

THE EFFICIENCY OF REGIONAL GOVERNMENT EXPENDITURE IN THE RUSSIAN FEDERATION

*Vladimir Tyutyuryukov*¹

*Sabina Hodzic*²

ABSTRACT

Russia features complex and rather centralized structure of public finances. The federation controls the majority of tax revenues, partially allocated to the regions, and the public expenditure in respect of regional public goods is done via direct regional expenditure, as well as via federal programs and federal grants, depending on which level of administration is responsible for the said public good. In any case these expenditures need to be efficient partially due to limited resources of the regions and partially due to cost-limiting approach of the Russian public authorities.

Numerous studies analyzed the efficiency of public expenditures at the level of central, regional or local governments; however, there was only limited and partial analysis of public finances of Russian regions, without detailed estimates of efficiency of expenditures or comparison across geographically close regions. Therefore, authors intend to cover this gap in scientific literature.

The objective of this paper is to estimate the technical efficiency of regional public expenditure, with special emphasis on regions of Russian Federation located in Volga Federal District in the period 2013-2017. Volga Federal District includes fourteen administrative regions, all of which feature developed industry and infrastructure but vary in terms of social development.

To evaluate the technical efficiency of public expenditures in the regions of Volga Federal District in the period 2013-2017, the authors used the Data Envelopment Analysis (DEA) methodology to process data, following Charnes, et al. (1978). The DEA model inputs comprise total expenditure for education and total expenditure for health care of each region, while two sets of outputs consist of (1) teacher-student ratio at all levels of education and number of medical doctors per 10,000 inhabitants and (2) number of students at all levels of education and number of clinic visits per doctor per year.

The DEA model identified significant differences in the efficiency of expenditure on education and health care across regions of Volga Federal District; however, there was no expected correspondence with the size and economic development of the regions (regions with larger population and economy were expected to be more efficient, but the model suggests otherwise). The authors further examine the potential causes of regional public expenditure in the examined sectors of education and health care.

Key words: regional public finance, regional budget, efficiency, Russian Federation

Acknowledgements: The authors are grateful to the discussants of working group "Public Finance and Public Financial Management" at 27th NISPAcee Annual Conference for helpful comments and suggestions.

1. INTRODUCTION

The Constitution of Russia and federal laws allocate the public functions among federal, joint federal-regional, regional and two levels of municipal jurisdictions, where the control and financing of those functions remain centralized to a significant extent. The federation controls the majority of tax revenues via establishing strict framework for a tax system in the Tax Code (which includes tax rate limits for the regional and local taxes) and via redistributing tax revenue flows in the Budget Code and annual laws on the federal budget. The public expenditure in respect of regional public goods is done in several ways: by direct regional expenditure (where the regional authorities are responsible for the said public good), by subventions (a type of federal grants provided along with transfer of responsibility from the federation to the regions), by funds from federal programs, which involve certain developments in the regions, and by funds from regional non-budgetary funds (earmarked state funds financed by social security contributions). These expenditures need to be efficient partially due to limited resources of the regions and partially due to cost-limiting approach of the Russian public authorities. The authors focus on education and health care expenditures, where the responsibility and financing are partially decentralized. In 2016, 61.17% of the consolidated regional budgets were spent on social sector, along with 36.04% of the federal budget. However, the breakdown of these amounts differ, the federal budget mainly spending on pensions, allowances and support for civil and military servicepersons, while the regions allocate significant amounts on primary and secondary education and health.

¹ Ph.D., ACCA, Associate Professor at National Research University Higher School of Economics, School of Public Administration, Moscow, Russia, e-mail: vtutyuryukov@hse.ru

² Ph.D., Assistant Professor at the University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia, e-mail: sabinah@fthm.hr

The objective of this paper is to estimate the technical efficiency of regional public expenditure in the Volga Federal District for 2013-2017 period. Numerous studies analyzed the efficiency of public expenditures at the level of central, regional or local governments (Afonso and Fernandes, 2003; Melkers and Willoughby, 2005; Afonso and Scaglioni, 2005; De Borge and Naper, 2006; Afonso and Fernandes, 2008; Chebukhanova and Kuznetsova, 2014; Hodzic et al., 2017). However, there was only limited and partial analysis of public finances of Russian regions, without detailed estimates of efficiency of expenditures or comparison across geographically close regions (Fattahov, 2006; Shipunova, 2009).

The authors intend to cover this gap, and targeted for this research two type of expenditure – those on education and on health care. This is because of DEA limitations, arising from number of regions in Volga Federal District – there are fourteen of them: Republic of Bashkortostan, Republic of Mari El, Republic of Mordovia, Republic of Tatarstan, Udmurt Republic, Chuvash Republic, Permsky krai, Kirovskaya oblast, Nizhegorodskaya oblast, Orenburgskaya oblast, Penzenskaya oblast, Samarskaya oblast, Saratovskaya oblast, Ulianovskaya oblast³. All of them feature developed industry and infrastructure but vary in terms of social development. We used the DEA model to identify significant differences in the technical efficiency of expenditure on education and health care across the regions of Volga Federal District, corresponding with the size and economic development of the regions (regions with larger population and economy were expected to be more efficient). The authors further examine the potential causes of regional public expenditure in the sectors of education and health care and develop the respective recommendations for increase of expenditure efficiency.

The inherent limitation of this research was quality of data. For instance, Russian Ministry of health reported the number of medical doctors in Russia for 2014 as 580,311 people (and 622,602 people if counting doctors-in-training, such as interns, residents or doctoral candidates; in a publication for 2014) and as 542,543 people (in a publication for 2015), without any explanation of the difference⁴. For the same year, Federal State Statistics Service of Russia – while explicitly referring to the methodology of the Ministry of health and apparently including doctors-in-training – reported 709,400 doctors in Russia⁵. Therefore, the authors used more conservative data of the Ministry of health.

This paper is organized as follows. After the Introduction, in Section 2 we provide an overview of allocation of functions and budgetary expenditures in Russia, and in Section 3 – the overview of Volga Federal District. In Section 4, we briefly describe the data and DEA methodology that was used to obtain the empirical results. In Section 5 we present empirical results while the last Section provides concluding remarks.

2. ALLOCATION OF FUNCTIONS AND BUDGETARY EXPENDITURE IN RUSSIAN FEDERATION

The Constitution of Russia allocate the public functions among federal, joint federal-regional, regional and municipal jurisdictions. In particular, it puts under the joint federal-regional jurisdiction the “general issues of upbringing, education, science, culture, physical education and sport”⁶ (Art.72(1)(e)) and “coordination of health care issues” (Art.72(1)(ж)). The text of the Constitution then states that all matters not explicitly put into jurisdiction of the Russian Federation or joint federal-regional jurisdiction are to be managed by the regions (Art.73; and the matters of local importance or those stipulated by federal laws should be managed by municipalities under Art.130-133).

The authors focus on the sectors of education and health care, where the responsibilities and financing are partially decentralized. The Federal Treasury reported, that in 2018 in Russia 18% of the regional budgets (including regional state non-budget funds) were spent on education, and 24.1% on health care (Federal Treasury, 2019). At the level of Volga Federal District these shares were 21% and 26.5%, respectively. Some additional data is shown in Table 1.

The legal basis for education system in Russia have included Law No. 3266-1 “On education” (effective from 31 July 1992 till 31 August 2013), Federal Law No. 125-FZ “On higher and post-graduate education” (effective from 29 August 1996 till 31 August 2013) and Federal Law No. 273-FZ “On education in the Russian Federation” (effective from 1 September 2013). This does not contradict the Constitution, as federal laws covering matters of joint jurisdiction are agreed with the supreme executive and representative bodies of all regions before readings in the Federal Assembly (federal parliament).

³ In the order used by Federal State Statistics Service of Russia.

⁴ Ministry of health. Statistical materials. URL: <https://www.rosminzdrav.ru/ministry/61/22/stranitsa-979/statisticheskie-i-informatsionnye-materialy/statisticheskie-materialy> (accessed on 15 June 2019)

⁵ Federal State Statistics Service of Russia. Social and economic indicators by regions of the Russian Federation. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/4890740049342bcf8657de3fbd401489 (accessed on 15 June 2019)

⁶ Here and below the translations Russian laws and regulations are provided by the authors.

These laws have foreseen free access for everyone to pre-school, secondary (school), secondary vocational education, as well as higher (tertiary) education on competitive basis. They also introduced a variety of public functions in educational area, which are summarized in Table 2. It is thus obvious that the control of these functions remains centralized to a significant extent, while a significant share of financing goes via regional and municipal budget (though these flows are still centrally controlled).

Table 1. Allocation budgetary expenditure on education and health care among different levels of Russian budget system, in million RUB

	Federal budget	Budget of federal state non-budget funds	Budgets of subjects of Russian Federation	Budgets of regional state non-budget funds	Municipal budgets
Total expenditure	16 712 906,27	10 715 544,16	10 394 300,33	2 064 988,83	2 136 007,82
Education	722 622,52	166,14	2 246 118,86	0,00	1 086 545,98
Share in total expenditure	2,64%		18,03%		49,39%
Health care	537 311,70	1 987 854,51	948 337,78	2 051 461,52	8 156,70
Share in total expenditure	9,21%		24,08%		0,35%

Source: Authors' systematization based on (Federal Treasury, 2019).

Table 2. Allocation of educational functions among Russian public bodies of different public administration levels

FEDERAL BODIES	REGIONAL BODIES	MUNICIPAL BODIES
Create, maintain and disband education facilities (tertiary and professional are primarily targeted; other are an option; federal state bodies may also run elementary, secondary and secondary vocational education facilities)	Create, maintain and disband regional education facilities (elementary, secondary, secondary vocational and professional are primarily targeted; tertiary is an option)	Create, maintain and disband education facilities (pre-school, elementary, and secondary are primarily targeted; secondary vocational and professional are an option; tertiary is an option only for city districts)
Finance federal education facilities and functions transferred to the regions	Finance regional and municipal education facilities (also the accredited programs run by private facilities)	
Development of state education development programs	Development of regional education development programs	
Development of federal educational standards		
Licensing, accreditation and control of tertiary education facilities, certain professional education facilities and foreign education facilities	Licensing, accreditation and control of education facilities in respective territory (transferred federal function)	
Regulating and controlling execution of state functions in the area of education	Monitoring the regional education system	
Develop reporting requirements for education facilities		
	Maintaining psychological, medical and social assistance for students	

Source: Authors' systematization based on Russian legislation.

The legal basis for health care system in Russia is Federal Law No. 323-FZ "On principles of protection of citizens' health in the Russian Federation" (effective from 1 January 2012). It provides for the free access for everyone to health care and the responsibility of the state for development and running of the health care system. It also establishes a variety of public functions in health care area, which are summarized in Table 3. Contrary to the example of public education system, the control and financing of these functions is decentralized.

The decentralization is supported by the system of Federal Obligatory Medical Insurance Fund and “territorial” (regional) Obligatory Medical Insurance Funds, which obtain money primarily from employers via social security contributions. Such system was introduced in 1993 and currently runs in accordance with Federal Law No. 326-FZ “On obligatory medical insurance in the Russian Federation” (effective from 1 January 2011); this law creates the basis for financing of Russian health care system.

The rates of medical insurance contributions during the period in question is were set by Federal Law No. 212-FZ “On insurance contributions to Pension Fund of the Russian Federation, Social Insurance Fund of the Russian Federation, Federal Obligatory Medical Insurance Fund and territorial medical insurance funds” (2010-2016), and currently by Chapter 34 “Insurance Contributions” of the Tax Code (from 1 January 2017). The rates were the same across the country at any given year.

Table 3. Allocation of health care functions among Russian public bodies of different public administration levels

FEDERAL BODIES	REGIONAL BODIES	MUNICIPAL BODIES
Develop, adopt and implement federal policy for health care General management of health care system (including issuance of legal acts, instructions, reporting requirements etc.)	Develop, adopt and implement regional program of state-financed health care, including regional program of obligatory medical insurance	
Maintain environment for medical care, including maintenance of medical organizations run by regional public bodies	Maintain environment for medical care, including maintenance of medical organizations run by regional public bodies	Maintain environment for medical care as prescribed by regional program of state-financed health care and regional law
	Informing those living in respective region about outbreaks of socially dangerous diseases	Informing those living in respective municipality about outbreaks of socially dangerous diseases
Organize supply of donor blood, medicines, medical equipment, agents for disinfection and pest control	Organize supply of donor blood, medicines, medical equipment, agents for disinfection and pest control	
Licensing of certain health care activities; registering licenses and running licensing control over regional bodies; accrediting medical professionals; quality control over reports of medical organizations	Licensing of health care facilities in respective territory (transferred federal function)	
Performing life-saving and health care actions in emergency cases; medical evacuation of people	Performing life-saving and health care actions in emergency cases	Performing life-saving and health care actions in emergency cases
	Implementation of prophylactics and health lifestyle propaganda, epidemy prophylactics as prescribed by federal law, as well as disinfection and pest control	Implementation of prophylactics as prescribed by regional law
Safety control of medical equipment		
Supply of medicines for people suffering from qualifying diseases	Supply of medicines and medically prescribed food for people suffering from qualifying diseases (mostly orphan ones)	
	Social care and medicine supply for people suffering from socially dangerous diseases	
Development and implementation of federal health care research programs	Development and implementation of regional health care research programs	

FEDERAL BODIES	REGIONAL BODIES	MUNICIPAL BODIES
	Set up procedures for performing emergency medical assistance for those not covered by local health care system	

Source: Authors' systematization based on Russian legislation.

With introduction of the Budget Code from 1 January 2000 Russia started a chain of budgetary reforms, aiming at delineation of powers between federation and the regions, introduction of result-oriented budgeting, eradication of non-financed transfer of powers and further goals. In 2010 Russian Government adopted the Program for increase of budget expenditure efficiency to streamline the respective governmental functions (Makovetsky, 2014). It set up the framework for program-based budgeting at the federal level and foresaw the adoption of publicly available indicators to make possible the assessment of meeting the targets and overall efficiency of use of state property (Government of Russia, 2010a). Later the Government specified that the criteria must reflect both economic efficiency (direct or indirect influence of the state program on the economic development of the country) and social efficiency (measured in non-monetary units) (Government of Russia, 2010b). Earlier this year, however, the Government recognized that the efficiency criteria used in the state programs were not in line with strategic priorities of social and economic development of the country, and the assessment of state program implementation was formal (Government of Russia, 2019).

3. OVERVIEW OF VOLGA FEDERAL DISTRICT

Volga Federal District is the eastmost part of Europe located along Volga and Kama rivers, bordering with Ural mountains. It features developed agricultural sector, mineral extraction and manufacturing industry (including machinery production and chemistry), as well as transportation routes⁷. In terms of gross regional product (GRP), by 2016 its top 5 economic activities were: manufacturing, wholesale and retail trade, mining and quarrying (including oil extraction), real estate activities and transport and communication⁸; Figure 1 shows the GRP breakdown. It is visible that 5 out of 14 regions have significant mineral extraction activities, while the levels of manufacturing and agriculture vary across the regions.

In social and economic terms, the regions differ as well. A 2010 estimate of integral indicator of people wellbeing showed in top 3 Republic of Tatarstan (due to highest per capita GRP, highest purchase power and lowest poverty), Samarskaya oblast and Republic of Bashkortostan; outsiders were Kirovskaya oblast, Chuvash Republic and Republic of Mari El (though the paper mentioned no factors that contributed to their low position) (Podzorov and Katyn, 2010). By 2016 Gini coefficient varied from 0.416 in Republic of Bashkortostan to 0.345 in Chuvash Republic (with Russian average at 0.412). Share of people below poverty line varied from 7.5% in Republic of Tatarstan to 22.5% in Republic of Mari El (with Russian average at 13.4%) (Bobkov and Dolgushkin, 2018). It should be noted that poverty line in Russian statistics equals to minimum subsistence level (which includes amount of food just enough to survive and equal monetary value to cover other necessities).

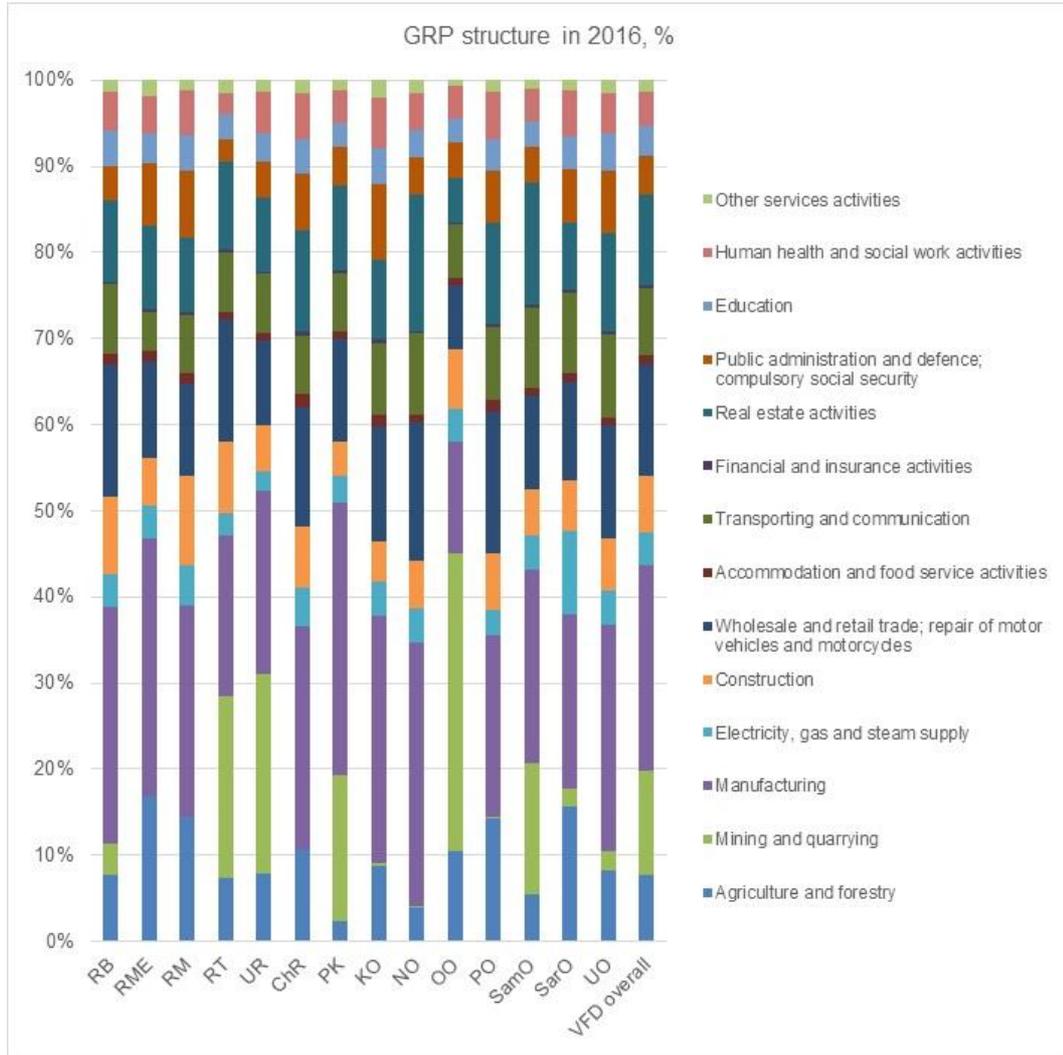
By 2017 per capita GRP in the region ranged from 106.5% of Russian average in Republic of Tatarstan (which also demonstrated regional highest average monthly income and lowest poverty rate) to 43% of Russian average in Chuvash Republic (where also average monthly income was the lowest in the region and poverty rate was third highest).⁹

⁷ Official web site of Plenipotentiary Representative of the President of the Russian Federation in Volga Federal District. URL: <http://pfo.gov.ru/> (accessed on 30 March 2019)

⁸ Federal State Statistics Service of Russia uses slightly different classification than NACE 2010.

⁹ Main indicators of social and economic development of the regions of Volga Federal District. In: Official web site of Plenipotentiary Representative of the President of the Russian Federation in Volga Federal District. URL: <http://pfo.gov.ru/district/projects/soceconom/> (accessed on 30 March 2019).

Figure 1. GRP structure in 2016, %



Source: Developed by authors based on data of Federal State Statistics Service.

4. DATA AND METHODOLOGY

To evaluate the technical efficiency of regional public expenditures in the regions of Volga Federal District in the period 2013-2017, the authors applied the methodology of DEA model. The objective of this analysis is to identify relatively efficient vs. relatively inefficient units (regions) within a group of observed units (14 regions of the Volga Federal District), characterized by certain inputs and outputs.

For the purpose of comparing the efficiency of the units by using the DEA analysis, two inputs and two outputs were used. According to Bowlin (1998) there should be three times the number of DMU as there are input and output variables. The DEA model inputs included values of total expenditure on education and total expenditure on health care for each region for the period 2013-2017. We also tested two sets of outputs. First set consists of teacher-student ratio (for all levels of education) and number of medical doctors per 10,000 inhabitants, both being ratios between providers and recipients of particular services. Second set covers number of students at all levels of education and number of clinic visits per doctor per year, with the underlying idea being the number of service recipients.

Data were collected from publicly accessible sources, in particular from the official websites of Federal Treasury of the Russian Federation (data on budgetary expenditure), Federal State Statistics Service and Ministry of health.

The first input – total expenditure on education – covers the expenditure on pre-school, primary, secondary, secondary professional, higher and supplementary education, “youth policy” and other relevant issues. This expenditure includes operational expenses, stipends and grants, procurement of goods and services to supply to socially vulnerable citizens, investments (construction or procurement of real estate and other fixed assets), payments for execution of state and municipal orders, taxes and duties, as well as other relevant expenses. It was taken for the same year as outputs, as the latter are estimated at start of academic year (i.e. at 1 September of the same year), thus allowing planning for better use of existing budget.

The second input – total expenditure on health care – covers expenditures on various areas of public health care system, including hospitals, clinics, ambulance, medical resorts, prevention of epidemics and so on. The accounting nature of expenditure on health care is similar to that on education. It was taken for the year previous to that of outputs to allow the timeframe for its effect to be visible.

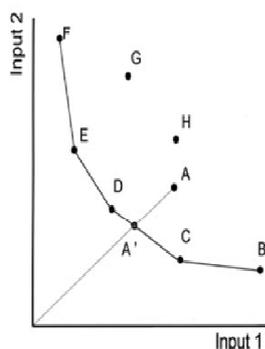
Teacher-student ratio (for all levels of education) and total number of students were calculated by authors based on data from Federal State Statistics Service (Rosstat, 2018). Authors further calculated the number of medical doctors and number of clinic visits per doctor per year from the data published by Ministry of health (Ministry of health, 2017).

According to the above described data, inputs and outputs were processed as part of the data analysis, with a view to use the DEA method to determine the technical efficiency of regional public expenditures, represented by regions, in the period 2013-2017 period.

4.1. Analytical Framework

In 1957 Farnell laid the foundations for the DEA model, which was later developed by Charnes et al. (1978). This is a nonparametric linear programming method for assessing the efficiency and productivity of decision-making units (DMUs). This method identifies the most efficient units in a given set, without assuming any type of functional relationship between inputs and outputs. To determine the efficiency of an observed unit compared to other units included in the analysis, based on output and input variables, we applied the nonparametric DEA technique. Therefore, the efficiency curves created units that are relatively efficient compared to other observed units, by maximizing their output variables with specified input variables. In addition, there is a test for each unit on whether it is able to cover its inputs from the “bottom” (with lower input values to reach a given output), without excluding remaining input values. The model also analyses output variables from the “top” (whether it is able to reach larger output values with given input values). Units that are included in data processing are considered relatively inefficient compared to other units that were excluded. Excluded units form an efficiency curve or marginal production function. The efficiency curve (frontier) is composed of units that utilize resources in the best possible way in order to achieve outputs. This curve also represents the goal the inefficient units are seeking. Inefficient units may achieve their efficiency by representing their inputs and outputs values on the curve. Figure 2 presents the efficiency frontier, input oriented model.

Figure 2. Efficient unit



Source: Zhu (2002).

The Charnes-Cooper-Rhodes (CCR) model and Banker-Charnes-Cooper (BCC) model were derived from the model established by Charnes, Cooper and Rhodes in 1978. For the purpose of conducting this research and exploring the technical efficiency of regional government spending, with special emphasis on regions of Volga Federal District in the period 2013-2017, both input-oriented models was employed in this paper.

4.2. CCR Model

The efficiency formula that was first defined by Charnes, Cooper and Rhodes (1978) went through its first revision in 1984. The CCR model implies constant returns-to-scale. This means that output variables increase proportionally with input variables (Cooper et al., 2006). Rowena et al. (2006) assumes constant yields with respect to the scope of the action, and due to the modification of this assumption, other data-limiting models have emerged, including the BCC model.

This model is specified in the following way:

$$\max \theta_0 = \frac{\sum_{r=1}^s u_r y_{r0}}{\sum_{i=1}^m v_i x_{i0}} \quad (1)$$

Subject to:

$$\frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \quad (j = 1, 2, \dots, n) \quad (2)$$

$$u_1, u_2, \dots, u_s \geq 0; v_1, v_2, \dots, v_m \geq 0 \quad (3)$$

The above constraints specify that the ratio of output to input should not exceed 1 for each decision-making unit. Furthermore, the objective is to get assigned weights by which the ratio is maximized for a particular decision-making unit that is being analysed. Because of the setup of the actual constraints, the optimal value is 1.

4.3. BCC Model

In 1984, Banker, Charnes and Cooper established the BCC model. This model assumes increasing returns-to-scale. Unlike the CCR model, which is represented by a straight line, the BCC model is represented by a convex efficiency frontier.

The model is specified in the following way:

$$\max h_k = \sum_{r=1}^s u_r y_{rk} + u_* \quad (4)$$

Subject to:

$$\sum_{i=1}^m v_i x_{ik} = 1 \quad (5)$$

The most important step in the formulation of a DEA model is the selection of input and output variables because it could significantly improve the quality of results in subsequent steps.

5. RESULTS

The analysis identified significant differences for each year in the efficiency of expenditure on education and health care between regions. The results of CCR models are presented in Tables 4 and 5, those of BCC model in Tables 6 and 7.

Table 4. Results of CCR model (teacher-student and doctor-population ratios)

	2013	2014	2015	2016	2017
Republic of Bashkortostan	0,156	0,145	0,147	0,140	0,150
Republic of Mari El	1,000	1,000	1,000	1,000	1,000
Republic of Mordovia	1,000	1,000	1,000	1,000	1,000
Republic of Tatarstan	0,159	0,169	0,162	0,166	0,158
Udmurt Republic	0,480	0,479	0,440	0,446	0,437
Chuvash Republic	0,684	0,684	0,657	0,631	0,809
Permsky krai	0,253	0,212	0,200	0,216	0,217
Kirovskaya oblast	0,517	0,489	0,471	0,485	0,484
Nizhegorodskaya oblast	0,174	0,184	0,170	0,180	0,185
Orenburgskaya oblast	0,356	0,331	0,329	0,323	0,404

Penzenskaya oblast	0,528	0,532	0,554	0,478	0,529
Samarskaya oblast	0,218	0,211	0,198	0,207	0,201
Saratovskaya oblast	0,360	0,325	0,302	0,285	0,303
Ulianovskaya oblast	0,559	0,566	0,554	0,496	0,516

Source: Authors' calculation.

Table 5. Results of CCR model (number of students and clinic visits)

	2013	2014	2015	2016	2017
Republic of Bashkortostan	0,945	0,911	0,895	0,849	0,885
Republic of Mari El	1,000	1,000	1,000	1,000	1,000
Republic of Mordovia	0,939	0,846	0,869	0,838	0,808
Republic of Tatarstan	0,858	0,911	0,881	0,870	0,671
Udmurt Republic	0,765	0,838	0,916	0,927	0,777
Chuvash Republic	0,999	0,968	0,967	0,971	1,000
Permsky krai	0,796	0,731	0,764	0,819	0,750
Kirovskaya oblast	0,818	0,827	0,903	0,894	0,819
Nizhegorodskaya oblast	0,805	0,800	0,829	0,832	0,710
Orenburgskaya oblast	0,891	0,874	0,869	0,813	0,906
Penzenskaya oblast	0,941	0,947	0,963	0,809	0,874
Samarskaya oblast	0,849	0,840	0,916	0,919	0,811
Saratovskaya oblast	1,000	1,000	0,990	0,889	0,946
Ulianovskaya oblast	1,000	0,964	0,916	0,802	0,803

Source: Authors' calculation.

Based on Table 4, we observed that, for each year only two regions are the most efficient – Republic of Mari El and Republic of Mordovia, since they achieved the score of 1. Table 5 suggests the same Republic of Mari El as most technically efficient, closely followed by Saratovskaya oblast and Chuvash Republic; though technical efficiency is much higher in this case.

This is remarkable, as the publications quoted above placed Republic of Mari El, Republic of Mordovia and Chuvash Republic among those least developed in Volga Federal District. Besides, the relevant expenditure in Republic of Mari El and Republic of Mordovia were the lowest in the region, those for Chuvash Republic and Saratovskaya oblast were below average. During the same period the relevant non-financial indicators were only partially positive:

- number of pre-school facilities per 10,000 people grew by 13.8-45.7%;
- number of school teachers per 10,000 people grew by 1.7% only in Chuvash Republic, while going down by 1.0-2.9% in other three;
- number of doctors per 10,000 people grew by 2% only in Republic of Mari El, went down by 1.2-2.4% in two other republics and dropped by 11.7% in Saratovskaya oblast;
- number of places in hospitals per 10,000 people grew by 3.5% in Saratovskaya oblast and fell by 6.5% to 23.2% in other three regions.

According to last Complex survey of living conditions (Rosstat, 2019), Republic of Mari El had longest time in the district in queue to apply for medical appointment (19.4% of patients waited for more than 30 minutes), while Chuvash Republic was the leader for time spent in queue for medical appointment (56.5% patients waited for more than 30 minutes). Otherwise the results of these two regions in the areas of education and health care were average – despite relatively low expenditure.

It is possible that the smaller changes in expenditure and negative or small positive changes in non-financial indicators over the reviewed period, compared to other regions, contributed to high position of Republic of Mari El. In other words, a region does not need to have more funds to be technically efficient: regions may be efficient with smaller amount of expenditures, meaning that they used their expenditure in total and for right purpose. Besides, this discussion covers only technical efficiency of specific expenditure, not efficiency of public finance administration as a whole.

Table 6. Results of BCC model (teacher-student and doctor-population ratios)

	2013	2014	2015	2016	2017
Republic of Bashkortostan	0,160	0,149	0,151	0,143	0,151
Republic of Mari El	1,000	1,000	1,000	1,000	1,000
Republic of Mordovia	1,000	1,000	1,000	1,000	1,000
Republic of Tatarstan	0,176	0,179	0,164	0,167	0,163
Udmurt Republic	1,000	0,482	0,454	0,460	0,457
Chuvash Republic	0,703	0,692	0,672	0,650	0,836
Permsky krai	0,263	0,217	0,210	0,229	0,236
Kirovskaya oblast	0,526	0,502	0,521	0,521	0,545
Nizhegorodskaya oblast	0,194	0,191	0,192	0,192	0,206
Orenburgskaya oblast	0,364	0,337	0,343	0,326	0,433
Penzenskaya oblast	0,570	0,536	0,558	0,478	0,531
Samarskaya oblast	0,220	0,218	0,220	0,224	0,223
Saratovskaya oblast	0,375	0,331	0,318	0,285	0,308
Ulianovskaya oblast	0,618	0,587	0,567	0,499	0,540

Source: Authors' calculation.

Table 7. Results of BCC model (number of students and clinic visits)

	2013	2014	2015	2016	2017
Republic of Bashkortostan	1,000	1,000	1,000	1,000	1,000
Republic of Mari El	1,000	1,000	1,000	1,000	1,000
Republic of Mordovia	0,970	0,848	0,876	0,842	0,845
Republic of Tatarstan	1,000	1,000	1,000	1,000	1,000
Udmurt Republic	0,770	0,839	0,977	0,977	0,824
Chuvash Republic	1,000	0,971	1,000	1,000	1,000
Permsky krai	0,823	0,759	0,839	0,890	0,864
Kirovskaya oblast	0,822	0,829	0,947	0,921	0,833
Nizhegorodskaya oblast	0,837	0,885	0,923	0,919	0,945
Orenburgskaya oblast	0,895	0,896	0,877	0,908	1,000
Penzenskaya oblast	0,943	0,963	0,969	0,868	0,905
Samarskaya oblast	0,875	0,909	1,000	1,000	0,980
Saratovskaya oblast	1,000	1,000	1,000	1,000	1,000
Ulianovskaya oblast	1,000	0,979	0,950	0,844	0,858

Source: Authors' calculation.

From the results of Table 6 we can conclude that most technically efficient are again Republic of Mari El and Republic of Mordovia. Table 7 suggests the technical efficiency of the Republics of Bashkortostan, Mari El, Tatarstan and Saratovskaya oblast, closely followed by Chuvash Republic and Samarskaya oblast.

The new regions here are generally considered the leaders of Volga Federal District in terms of social and economic development, being among Russian regions that receive zero dotation from the federal budget.

It should be mentioned that the student-to-teacher ratios in education facilities and density of medical doctors in Russia (and in the regions in question) are in line with the OECD countries. However, general critique points out the low salaries in education and health care, leading to excessive workload on teachers and medical personnel (who takes extra workload for extra pay), as well as uneven coverage of health care (denser in regional centers and scarce elsewhere). These issues may also contribute to higher technical efficiency, as certain regions achieve similar indicator values with less expenditure.

CONCLUSION

The comparative analysis of the functions of federal, regional and municipal levels of administration in Russia shows that the legal framework significantly centralizes the control in the area of education (via actual control and financing), but shifts powers and financial resources in respect of health care to the regional level.

The regions of the Russian Federation significantly differ in terms of size and structure of economy, number and well-being of population, which affect amount of budget they may generate and spend. Out of 85 administrative regions of Russian Federation only 12 do not require donations from the federal budget, and recently the federal Ministry of Finance launched a country-wide program of review of regional public finance efficiency.

The objective of this paper is to evaluate and analyze the technical efficiency of regional public expenditures in 14 regions located in Volga Federal District by applying a DEA approach for the period 2013-2017. Since most of the studies concentrate on the benchmarking of public and local expenditures among countries in the world, this paper makes a contribution to the existing literature by analyzing the efficiency of the regional government expenditures among Russian regions within Volga Federal District.

The results of the empirical analysis showed the prevailing inefficiencies among fourteen region located in Volga Federal District in using their regional government expenditures, i.e. expenditures on education and health care. Based on calculated indicators we concluded that, among 14 regions, the most technically efficient are consistently only Republic of Mari El, Republic of Mordovia, Chuvash Republic and Saratovskaya oblast. However, these four regions generally have low values of social and economic development indicators. At the same time the regions with higher social and economic development indicators (and no federal donations) demonstrated lower technical efficiency, except in the case of BCC model for number of students and clinic visits per doctor.

This suggests that relative efficiency does not correlate with general social and economic performance – on the contrary, same level of indicative results at lower cost may mean higher efficiency. There may be further reasons of higher public expenditure efficiency, not visible in publicly available statistics.

The limitations of this research are that efficiency is only measured in fourteen Russian regions located in Volga Federal District and only a few input and output variables are utilized. The reason why we have only two input and two output is because of DEA limitations. For further research, this should be expanded to other regions within Russian Federation where in that case more input and variables should be included in analysis.

REFERENCES

- Afonso, António, and Fernandes, Sonia. 2003. *Efficiency of Local Government Spending: Evidence for the Lisbon Region. Working Paper No.9*. University of Lisbon: School of Economics and Management.
- Afonso, António, and Scaglioni, Carla. 2005. *Public Services Efficiency Provision in Italian Regions: a Non-Parametric Analysis. Working Paper No.2*. University of Lisbon: School of Economics and Management.
- Afonso, António, and Fernandes, Sónia. 2008. Assessing and explaining the relative efficiency of local government. In: *The Journal of Socio-Economics* 37: 1946-1979.
- Bobkov, V.N., and Dolgushkin, N.K. 2018. Spatial Inequality in the Quality of Life and Living Standards of the Population of the Ural and Volga Federal Okrugs and Russia as a Whole. In: *Uroven' zhizni naseleniya regionov Rossii*, 1(207), 15-28.
- Bowlin, William. 1998. Measuring Performance: An Introduction to Data Envelopment Analysis (DEA). In: *Journal of Cost Analysis* 7: 3-27.
- Charnes, Abraham., William W. Cooper, and Rhodes, E.L. 1978. Measuring the efficiency of decision making units. In: *European Journal of Operational Research* 3(4): 429-444.
- Chebukhanova, L.V., and Kuznetsova, O.A. 2014. Efficiency of budget expenditures for social development of Russia (on example of health care). In: *Vestnik Tambovskogo universiteta. Seriya: Gumanitarnye nauki*, 7 (135), 79-82.
- Cooper, William W., Seifrod, Lawrence M., and Kaoru, Tone. 2006. *Introduction to data envelopment analysis and its uses*. New York: Springer.
- De Borger, Lars-Erik, and Naper, Linn René. 2006. Efficiency Potential and Efficiency Variation in Norwegian Lower Secondary Schools. In: *Public Finance Analysis* 62(2): 221-249.
- Fattahov, R.V. 2006. Republic of Bashkortostan: the evaluation of social and economic situation and the development perspectives. In: *Ekonomika regiona* 1: 42-55.
- Federal Treasury. 2019. *Information on execution of consolidated budget of the subject of the Russian Federation and the budget of state non-budgetary fund (breakdown by the subjects of the Russian Federation as on 1 January 2019)*. URL: <http://roskazna.ru/> (accessed on 15 March 2019).

- Government of Russia. 2010a. *Program of the Government of the Russian Federation for increasing the efficiency of budgetary expenditure for the period till 2012* (adopted by the Order of the Government of the Russian Federation dated 30 June 2010 No. 1101-p).
- Government of Russia. 2010b. *Procedures of development, implementation and assessment of the efficiency of state programs of the Russian Federation* (adopted by the Decree of the Government of the Russian Federation dated 2 August 2010 No. 588).
- Government of Russia. 2019. *Concept of increasing of the efficiency of budgetary expenditure in 2019-2024* (adopted by the Order of the Government of the Russian Federation dated 31 January 2019 No. 117-p).
- Hodzic, Sabina, Jurlina Alibegovic, Dubravka and Becic, Emira. 2017. Efficiency of Public Expenditures: The Case of Croatian Counties. In: *Proceedings of the 25th NISPAcee Annual Conference-Innovation Governance in the Public Sector*, Kazan: Russian Federation, May 18-20. ISBN: 978-80-89013-96-8.
- Makovetsky, M.Yu. 2014. Advanced topics of budget expenses effectivization in the sphere of education. In: *Universum: ekonomika i jurisprudentsia*, 1, 1-14.
- Melkers, Julia, and Willoughby, Katherine. 2005. Models of Performance-Measurement Use in Local Governments: Understanding Budgeting, Communication, and Lasting Effects. In: *Public Administration Review* 65(2): 180-190.
- Ministry of health. Statistical materials. URL: <https://www.rosminzdrav.ru/ministry/61/22/stranitsa-979/statisticheskie-i-informatsionnye-materialy/statisticheskie-materialy> (accessed on 15 June 2019)
- Podzorov, N.G., and Katyn, A.V. 2010. A statistical assessment of the quality of life of the population of regions of the Volga Federal District. In: *Vestnik Volzhskogo universiteta im.V.N.Tatischeva*, 19, 122-125.
- Rosstat. 2018. *Regions of Russia. Social and Economic Indicators. 2018: Statistical Yearbook*. Moscow: Rosstat. ISBN 978-5-89476-458-0.
- Rosstat. 2019. The Results of Complex survey of living conditions 2018. URL: http://www.gks.ru/free_doc/new_site/KOUZ18/index.html (accessed on 8 April 2019).
- Rowena, J., Smith, P.C., and Street, A. 2006. *Measuring Efficiency in Health Care: Analytic Techniques and Health Policy*. Cambridge: Cambridge University Press.
- Shipunova, V.V. 2009. Technique of the estimation of efficiency budgetary regulation of local budgets. In: *Ekonomika regiona*, 1, 213-216.
- Zhu, Joe. 2002. *Quantitative Models for Performance Evaluation and Benchmarking: Data Envelopment Analysis with Spreadsheets and DEA Excel Solver*. Netherlands: Kluwer Academic Publishers.