damage from these circumstances; in addition, anticoroncrisis measures taken by the authorities had a noticeable positive impact on the economic situation of the lagging regions (Freihe et al., 2023).

Table 1 also shows that during the regression analysis of the dependence of the scale of heterogeneity of Russia's economic space on the concentration degree of budget revenues and expenditures at the federal level it is possible to cover

only the period from 2006 to 2021, as the amount of information presented on the official website of the RF Ministry of Finance does not allow calculating the above value for earlier years. Table 2 presents the results of this analytical procedure.

According to the data in Table 2, the dependence of the scale of heterogeneity of Russia's economic space on the concentration degree of budget revenues and expenditures at the federal level takes place because the coefficient of determination R^2 turned out to be statistically significant. As for the coefficients on exogenous variables, among them, only the coefficient on the variable $d_{exp. fed.}$ turned out to be statistically significant. Consequently, the scale of heterogeneity of the Russian economic space may be absolutely inelastic to changes in the degree of concentration of budget revenues at the federal level, while a 1% change in the degree of concentration degree of budget expenditures at that level may entail a similarly directed change in the given scale by about 12.6%. One of the most favorable circumstances leading to the weakening of the concentration of budget expenditures at the federal level is the faster growth in expenditures of regional and local budgets, as compared with the growth in the expenditure volume of the federal budget. On the basis of the fact that to ensure such growth they need additional revenue sources, we can say that Russia really needs to strengthen fiscal decentralization.

Table 2. Regression analysis results of the dependence of the scale of heterogeneity of Russia's economic space on $d_{exp. fed.}$ $d_{exp. fed.}$

Dependent variable	Coefficient (standard error)			R^2	Regression equation
	a	b	c		
Area of heterogeneity figure	$8.8063 \cdot 10^{17}$ ($5.1187 \cdot 10^{11}$)	-14.9942 (9.3421)	12.5988^{**} (5.1838)	0.3196*	$Y = 8.8063 \cdot 10^{17} \cdot X_1^{-14.9942} \cdot X_2^{12.5988}$
Note: a) *, ** – significance levels of 10% and 5%, respectively (the absence of asterisks indicates that the coefficient is statistically insignificant); b) X_1 and X_2 in the regression equation – $d_{rev. fed.}$ and $d_{exp. fed.}$ respectively. Source: own compilation.					

Discussion

The main feature of measures to strengthen fiscal decentralization in Russia should be their selective nature. In other words, such measures should not be applied to the regions, due to the successful development of which the scale of heterogeneity of the Russian economic space is rapidly growing and which are clearly distinguished in the point diagrams presented in Figures 1 and 2, namely Moscow, the Moscow Oblast, Saint Petersburg, Nenets, Khanty-Mansi and Yamalo-Nenets Autonomous okrugs. The points indicating the other regions are concentrated in the bottom left corner of the diagrams, which corresponds to an extremely low GRP and GRP volume per capita compared to the indicators of the aforementioned regions. Measures to strengthen fiscal decentralization should be aimed at these regions. As for the specific ways of carrying out such a policy, it is important to agree with the above mentioned opinion of A.O. Yushkov, N.Y. Oding and L.I. Savulkin that tax revenues from excise taxes on tobacco products according to the norm 50%, on alcohol products with a volume fraction of ethyl alcohol over 9% except for the products listed in Paragraph 9 of Article 50 of the Budget Code, according to the norm 100% can be transferred to the regional level, the federal component of corporate income tax and mineral extraction tax in the form of oil according to the norm 30%

(Yushkov et al, 2017). At the same time, scenarios of fiscal decentralization strengthening should be individual for each of the regions. For example, with respect to some entities they should be limited to a conservative one, while for others it is worth applying the optimal scenario.

It is possible to identify which scenario of strengthening fiscal decentralization should be implemented in this or that constitute entity by determining the economic orientation degree of the regional budget and comparing it with this parameter of the federal budget. The economic orientation degree of the budget should be understood as the amount of spending on the national economy, directed on average from one ruble of its revenues. The importance of this indicator lies in the fact that in the current economic realities, when Russia is experiencing enormous sanctions pressure, the expenditures on the national economy are the priority expenditures of its budget of the expanded government, as they will allow implementing the import substitution policy and, therefore, ensuring the country's resistance to the sanctions pressure. This parameter can be defined as a coefficient with the exogenous variable X in the linear regression equation, describing the dependence of the specified expenditures of this or that budget on the volume of its revenue part. *Table 3* presents the results of the regression analysis of such dependence, carried out on the basis of the data from 2006 to 2021.

Table 3. Regression analysis results of the dependence of expenditures on the national economy of the federal budget and regional budgets on their revenues volume

Dependent (endogenous) variable	Coefficient (standard error)		R ²	Regression equation
	a	b		
Federal budget expenditures on the national economy	-307102311.0487 (306771348.6658)	0.1786*** (0.0212)	0.8354***	Y = -307102311.0487 + 0.1786X
Expenditures on the national economy budget:				
Altai Krai	2363979.7665* (1324310.4191)	0.1523*** (0.0156)	0.8716***	Y = 2363979.7665 + 0.1523X
Amur Oblast	-4018616.2082** (1443152.2486)	0.2813*** (0.0261)	0.8922***	Y = -4018616.2082 + 0.2813X

Continuation of Table 3

Dependent (endogenous) variable	Coefficient (standard error)		R ²	Regression equation
	a	b		
Archangelsk Oblast	580502.9064 (966733.2461)	0.1390*** (0.0141)	0.8822***	Y = 580502.9064 + 0.139X
Astrakhan Oblast	-350384.1852 (510045.6042)	0.1477*** (0.0140)	0.8883***	Y = -350384.1852 + 0.1477X
Belgorod Oblast	12136508.7941*** (3805052.8991)	0.1458** (0.0493)	0.3849**	Y = 12136508.7941 + 0.1458X
Bryansk Oblast	-2055061.6750 (1275824.5719)	0.3188*** (0.0265)	0.9177***	Y = -2055061.6750 + 0.3188X
Vladimir Oblast	1980052.2607* (1000750.2001)	0.1201*** (0.0196)	0.7583***	Y = 1980052.2607 + 0.1201X
Volgograd Oblast	-375062.2726 (1092120.1176)	0.1959*** (0.0130)	0.9458***	Y = -375062.2726 + 0.1959X
Vologda Oblast	-1358817.3659 (1261623.4185)	0.2136*** (0.0192)	0.9053***	Y = -1358817.3659 + 0.2136X
Voronezh Oblast	201803.8866 (1543820.4031)	0.2120*** (0.0175)	0.9131***	Y = 201803.8866 + 0.2120X
Jewish Autonomous Oblast	711948.1183*** (181725.2011)	0.0781*** (0.0160)	0.6638***	Y = 711948.1183 + 0.0781X
Zabaykalsky Krai	-1491427.2463** (658102.5514)	0.1803*** (0.0125)	0.9371***	Y = -1491427.2463 + 0.1803X
Ivanovo Oblast	-1421034.4136*** (467498.0363)	0.1865*** (0.0135)	0.9320***	Y = -1421034.4136 + 0.1865X
Irkustk Oblast	-968898.0057 (1094261.7446)	0.1364*** (0.0084)	0.9494***	Y = -968898.0057 + 0.1364X
Kabardino-Balkar Republic	732336.6841 (462205.4780)	0.1497*** (0.0162)	0.8597***	Y = 732336.6841 + 0.1497X
Kalinigrad Oblast	-14723467.2060*** (3295842.9922)	0.7170*** (0.0432)	0.9582***	Y = -14723467.2060 + 0.717X
Kaluga Oblast	-116101.9470 (1025964.2282)	0.2624*** (0.0210)	0.9181***	Y = -116101.9470 + 0.2624X
Kamchatka Krai	-3485341.5617*** (646121.1963)	0.3026*** (0.0109)	0.9822***	Y = -3485341.5617 + 0.3026X
Karachay-Cherkess Republic	-194938.5100 (223679.3350)	0.2029*** (0.0110)	0.9602***	Y = -194938.5100 + 0.2029X
Kemerovo Oblast	760251.8903 (1988860.4783)	0.1161*** (0.0164)	0.7820***	Y = 760251.8903 + 0.1161X
Kirov Oblast	613877.8142 (665663.1032)	0.1703*** (0.0144)	0.9090***	Y = 613877.8142 + 0.1703X
Kostroma Oblast	-1213560.0320*** (282365.2705)	0.2345*** (0.0114)	0.9679***	Y = -1213560.0320 + 0.2345X
Krasnodar Krai	-2262777.5905 (2676391.7553)	0.1786*** (0.0127)	0.9427***	Y = -2262777.5905 + 0.1786X
Krasnoyarsk Krai	12825336.8133*** (3137196.5472)	0.0748*** (0.0158)	0.6168***	Y = 12825336.8133 + 0.0748X
Kurgan Oblast	-702719.0311 (554373.4005)	0.1901*** (0.0161)	0.9082***	Y = -702719.0311 + 0.1901X
Kursk Oblast	1864039.2197** (757931.6306)	0.1897*** (0.0159)	0.9104***	Y = 1864039.2197 + 0.1897X
Leningrad Oblast	2288796.8781 (1336479.3326)	0.1660*** (0.0134)	0.9161***	Y = 2288796.8781 + 0.166X
Lipetsk Oblast	3163114.7851** (1381441.3816)	0.1519*** (0.0265)	0.7009***	Y = 3163114.7851 + 0.1519X

Continuation of Table 3

Dependent (endogenous) variable	Coefficient (standard error)		R ²	Regression equation
	a	b		
Magadan Oblast	533088.0501 (361540.2961)	0.1048*** (0.0128)	0.8275***	Y = 533088.0501 + 0.1048X
Mumansk Oblast	1529207.4369** (536232.8537)	0.0687*** (0.0091)	0.8017***	Y = 1529207.4369 + 0.0687X
Nizhny Novgorod Oblast	-166505.5191 (1751630.0926)	0.1774*** (0.0128)	0.9365***	Y = -166505.5191 + 0.1774X
Novgorod Oblast	-1023580.8748 (650569.6408)	0.2627*** (0.0229)	0.9098***	Y = -1023580.8748 + 0.2627X
Novosibirsk Oblast	-1543234.6828 (1759161.1551)	0.1875*** (0.0145)	0.9230***	Y = -1543234.6828 + 0.1875X
Omsk Oblast	-1232372.1515 (1120982.7284)	0.1830*** (0.0154)	0.9102***	Y = -1232372.1515 + 0.183X
Orenburg Oblast	495117.5133 (1020525.0848)	0.1780*** (0.0133)	0.9277***	Y = 495117.5133 + 0.178X
Orlov Oblast	146055.7130 (540578.1326)	0.2057*** (0.0197)	0.8864***	Y = 146055.713 + 0.2057X
Penza Oblast	-210654.3044 (565313.2737)	0.1931*** (0.0123)	0.9460***	Y = -210654.3044 + 0.1931X
Perm Krai	-2455986.4119 (2090346.4525)	0.1841*** (0.0189)	0.8718***	Y = -2455986.4119 + 0.1841X
Primorsky Krai	948650.3515 (3052947.3271)	0.1919*** (0.0317)	0.7242***	Y = 948650.3515 + 0.1919X
Pskov Oblast	-1591596.8373*** (487427.7215)	0.3149*** (0.0180)	0.9564***	Y = -1591596.8373 + 0.3149X
Republic of Adygeya	-1867603.7489*** (370824.7400)	0.3249*** (0.0207)	0.9499***	Y = -1867603.7489 + 0.3249X
Republic of Altai	-420349.2266 (545524.6959)	0.2530*** (0.0328)	0.8094***	Y = -420349.2266 + 0.253X
Republic of Bashkortostan	2984272.3004 (2098158.1437)	0.1662*** (0.0140)	0.9097***	Y = 2984272.3004 + 0.1662X
Republic of Buryatia	632453.0846 (756938.9848)	0.1337*** (0.0142)	0.8715***	Y = 632453.0846 + 0.1337X
Republic of Dagestan	3399471.5871** (1427436.6641)	0.0948*** (0.0150)	0.7415***	Y = 3399471.5871 + 0.0948X
Republic of Ingushetia	1721677.6287** (681384.0695)	0.0467 (0.0304)	0.1438	Y = 1721677.6287 + 0.0467X
Republic of Kalmykia	-363543.9571 (215947.1734)	0.2365*** (0.0189)	0.9180***	Y = -363543.9571 + 0.2365X
Republic of Karelia	-1791490.9899** (742054.5636)	0.2343*** (0.0202)	0.9060***	Y = -1791490.9899 + 0.2343X
Komi Republic	2130166.1525** (961491.7727)	0.0980*** (0.0156)	0.7384***	Y = 2130166.1525 + 0.098X
Mari El Republic	-584670.3603 (344896.0445)	0.2216*** (0.0135)	0.9505***	Y = -584670.3603 + 0.2216X
Republic of Mordovia	3904043.9066*** (1270268.2830)	0.1453*** (0.0362)	0.5355***	Y = 3904043.9066 + 0.1453X
Republic of Sakha (Yakutia)	-143139.3628 (1792801.8855)	0.1582*** (0.0107)	0.9400***	Y = -143139.3628 + 0.1582X
Republic of North Ossetia – Alania	-586853.3778 (375662.9981)	0.1546*** (0.0147)	0.8945***	Y = -586853.3778 + 0.1546X
Republic of Tatarstan	7989322.3203* (3978657.6574)	0.2802*** (0.0189)	0.9399***	Y = 7989322.3203 + 0.2802X

End of Table 3

Dependent (endogenous) variable	Coefficient (standard error)		R ²	Regression equation
	a	b		
Republic of Tyva	-1889930.6150*** (448524.2064)	0.2415*** (0.0173)	0.9420***	Y = -1889930.615 + 0.2415X
Republic of Khakassia	717294.4294* (356855.5933)	0.0979*** (0.0148)	0.7576***	Y = 717294.4294 + 0.0979X
Rostov Oblast	-595760.0670 (2218715.5636)	0.1527*** (0.0156)	0.8720***	Y = -595760.067 + 0.1527X
Ryazan Oblast	-1371147.1153* (732278.3991)	0.2426*** (0.0161)	0.9458***	Y = -1371147.1153 + 0.2426X
Samara Oblast	-7540348.9718*** (2328442.6541)	0.2525*** (0.0164)	0.9440***	Y = -7540348.9718 + 0.2525X
Saratov Oblast	993106.2146 (909095.1309)	0.1399*** (0.0114)	0.9146***	Y = 993106.2146 + 0.1399X
Sakhalin Oblast	709952.0295 (2526909.7882)	0.2104*** (0.0230)	0.8655***	Y = 709952.0295 + 0.2104X
Sverdlovsk Oblast	2035012.6124 (1850725.8884)	0.1296*** (0.0095)	0.9353***	Y = 2035012.6124 + 0.1296X
Smolensk Oblast	-864001.0156* (431876.7832)	0.2159*** (0.0122)	0.9569***	Y = -864001.0156 + 0.2159X
Stavropol Krai	1047553.7873 (1333256.9653)	0.1590*** (0.0153)	0.8853***	Y = 1047553.7873 + 0.159X
Tambov Oblast	-5328.2871 (1595194.2370)	0.2497*** (0.0413)	0.7229***	Y = -5328.2871 + 0.2497X
Tver Oblast	-4081692.7832*** (992754.0218)	0.2683*** (0.0192)	0.9330***	Y = -4081692.7832 + 0.2683X
Tomsk Oblast	336590.7747 (862807.9947)	0.1511*** (0.0168)	0.8522***	Y = 336590.7747 + 0.1511X
Tula Oblast	1041711.6824 (944862.8811)	0.1505*** (0.0155)	0.8712***	Y = 1041711.6824 + 0.1505X
Tyumen Oblast	34795338.4308*** (6591616.2275)	0.0341 (0.0417)	0.0457	Y = 34795338.4308 + 0.0341X
Udmurt Republic	-1004779.3146 (969692.9204)	0.1936*** (0.0164)	0.9090***	Y = -1004779.3146 + 0.1936X
Ulyanovsk Oblast	718010.8529 (1250990.0176)	0.1655*** (0.0262)	0.7539***	Y = 718010.8529 + 0.1655X
Khabarovsk Krai	6060345.4726* (2945269.3362)	0.0071 (0.0401)	0.0026	Y = 6060345.4726 + 0.0071X
Chelyabinsk Oblast	1618138.8062 (1494076.5960)	0.1272*** (0.0109)	0.9132***	Y = 1618138.8062 + 0.1272X
Chechen Republic	5033681.5708** (1694723.3918)	0.0475** (0.0210)	0.3182**	Y = 5033681.5708 + 0.0475X
Chuvash Republic	2536590.2286*** (669922.9634)	0.1249*** (0.0156)	0.8209***	Y = 2536590.2286 + 0.1249X
Chukotka Autonomous Okrug	474810.5380 (1227159.3172)	0.2528*** (0.0413)	0.7276***	Y = 474810.5380 + 0.2528X
Yaroslavl Oblast	969258.6824 (662428.3556)	0.1421*** (0.0122)	0.9068***	Y = 969258.6824 + 0.1421X

Note: *, **, *** – significance levels of 10%, 5% and 1%, respectively (the absence of asterisks indicates that the coefficient is statistically insignificant).
Source: own compilation.

The economic orientation degree of the federal budget is 0.1786 points, i.e. from each ruble of its income about 18 kopecks is directed to the national economy. On this basis, we can say that fiscal decentralization should be strengthened according to the conservative scenario with regard to regions, where the degree of economic orientation of their budget does not exceed 0.1686 points or where this coefficient is statistically insignificant, according to the moderate scenario – with regard to regions, for which this parameter is in the range of 0.1687 to 0.1885 points, and according to the optimal scenario – with regard to regions, whose budget is characterized by economic orientation, which is at least 0.1886 points.

To assess the effectiveness of the proposed measures, it is necessary to conduct a regression analysis of the dependence of $d_{exp. fed.}$ on the value of oil and gas revenues of the budget of the expanded government, which include revenues from MET as oil, on its tax revenues from excise taxes and corporate income tax. *Table 4* demonstrates the results of the analysis.

As the data show, an increase in revenues of the enlarged government budget from excises entails an increase in $d_{exp. fed.}$ and from the tax on profit of organizations – a decrease, as the first of these taxes is almost entirely credited to the federal budget, and most of the second – to the budgets of the RF entities. Consequently, the transfer of part of revenues from excises to the regional level will allow,

at least, reducing the elasticity of dependence of the federal budget on them and the federal component of corporate income tax – to make more pronounced the positive effect of increased budget revenues of the expanded government from this tax, which consists in reducing the concentration of budget expenditures at the federal level. Based on the mentioned above, as well as on the fact that MET in the form of oil, the dynamics of revenues of the enlarged government budget from which can have no effect on the federal budget, is proposed to be transferred only under the best scenario of fiscal decentralization strengthening, we can state that the adoption of the recommended measures by the authorities will reduce the heterogeneity of the Russian economic space.

The implementation of the measures proposed in the study to weaken the heterogeneity of the Russian economic space will entail a loss of funds from the federal budget. Some changes in legislation on taxes and fees, which came into force on January 1, 2023, will help to compensate the lost revenues. First of all, they include increasing the tax burden on Gazprom and other enterprises engaged in coal, oil and gas production, which will bring the federal budget more than 1 trillion rubles in 2023–2025.

Conclusion

Russia’s highly heterogeneous economic space is one of the factors slowing down the national economy development and, therefore, attracting the authorities’ focus. The aim of the research

Table 4. Regression analysis results of the dependence of $d_{exp. fed.}$ on the value of some revenues of the expanded government budget

Dependent variable	Coefficient (standard error)				R ²	Regression equation
	a	b	c	d		
$d_{exp. fed.}$	137.7892*** (1.4297)	0.0033 (0.0552)	0.1339*** (0.0348)	-0.1967*** (0.0473)	0.6749***	Y = 137.7892 * X ₁ ^{0.0033} * X ₂ ^{0.1339} * X ₃ ^{-0.1967}
Note: a) *, **, *** – significance at 10%, 5% and 1% respectively (the lack of asterisks indicates the statistical insignificance of the coefficient); b) X ₁ , X ₂ and X ₃ in the regression equation – oil and gas revenues, excise taxes and corporate income tax respectively. Source: own compilation.						

is to determine whether the strengthening of fiscal decentralization will allow weakening the heterogeneity of the country's economic space. With the help of calculation and analytical procedures, we have revealed the statistically significant dependence of the scale of heterogeneity of the Russian economic space on the concentration degree of budget revenues and expenditures at the federal level, i.e. on $d_{rev. fed.}$ and $d_{exp. fed.}$, the weakening of which acts as an indicator of fiscal decentralization strengthening; and we have found that the reduction of $d_{rev. fed.}$ by 1% can reduce the scale of heterogeneity of the Russian economic space by about 12.6%.

The conducted research is significant both from theoretical and practical points of view. Its theoretical significance consists in the fact that it includes the development and approbation of a new approach to assessing the heterogeneity of Russia's economic space, requiring the construction of a figure in a rectangular coordinate system, called a figure of heterogeneity, finding its area and taking into account both the most important economic indicators of its regions simultaneously; and practical significance is explained by the fact that

its results can be taken into account by authorities in implementing strategic documents such as the Economic Security Strategy of the Russian Federation for the period through to 2030, etc.

The regression analysis of the dependence of the scale of heterogeneity of the Russian economic space on the concentration degree of budget revenues and expenditures at the federal level covered the time interval beginning in 2006. This limitation was imposed on the authors by the fact that the amount of information available on the official website of the RF Ministry of Finance does not allow calculating the values of exogenous variables for earlier years. The elimination of this drawback by the departments of the above body responsible for the preparation of information will significantly improve the quality of future research in this area.

The geometric method we propose to use when assessing the heterogeneity level of the economic space of the country and its regions can also be applied to evaluate the specified parameter of each Russia's entity in the context of its constituent municipalities. One of the future studies should be devoted to such an assessment.

References

- Akai N., Sakata M. (2002). Fiscal decentralization contributes to economic growth: Evidence from state-level cross-section data for the United States. *Journal of Urban Economics*, 52(1), 93–108. DOI:10.1016/S0094-1190(02)00018-9
- Brueckner J. (2006). Fiscal federalism and economic growth. *Journal of Public Economics*, 90(10-11), 2107–2120. DOI:10.1016/j.jpubeco.2006.05.003
- Bulochnikov P.A., Smirnov K.B. (2019). Interregional differentiation of spatial development of regions of the Russian Federation. *Peterburgskii ekonomicheskii zhurnal*, 4, 68–75. DOI: 10.25631/PEJ.2019.4.68.75 (in Russian).
- Cantarero D., Gonzalez P.P. (2009). Fiscal decentralization and economic growth: Evidence from Spanish regions. *Public Budgeting & Finance*, 29(4), 24–44.
- Freije S., Matytsin M.S., Popova D.O. (2023). The distributional impacts of the COVID-19 crisis and policy response in Russia. *Voprosy ekonomiki*, 2, 43–60. DOI: 10.32609/0042-8736-2023-2-43-60 (in Russian).
- Gubanova A.K. (2019). Problems of economic inequality in Russian regions. *Vestnik nauki*, 4, 8(17), 9–14 (in Russian).

- Hirschman A. (1958). *The Strategy of Economic Development*. New Haven: Yale University Press.
- Kataeva Yu.V. (2013). Assymetry of the interests of the urban environment transformation subjects as a factor of its unbalanced development. *Vestnik Permskogo universiteta. Seriya: Ekonomika=Perm University Herald Economy*, 4(19), 66–73 (in Russian).
- Khan M.S., Siddique A.B. (2021). Spatial analysis of regional and income inequality in the United States. *Economies*, 9(4), 159. DOI: 10.3390/economies9040159
- Lavrikova Yu.G., Suvorova A.V. (2020). Optimal spatial organisation of the regional economy: Search for parameters and dependencies. *Ekonomika regiona=Economy of Region*, 16(4), 1017–1030. DOI: 10.17059/ekon.reg.2020-4-1 (in Russian).
- Manshin R.V., Moiseeva E.M. (2022). Influence of infrastructure on population distribution and socio-economic development of Russian regions. *Ekonomika regiona=Economy of Region*, 18(3), 727–741. DOI: 10.17059/ekon.reg.2022-3-8 (in Russian).
- Martinez-Vazquez J., McNab R. (1997). *Fiscal Decentralization, Economic Growth, and Democratic Governance*. International Center for Public Policy, Andrew Young School of Policy Studies, Georgia State University.
- Moroshkina M.V. (2018). Spatial development of Russia: Regional disproportions. *Regionologiya=Regionology*, 26, 4(105), 638–657. DOI: 10.15507/2413-1407.105.026.201804.638-657 (in Russian).
- Myrdal G. (1957). *Economic Theory and Under-Developed Regions*. London: Gerald Duckworth & Co Ltd.
- Pechenskaya-Polishchuk M.A. (2021). The influence of centralisation and decentralisation processes on regional tax potential. *Ekonomika regiona=Economy of Region*, 17(2), 658–672. DOI: 10.17059/ekon.reg.2021-2-22 (in Russian).
- Perroux F. (1961). *L'économie du XXe siècle*. Paris: Presses Universitaires de France.
- Pottier P. (1963). Axes de communication et développement économique. *Revue économique*, 14, 58–132. DOI: 10.3406/RECO.1963.407543
- Pyankova S.G., Kombarov M.A. (2022). Imbalances in the spatial development of Russia and its economic regions: Choosing an accurate and adequate assessment method and levelling-off ways. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 15(3), 75–90. DOI: 10.15838/esc.2022.3.81.4 (in Russian).
- Pyankova S.G., Kombarov M.A. (2023). Giersch's "volcano" model and its application for the analysis of regional disparities in Russia. *R-Economy*, 9(1).
- Thünen J. von (1910). *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie*. Jena: Verlag von Gustav Fischer.
- Tiebout C. (1956). A pure theory of local expenditures. *The Journal of Political Economy*, 64(5), 416–424. DOI:10.1086/257839
- Turovskii R.F., Dzhavatova K.Yu. (2019). Regional disparity in Russia: Can centralization become a remedy? *Politicheskaya nauka=Political Science*, 2, 48–73. DOI: 10.31249/poln/2019.02.03 (in Russian).
- Uskova T.V. (2018). The potential of Russian territories' development. *Problemy razvitiya territorii=Problems of Territory's Development*, 5(97), 7–17. DOI: 10.15838/ptd.2018.5.97.1 (in Russian).
- Yushkov A.O., Oding N.Yu., Savulkin L.I. (2017). The trajectories of donor regions in Russia. *Voprosy ekonomiki*, 9, 63–82. DOI: 10.32609/0042-8736-2017-9-63-82 (in Russian).
- Zubarevich N.V. (2009). The problem of social inequality in the regions: Is real mitigation possible? Upravlencheskoe konsul'tirovanie. *Aktual'nye problemy gosudarstvennogo i munitsipal'nogo upravleniya*, 3(35), 154–169 (in Russian).

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Received March 27, 2023.