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Development of the Methodology for Comprehensive Analysis of the Efficiency of the State Financial and Investment Model of Population Social Security Using the Example of Russian Regional Finance

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ABSTRACT

The effectiveness of financing the social security system is one of the key conditions for sustaining sustainable economic growth. The global economic crisis of 2020 associated with the coronavirus pandemic, and the subsequent crisis of 2022, due to the urgent need to carry out a structural transformation of the Russian economy in the context of large-scale international sanctions, emphasized the **relevance** of the problem of increasing the efficiency of budget expenditures on social policy. The **purpose** of the study is to develop methodological approaches to the comprehensive analysis of the effectiveness of the State financial and investment model of social security of the population (further – SFIMSS) using the example of data on the socio-economic development of the regions of Russia. The following **methods** were used: coefficient analysis, ranking, construction of heat maps and regression analysis. The coefficient of efficiency of budget expenditures at the regional level makes it possible to have fairly comprehensive assessments of the regions. The application of the regression analysis methodology makes it possible to expand its effectiveness and identify important dependencies and relationships on the basis of which it is able to establish the policy of state financial regulation. This study evaluated the effectiveness of 85 regions for the period from 2017 to 2021. The most and least effective regions were identified. The construction and interpretation of the regression model made it possible to identify a number of significant exogenous factors such as GRP, GRP per capita, volume indices of GRP, that positively impact the effectiveness of SFIMSS. At the same time, the public debt on loans in rubles, the volume of budget expenditures on social support measures for certain categories, and the proportion of the population older and younger than working age have a negative impact. In the article, recommendations are given on the development of mechanisms for increasing the efficiency and targeting of budget expenditures, as well as the creation of conditions to accelerate economic growth in regions, which will increase the effectiveness of SFIMSS.

Keywords: poverty; income inequality; social policy; regional finance; regional budget; efficiency of budget expenditures; state financial and investment model of social security

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INTRODUCTION

One of the most important systemic objectives of social and economic policy within the framework of Russia's national development goals is to reduce poverty by half (to the level of 6.45% of the total population) compared to 2017. Regional poverty indicators are directly related to Russia's average poverty rate. As a result, the strategy for halving poverty in Russia should be based primarily on the use of effective budgetary instruments, provided that the targeted impact on socio-economic indicators of regional development is achieved.

The effectiveness of the use of budget money is assessed in two aspects, according to the principles of budget system design: (1) economy, i.e. using the fewest budget money to achieve a comparable socioeconomic effect, and (2) effectiveness — achieving the highest socioeconomic impact feasible with the limited budgetary resources available.

According to Rosstat, five regions were numbered in Russia with poverty levels below 6.45% in 2021 (Moscow, Moscow region, St. Petersburg, Republic of Tatarstan, Yamalo-Nenets autonomous district). In nine regions of Russia (Belgorod, Voronezh, Lipetsk, Leningrad, Nizhny Novgorod, Sakhalin, Magadan districts, Khanty-Mansiysk and Chukotka AD), the poverty level of the population exceeded the target of 6.75% by no more than 2 p.p. All other things being equal, the greatest impact on poverty indicators in Russia will come from the medium- and high-poverty regions and the population.

The calculation methodology certainly also has an impact on poverty indicators. The changes in the methodology for determining the poverty line in 2021 were received by the scientific community with a certain amount of criticism and fear, that such reform could result in a sharp rise in regional income inequality, while formally reducing poverty in some regions. The reform of the subsistence minimum (hereinafter — SM) for regions with relatively low SM, for example, Moscow, is likely to increase poverty and increase the burden on the regional budget to finance social expenditures.

Regions with low levels of poverty (Moscow, St. Petersburg, Republic of Tatarstan, etc.) are characterized by a high concentration of the population with incomes between the current poverty level calculated as the SM (in the future — 42.5% of the median per capita income) 50% of median per capita income. A full-price increase of the poverty line to at least 42.5% by 2025 will lead to increased poverty in high per capita income and population regions. In the future, such regions could lead to a deterioration of the national poverty rate.

The purpose of this research is to develop the methodology for assessing the effectiveness of budget expenditures within the current financial and investment model of social security of the population of Russia. This methodology should be used as an additional instrument for effective financial management over the problem of poverty reduction in order to successfully achieve Russia's national development goals.

REVIEW OF THE LITERATURE

The principal approach to estimation of efficiency of budget expenditures is the so-called methodology "cost-efficiency" [1–6]. On the principle of correlation of achieved indicators of socio-economic efficiency with costs or resources spent from the budget, most models and methods of assessment of efficiency of budgetary expenditures on social policy are based [7–14].

Simple methods are useful in the preliminary analysis of the efficiency of budget expenditures, while more complex and integrated methodologies are useful in intercountry and interregional comparisons.

The idea of efficiency analysis based on data with lagged input and output information (cost and socio-economic efficiency indicators) is considered in a number of scientific papers [8, 15]. Current level of some socio-economic indicators such as life expectancy, health indicators, financial literacy, etc. depend on

the accumulated base effect. They can be used as output parameters for budget efficiency analysis, taking into account time lags. However, the scientific literature does not meet enough compelling research from this field. Most socio-economic development indicators, such as a country's degree of poverty, are thought to be impacted by budget expenditures during the period of direct implementation [4–7].

The current financial and investment model of state regulation of poverty in most countries, especially in Russia, is mainly based on budget financing of social policy. Policy on poverty alleviation influences income inequality [11]. Analysis of poverty and income inequality before and after taxes and transfers in OECD countries in a long-term perspective shows that an effective social security system reduces poverty from 15 to 60%.

MATERIALS AND METHODS

By State financial and investment model of social security of the population (hereinafter — SFIMSS) we mean the form of organization of the system of economic relations regarding the interaction of socio-economic institutions, providers and consumers of social services, as well as the mechanism of financing, investment and management of financial resources for the implementation of the State's social guarantees.

The efficiency of the public financial and investment model of social security will be evaluated in this study using indices of regional poverty and expenditures on its alleviation from regional budgets.

The research information base — The research information base — balanced panel data of socio-economic development of 85 regions of Russia and expenditures of the budget system for the period from 2017 to 2021. The main sources of information were Rosstat's open data from the single portal of the budget system of the Russian Federation (portal Electronic Budget).

Methods of the study are coefficient analysis of efficiency of expenditures on social policy of regions, method of construction the heat maps and regression analysis of efficiency indicators with the involvement of an extended set of exogenous factors.

A heat map of efficiency indicators was built on the principle of automatic selection of cells of the table containing high indicators using MS Excel tools. Construction and testing of the regression model results was carried out in RStudio.

Efficiency analysis of budget expenditures on social security, aimed at overcoming poverty, was carried out according to the formula (1).

$$\text{CeffB} = \frac{\left(100\% - \text{C}_{\text{Poverty}}\%\right)}{\text{Social security expenditure, \% of GRP}}, (1)$$

where CeffB — coefficient of efficiency of state financial regulation of poverty, reflecting the share of citizens living above the poverty line, through budget expenditures on social security at 1% of GRP; $C_{Poverty}\%$ — share of population with incomes below the poverty line or the subsistence minimum of 42.5%; Social security expenditure, % of GRP— the value of expenditures on social policy as% of GRP in the consolidated budget of the Russian Federation'.

Regression analysis of efficiency indicators and a set of 38 exogenous variables of socio-economic development of the regions of Russia, available in the Rosstat database at the beginning of 2023, was conducted using the standard model of panel regression according to the formula (2).

$$y_{i,t} = \alpha + x_{i,t}^{'}\beta + z_{i}^{'}\gamma + c_i + u_{i,t}, \qquad (2)$$

where $z_i^{'}$ — vector of characteristics that do not change over time; c_i and $u_{i,t}$ — random elements; $E(c_i) = 0$, $E(u_{i,t}) = 0$; random effects (RE) models assume that $E(c_i \mid z_i^{'}, x_i) = 0$; fixed effects models (FE) allow that $E(c_i \mid x_i) = 0$; depends on x_i; fixed effects model does not allow estimating α and γ; through pooling regression assumes that $c_i = 0$.

Exogenous factors were pre-tested for stationarity. Dickey-Fuller test showed that

they are stationary. To improve the quality of the regression model, where possible, data in relative units of measurement were used and absolute values were scaled up (variables *x*9 — *x*14; *x*27 — *x*28; *x*35 — *x*37).

RESULTS

In the first stage of the study, a simple coefficient of efficiency of budget expenditures for social policy of 85 regions of the Russian Federation was calculated. Based on the data obtained, a heat map is built, and regions are ranked in terms of dynamics for the period 2017–2021 (see *Appendix 1*).

The construction of a regression model, in addition to a number of associated tests of the obtained results, particular to the regression analysis method, were carried out in the second stage of the major section of the study.

Testing of regression coefficients using the Lagrange test, the fixed effects F-test, and the Hausmann Test have shown that of the five options for evaluating regression coefficients, the most effective is the fixed effects evaluation option (see *Appendix 2*). Coefficients of determination R2 and corrected R2 for fixed effects are high enough to explain the efficiency factor of budget expenditures.

DISCUSSION

Data from *Appendix 1* show that with budgetary expenditures from the regional budget for social policy at 1% of GRP in the period 2017–2021, the Government of the Republic of Ingushetia provided incomes above the regional subsistence level only 4.96–6.09% of the region's population. This is the worst indicator in Russia (average — from 21.94 to 28.01%), which indicates inefficiency of the social support system in the region.

The top 5 regions in terms of efficiency of budget expenditures on social policy include: (1) Yamal-Nenets AD; (2) Khanty-Mansiysky AD; (3) Nenets AD; (4) Republic of Tatarstan and Magadan district (5). The evident competitive advantages of the first three regions have to do to their obvious advantages: the commodity and export-oriented type of economy, the comparatively small population, and the low share of the population over the working age. Existing regional labour market opportunities and government-business policies keep poverty levels low in these regions.

Separately, attention was paid to the efficiency indicators of the Magadan region in dynamics. The region, such as the top three, has a rich raw material base and a small population. In 2017, the region was ranked 23rd (see *Appendix 1*), and after 5 years it was ranked 5th in Russia, which is a huge progress in improving the efficiency rate (a smaller share of spending with simultaneous progress in poverty reduction). Further factor analysis of the efficiency factor is required to explain this phenomenon, and in some ways, this is a disadvantage of simple coefficient analysis. In five years, the age structure of the population of Magadan district has changed in favor of an increase in the proportion of the working-age population as the total population of the region has declined. By the end of 2021, the population of the Magadan district had decreased to 137.8 thous. people (–5.4%), due to a roughly proportional reduction in both the working-age population and children and pensioner. At the beginning of 2017, 145.6 thous. people lived in the region, of these 18.7% — are under working age, 60.4% — are of working age and 20.9% — are over working age. By the end of 2021, the population structure was as follows: 18.4–61.1–20.5%, respectively. The consolidated budget of the Magadan district grew in absolute terms in five years, but decreased in percentage to GRP from 3.03 to 2.11% due to the rather rapid growth of GRP. The regional poverty rate fell from 11.1 to 7.9% over the same period. Thus, favorable circumstances contributed to the performance of this region.

The analysis of *Appendix 1* data showed that further research, such as ranking, heat maps and, more importantly, factor analysis, is needed to obtain an adequate interpretation of the results of the efficiency factor calculations. From our point of view, this does not reduce the

practical significance of this method, provided that it is applied as part of a complex study of the effectiveness of budget expenditures for social policy.

Regression analysis of panel data for the period 2017–2022 showed that the efficiency of social expenditures from the regional budget is significantly influenced by a number of related and secondary factors for this indicator. Consider the most significant of them in the first model of the *Appendix 2*.

The principle of influence of variables *x*1, *x*2, *x*7, *x*8, *x*23, *x*27, *x*28, *x*37, *x*38 on the efficiency coefficient seems clear enough for indicators measured in relative units. Any region requires a more economical and effective use of public funds (reducing expenditure while maintaining or reducing poverty), which can be accomplished by improving support targeting to socially vulnerable groups and improving the quality of the social support means test system.

Some of the exogenous factors expressed in rubles should be interpreted and evaluated taking into account that their scale has been increased and they should be considered at least an order of magnitude lower, for example, *x*28 (GRP per capita) considered in thous. rubles, not in mln rubles. The regressors *x*27, *x*35 — *x*37 for the construction of the regression model were converted to trl rubles, but their interpretation makes more sense in the dimension of no more than bln rubles. For example, consider a couple of regressions.

Every additional billion rubles of GRP increases the efficiency of budget expenditures on social policy by about 0.0032 units. The minimum value of GRP in 2021 was in the Jewish AD — at the level of 69.9 bln rubles. The average growth of regional GRP in 2021 is 263.9 bln rubles, median — 114.4 bln rubles, and the minimum — 6.9 bln rubles. Thus, each year, this regressor increases the average efficiency of budget expenditures for social policy by about 0.84 units, and has the highest impact on the largest GRP regions. In this regard, economic growth, as well as its sustainability, should remain the main priorities of economic policy both for Russia as a whole and for individual regions [16]. Principled growth of the region's economy, for example by merging small regions in terms of GRP, is to increase the efficiency of the new territory.

High poverty in inefficient regions of Russia, forcing the population to increase the level of credit debt to finance current consumption expenditures, negatively affects the efficiency indicators. The average level of ruble debt of the population in the regions of Russia in 2020 was 212.3 bln rubles, and in 2021 — about 240.9 bln rubles (+28.6 bln rubles, or 13 27 regions out of 85 debts on loan in rubles exceeded the average in Russia. Of these, 13 had a lower efficiency rate than the national average (the average for 13 regions was 22.55 units, with Altai region having a minimum of 13.46 units). Every additional billion rubles of credit debt (*x*37 factor of *Appendix 1*) leads to a reduction of efficiency in the region by about 0.0114 units. Consequently, each year this factor results in an average reduction of 0.33 units. Such a dynamic is difficult to describe as a major threat to the efficiency of social expenditures at present, given the relatively lower availability of credit for the population.

According to the first regression model it can be seen that the factor of improvement of housing conditions (this is not necessarily growth of mortgage lending) has a positive impact on the efficiency indicator. At the same time, the growth of lending to individuals in all types of loans has a negative impact. Both factors can be at the same time and balance relative to each other. At the same time, growth of debt load of reduces efficiency to a lesser extent than improvement of housing conditions increases. It follows that a reasonable increase in the level of debt load of the population (without the risk of destabilizing the financial system) can improve the housing conditions of Russians and at the same time indirectly increase the efficiency of budget expenditures on social policy in the region.

The second regression model (shortened version of 13 factors) has a lower determination coefficient and explains less efficiency. However, it reduced the number of important regressors and exogenous factors from 13 to 6. At this stage of the study, it was found that the most influential exogenous factor for the efficiency of budgetary expenditures is the size of the region's economy and its growth rate, as well as the level of redundancy of the population.

The expansion of temporal and factor data coverage is difficult due to the lack of reporting on the socio-economic development of regions in open official sources. Further research based on the proposed method should be carried out as part of the expansion of data coverage in the database. It may also be useful to conduct additional iterations to reduce the number of regressions in the regression model, provided that the maximum share of significant factors is maintained and the determination ratio is maximized.

CONCLUSION

This study provides a complex analysis of SFIMSS efficiency. The methodological basis of the study was a simple coefficient analysis and regression analysis of data on the development of 85 regions of Russia for the period 2017–2021.

In combination with method for ranking, heat mapping and supporting descriptive statistics, a simple coefficient analysis method provides comprehensive primary information on the efficiency of social policy expenditures from regional budgets in the context of poverty reduction. Interpretation of calculation results should be carried out on the basis of factor analysis of data of socio-economic development of regions. The improved data is very visible and easy to interpret. The methodology of analysis on the basis of relative efficiency factors allows to compare regions with each other and to track the dynamics of efficiency by regions using rank indicators. This method can be qualitatively improved by its combined application with regression analysis, since in this case it becomes possible to identify a number of additional significant factors that influence the indicator of effectiveness, and on the basis of this to develop appropriate measures of state regulation.

Control of the regional budget deficit, development of the system of budgetary federalism and adequate level of support of the regions from the federal budget, subject to control of the problem of corruption, effective methodologies to ensure the targeting and need for social support and other objectively positive factors contributing to economic growth, allow to increase the effectiveness of budget expenditures on social policy. A qualitative improvement in these factors could make the current financial model of social security in Russia more effective.

One of the most important factors for improving the efficiency of SFIMSS is the size of the regional economy and the high growth rate of GRP. The housing improvement factor is comparable in economic effect to the growth of GRP. The results of the regression analysis show that the growth of ruble loans among the population negatively affects the efficiency coefficient, but its impact is less than that of the improvement of housing conditions. Consequently, it is advisable to continue developing and supporting the public real estate market, including through affordable mortgages, as one of the effects of such a policy will be to increase the efficiency of budgetary expenditures on social policy.

Two regression models showed that the effectiveness of SFIMSS depends on the choice of financial instruments in which people keep their savings. Therefore, the need to continue the policy of increasing the financial literacy of the population with the simultaneous development of the financial market and the adoption of measures to involve a larger share of the population in investment in the Russian stock market is obvious. In this context, the development of infrastructure, including reliable financial market foreign exchange instruments, is also appropriate.

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Appendix 1

Results of the Coefficient Analysis of the Efficiency of Budget Expenditures from the Consolidated Budgets of the Regions of Russia for the Period 2017–2021

No.	Name of the region of the Russian Federation	Efficiency factor KeffB					The rank of the region of the Russian Federation				
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
	1	2	3	4	5	6	7	8	9	10	11
Far Eastern Federal District											
1	Amur region	16.41	18.58	18.80	17.02	17.96	71	66	66	58	66
2	Jewish Autonomous District	12.99	12.25	11.12	7.58	7.76	79	80	81	81	82
3	Trans-Baikal region	13.43	14.83	14.95	12.67	12.99	78	75	76	72	77
4	Kamchatka region	15.45	17.31	18.43	17.66	21.92	73	71	68	54	56
5	Magadan region	29.30	32.05	36.15	44.72	49.16	23	23	12	5	5
6	Primorsky region	25.50	27.26	26.06	21.70	25.26	36	35	38	34	42
7	Republic of Buryatia	12.23	13.47	13.80	9.86	10.29	80	78	79	78	78
8	Sakha Republic (Yakutia)	23.08	25.25	26.61	20.27	26.63	47	44	33	40	37
9	Sakhalin region	30.86	47.79	38.25	28.05	41.90	18	6	9	16	8
10	Khabarovsk region	22.93	23.95	22.70	19.06	22.07	48	47	50	46	55
11	Chukotka Autonomous District	27.00	30.31	32.92	34.71	37.99	32	28	18	9	14
Volga Federal District											
12	Kirov region	18.53	18.63	18.00	15.13	17.69	66	65	69	65	68
13	Nizhny Novgorod region	30.36	30.89	30.29	24.70	31.81	20	27	26	23	23
14	Orenburg region	30.37	35.63	33.67	25.50	33.44	19	13	16	20	22
15	Penza region	22.39	23.00	25.70	23.43	27.78	51	50	40	28	33
16	Perm region	28.51	33.68	33.52	24.91	34.30	27	16	17	22	18
17	Republic of Bashkortostan	30.15	32.84	31.01	22.61	30.48	21	19	24	31	27
18	Republic of Mari El	18.85	20.05	20.38	15.02	17.66	64	62	61	66	69
19	Republic of Mordovia	20.20	20.44	21.65	17.69	23.24	57	61	55	53	48
20	Republic of Tatarstan	54.14	61.88	63.98	49.51	67.39	5	4	4	4	4
21	Samara region	31.19	33.08	32.36	24.32	30.88	17	18	20	24	24
22	Saratov region	21.42	21.29	21.81	17.69	21.06	54	56	53	52	59
23	Republic of Udmurt	29.72	32.41	32.19	22.81	29.70	22	21	21	29	28
24	Ulyanovsk region	18.71	18.48	19.80	16.42	19.49	65	67	62	62	62
25	Republic of Chuvash	20.57	20.66	20.80	15.27	18.39	55	60	60	64	64
North-Western Federal District											
26	Arkhangelsk region	20.35	21.93	20.98	17.88	21.91	56	53	59	51	57
27	Vologda region	24.84	26.84	23.80	18.43	24.11	40	38	46	48	45
28	St. Petersburg	54.69	45.53	39.90	34.73	43.93	4	7	7	8	7
29	Kaliningrad region	34.75	36.90	36.91	26.41	35.34	10	12	10	18	15
30	Leningrad region	37.51	41.60	38.74	33.14	40.09	8	9	8	10	9

Appendix 1 (continued)

No.	Name of the region of the Russian Federation	Efficiency factor KeffB					The rank of the region of the Russian Federation				
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
31	Murmansk region	22.43	23.39	26.40	29.27	33.74	50	48	36	13	19
32	Nenets Autonomous District	73.11	87.41	86.67	57.18	88.91	3	2	2	3	2
33	Novgorod region	25.18	25.37	25.19	18.41	21.26	38	43	42	49	58
34	Pskov region	17.41	17.90	18.62	13.31	17.07	70	69	67	70	71
35	Republic of Karelia	17.52	18.08	19.13	14.92	20.08	69	68	65	67	61
36	Republic of Komi	26.93	29.43	29.10	19.91	26.86	33	29	29	43	35
North Caucasus Federal District											
37	Republic of Kabardino-Balkarian	14.32	14.22	14.04	7.52	9.48	75	77	78	82	81
38	Republic of Karachay-Cherkess	10.77	10.82	11.24	8.12	9.50	81	82	80	79	80
39	Republic of Dagestan	19.36	18.76	19.19	12.52	13.67	62	64	64	74	76
40	Republic of Ingushetia	6.09	6.88	6.68	4.32	4.96	85	85	85	85	85
41	Republic of North Ossetia-Alania	17.67	17.58	16.82	13.29	14.42	68	70	72	71	73
42	Stavropol region	18.91	19.44	19.52	14.91	17.76	63	63	63	68	67
43	Republic of Chechen	7.89	7.43	6.88	4.51	5.26	83	83	84	84	84
Siberian Federal District											
44	Altai region	14.58	14.46	14.52	12.58	14.34	74	76	77	73	74
45	Irkutsk region	25.58	27.60	17.94	16.83	24.98	35	33	70	60	43
46	Kemerovo region	24.74	27.01	21.62	16.16	22.89	42	36	56	63	52
47	Krasnoyarsk region	28.52	32.65	35.31	27.44	35.28	26	20	14	17	16
48	Novosibirsk region	26.58	27.55	26.49	19.47	23.15	34	34	34	45	50
49	Omsk region	22.38	21.74	21.37	16.93	19.44	52	54	58	59	63
50	Republic of Altai	10.20	11.14	10.96	7.99	9.72	82	81	82	80	79
51	Republic of Tyva	6.95	7.40	7.23	4.89	6.05	84	84	83	83	83
52	Republic of Khakassia	23.31	22.89	24.25	18.70	23.05	46	51	44	47	51
53	Tomsk region	28.71	30.93	30.34	20.65	27.76	25	26	25	39	34
54	Kurgan region	13.59	13.46	15.39	12.24	14.31	77	79	75	76	75
55	Sverdlovsk region	32.00	32.06	31.63	25.88	33.59	16	22	22	19	20
56	Tyumen region	29.01	31.54	23.00	20.05	30.84	24	24	48	42	25
57	Khanty-Mansiysk Autonomous District – Ugra	79.12	85.28	85.61	58.01	87.47	2	3	3	2	3
58	Chelyabinsk region	28.15	28.39	26.80	21.68	26.09	28	31	32	35	38

Appendix 1 (continued)

No.	Name of the region of the Russian Federation	Efficiency factor KeffB					The rank of the region of the Russian Federation				
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
59	Yamalo-Nenets Autonomous District	97.52	108.44	101.57	80.99	121.27	1	1	1	1	1
Central Federal District											
60	Belgorod region	49.11	50.95	51.51	43.24	39.85	6	5	5	6	11
61	Bryansk region	19.77	20.90	22.68	18.19	22.49	61	59	51	50	53
62	Vladimir region	25.29	25.10	25.64	21.17	25.82	37	46	41	38	40
63	Voronezh region	32.09	33.58	34.18	28.20	33.56	15	17	15	15	21
64	Moscow	45.94	44.20	40.03	35.31	46.77	7	8	6	7	6
65	Ivanovo region	15.94	16.74	17.54	14.50	18.04	72	73	71	69	65
66	Kaluga region	32.62	34.83	35.70	30.24	38.04	13	14	13	11	13
67	Kostroma region	22.08	22.60	23.17	17.15	20.30	53	52	47	55	60
68	Kursk region	24.60	26.93	28.29	25.04	28.61	43	37	30	21	30
69	Lipetsk region	35.05	37.59	32.75	29.43	34.45	9	11	19	12	17
70	Moscow region	34.29	34.06	31.09	28.31	38.45	11	15	23	14	12
71	Orel region	19.90	21.29	22.17	19.70	23.20	59	57	52	44	49
72	Ryazan region	27.03	26.66	26.46	22.69	26.84	31	39	35	30	36
73	Smolensk region	22.64	23.15	21.59	17.13	23.30	49	49	57	57	47
74	Tambov region	25.04	26.15	23.91	21.99	23.57	39	41	45	33	46
75	Tver region	24.18	26.08	26.36	21.21	28.52	45	42	37	37	31
76	Tula region	24.30	26.41	26.01	23.79	29.53	44	40	39	26	29
77	Yaroslavl region	28.00	28.78	29.57	24.18	30.68	29	30	28	25	26
Southern Federal District											
78	Astrakhan region	32.19	38.18	36.35	21.44	39.90	14	10	11	36	10
79	Volgograd region	27.23	27.88	27.03	22.08	25.62	30	32	31	32	41
80	Sevastopol	20.19	21.53	22.75	16.72	25.99	58	55	49	61	39
81	Krasnodar region	33.12	31.09	30.09	23.49	28.13	12	25	27	27	32
82	Republic of Adygea	19.80	20.92	21.79	17.14	22.12	60	58	54	56	54
83	Republic of Kalmykia	18.00	16.91	15.65	12.02	15.69	67	72	74	77	72
84	Republic of Crimea	14.12	15.26	15.70	12.35	17.43	76	74	73	75	70
85	Rostov region	24.84	25.24	24.94	20.23	24.87	41	45	43	41	44
Descriptive statistics for Russia as a whole											
86	Maximum	97.52	108.44	101.57	80.99	121.27	-				
87	Average	26.38	28.01	27.43	21.94	27.97					
88	Median	24.60	25.37	24.94	19.91	24.98					
89	Minimum	6.09	6.88	6.68	4.32	4.96					

Source: Compiled by the author according to Rosstat and portal Electronic budget. URL: http://budget.gov.ru/epbs/faces/p/Бюджет/Расходы?_adf.ctrl-state=pyzjesslh_82&regionId=45; URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed on 02.01.2023).

Appendix 2

Results of Regression Analysis of Efficiency of Budgetary and Exogenous Variables of Socio-Economic Development of Russian Regions

Exogenous variable	Model 1		Model 2	
	Regression coefficient	Standard error	Regression coefficient	Standard error
x1 (Expenditures of consolidated budgets of regions of the Russian Federation on the implementation of social support measures for individual categories of citizens, % GRP)	**–1.504****	**–0.676**	**–2.469*****	**0.752**
x2 (Social transfers in natural form, % of GRP)	**–0.460****	**–0.231**	–0.279	0.221
x3	–0.376	–0.928	–	–
x4	3.062	–3.6		
x5	–3.785	–3.846		
x6	275.243	–395.963		
x7 (Population under working age, % of total population)	**–1.672****	**–0.666**	0.386	0.682
x8 (Population over working age, % of total population)	**–0.915*****	**–0.317**	0.205	0.234
x9	–649.711	–582.048	–	–
x10	–162.417	–112.495		
x11	–2.032	–418.08		
x12	393.169	–730.978		
x13	75.118	–776.842		
x14	348.478	–225.073		
x15	345.835	–1 258.02		
x16	–1 756.84	–6 601.30		
x17	–8 170.14	–18 417.26		
x18	13 852.32	–32 870.96		
x19	0.076	–0.051		
x20	–0.0001	–0.03		
x21	0.031	–0.034		
x22 (Income of consolidated budgets of regions of the Russian Federation, % of GRP)	**0.179***	**–0.1**	–0.07	0.104
x23 (Expenditures of consolidated budgets of regions of the Russian Federation, % of GRP)	**–0.327*****	**–0.118**	–0.194	0.125
x24	0. 254	–0.161	–	–
x25 (Share of families registered as requiring accommodation in total number of families)	**–0.415****	**–0.167**	–0.011	0.17

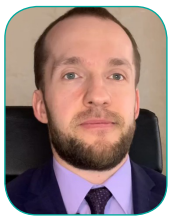
Appendix 2 (continued)

Exogenous variable	Model 1		Model 2	
	Regression coefficient	Standard error	Regression coefficient	Standard error
x26	–0.331	(0. 246)	–	–
x27 (Gross regional product)	**3.177*** **	**–0.726**	**3.906*** **	**0.803**
x28 (Gross regional product per capita)	**13.500*** **	**–1.074**	**7.504*** **	**0.809**
x29	–0.025	–0.02	–	–
x30	0.349	–0.319		
x31	0. 325	–0.325		
x32	–0.874	–2.895		
x33	0.582	–1.545		
x34	1.376	–1.338		
x35 [Funds (deposits) of individuals in rubles, attracted by credit organizations]	**–6.593** **	**–2.825**	**–5.920***	**3.119**
x36 [Funds (deposits) of individuals in foreign currency, attracted by credit organizations]	**14.360*** **	**–5.364**	**5.841**	**5.776**
x37 (Debt on loans in rubles provided by credit organizations to individuals)	**–11.359*** **	**–3.707**	**–19.239*** **	**3.665**
x38 (Index of volume of gross regional product as% of previous year)	**0.150*** **	**–0.054**	**0.367*** **	**0.052**
Constant	–	–	–	–
Number of observations	435		435	
Coefficient of determination R2	**0.778**		**0.667**	
Corrected R2	0.689		0.568	
F-Statistics Data	28.588***		229.012***	
	(df = 38; 310)		(df = 13; 335)	

Source: Compiled by the author.

Note: significance Levels: * – $p < 0,1$; ** – $p < 0,05$; *** – $p < 0,01$.

ABOUT THE AUTHOR



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