

Federal Budget Structure Research: Key Problems

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Abstract—The article covers a specific theme of the influence the federal budget structure on gross domestic product (GDP) dynamics, using correlation analysis for the period since 2008 to 2018y. The main hypothesis of the article is that exist the influence the federal budget structure revenues on the gross domestic product. The authors applied correlation analysis to establish the interdependence between these variables. The article reveals results of the correlation analysis showed the significant correlation between the unit weight of federal budget tax (non-tax) revenues in total federal budget revenues and GDP. In addition, the assessment of the significance of the correlation coefficient showed that there is a close statistical relationship between the studied indicators.

Keywords—Federal budget structure; federal budget tax revenues; federal budget non-tax revenues; gross domestic product

I. INTRODUCTION

The functional structure of the Russian financial system is represented by the following enlarged areas - public finance, finance of economic agents and household finance. One of the central ones is public finance, which includes budgets of various levels - the federal budget, sub-federal budgets and the budgets of state extra-budgetary funds. The federal budget currently accumulates about 19.5 trillion rub. (on 01.01.2019) [1]. The main sources of federal budget revenues are tax revenues, non-tax payments and gratuitous receipts. A similar budget classification of public revenues in the Russian budget system was set in 2005. The financial basis of the federal budget revenue is the finances of the population and economic agents. Budget tax revenues reflect the ability of tax administration and the level of well-being of the population and the availability of financial resources from business entities. Non-tax revenues reflect the efficient use of state-owned federal property. The aim of this article is to study the relationship between the structure of the federal budget and the gross domestic product of the country.

II. DATA

Research period – last ten years from 2008 till 2018.

Object – federal budget of Russia.

Subject – federal budget income

Data resources. The source data for this research were federal laws on budget execution of the federal budget of Russia for 2008–2010, reports on budget execution of the federal budget of Russia for 2011–2018, presented on the website of the Federal Treasury of the Russian Federation (Roskazna), GDP data according to Rosstat. In this article, for hypothesis test purposes all public revenues are classified as presented in Table 1.

TABLE I. CLASSIFICATION OF INCOME OF THE FEDERAL BUDGET

Tax revenues of the federal budget	Non-tax revenues of the federal budget
Corporate income tax;	Import duties;
Value added tax on goods (works, services) sold on the territory of the Russian Federation	Export customs duties;
Value added tax on goods imported into the territory of the Russian Federation	Revenues from the use of property owned by state and municipal property;
Excise duty	Payments when using natural resources;
Water tax	Revenues from the provision of paid services and compensation of state costs;
Fees for the use of objects of the animal world and for the use of objects of aquatic biological resources	Revenues from the sale of tangible and intangible assets;
Tax on mining in the form of hydrocarbons	Administrative fees and charges, fines, penalties, damages;
State duty	Other non-tax revenues.
Other tax revenues.	

Source: compiled by the authors on the base [2].

III. METHODOLOGY

To test the hypothesis about the influence of the existing structure of federal budget revenues and expenditures on the gross domestic product (GDP), a correlation analysis was used. Correlation analysis is understood as one of the methods for determining the relationship and measuring the tightness between random variables from the aggregate distributed according to the multidimensional normal law [3].

Using correlation analysis, the following tasks are solved [3]:

- Determination of the main indicators that have the greatest impact on the endogenous variable based on the assessment of the relationship between them.
- Establishing previously known causal relationships. Correlation analysis does not allow us to establish the causes of relationships between variables, but numerically establishes the significance of the identified relationships and the degree of reliability of hypotheses about their presence.

Correlation analysis in the framework of this article was carried out using MS Excel in the “Data” menu of the “Data Analysis” item of the “Correlation tool” [4]. The calculated value of the correlation coefficient varies in the range from -1 to + 1. At $r = -1$, an inversely proportional rigidly determined relationship between the variables is observed. When $r = +1$, it is directly proportional to the rigidly determined connection between the variables. For $r = 0$, there is no connection between the variables. The remaining values of the correlation coefficient according to the Chaddock table are classified as follows [3]:

- The connection is weak - $|r| < 0.3$.
- The connection is moderate - $0.3 < |r| < 0.5$.
- The connection is noticeable - $0.5 < |r| < 0.7$.
- The connection is significant - $0.7 < |r| < 0.9$.
- The connection is high - $0.9 < |r| < 0.99$.

The initial data for the correlation analysis are a set of endogenous and exogenous variables (factors), consisting of N observations (Table 2).

TABLE II. DESCRIPTION OF FACTORS

Symbol	Variable description	Indicators
Y	Dependent variable	Gross domestic product (GDP)
X ₁	independent variable	Unit weight of federal budget tax revenues in total federal budget revenues
X ₂	independent variable	Unit weight of federal budget non-tax revenues in total federal budget revenues

Table 3 presents the values of the analyzed factors.

TABLE III. INITIAL DATA FOR A CORRELATION ANALYSIS OF THE UNIT WEIGHT OF FEDERAL BUDGET TAX (NON-TAX) REVENUES IN TOTAL FEDERAL BUDGET REVENUES ON THE AMOUNT OF GDP (2008–2018)

Year	Gross domestic product (GDP), bln.rub.	Unit weight of federal budget tax revenues in total federal budget revenues, %	Unit weight of federal budget non-tax revenues in total federal budget revenues, %
2008	41 277	56.4	43.5
2009	38 807	53.1	45.3
2010	46 309	53.0	46.7
2011	60 283	52.7	47.1
2012	68 164	53.3	46.2
2013	73 134	54.3	45.4
2014	79 200	54.6	44.6
2015	83 387	62.9	35.2
2016	85 918	64.9	34.0
2017	92 082	73.4	26.4
2018	103 876	72.9	26.9

Source: compiled by the authors on the base of the data of the federal laws on the execution of the federal budget and the data of the Rosstat.

IV. EMPIRICAL STUDY RESULTS

Further, a graph of two indicators (the unit weight of federal budget tax revenues in total federal budget revenues and the gross domestic product (GDP)) was build, which allows us to represent the observed phenomenon in the space of two dimensions (Fig. 1). The unit weight of federal budget tax revenues in total federal budget revenues is a factor influence on the GDP, therefore, the abscissa axis (X-axis) will correspond to independent variable, and the dependent variable - ordinate axis (Y-axis).

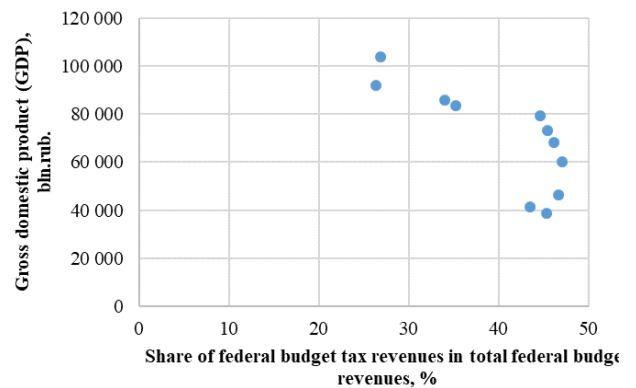


Fig. 1. Correlation field between the unit weight of federal budget tax revenues in total federal budget revenues and the gross domestic product (GDP).

Source: compiled by the authors on the base of the data of the federal laws on the execution of the federal budget and the data of the Rosstat.

The analogous correlation field presented for two other indicators – unit weight of federal budget non-tax revenues in total federal budget revenues and the GDP (Fig. 2).

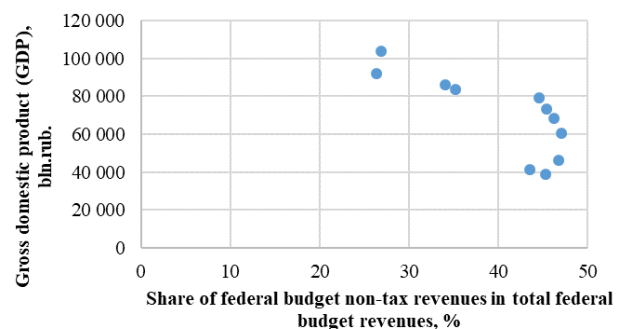


Fig. 2. Correlation field between the unit weight of federal budget non-tax revenues in total federal budget revenues and the gross domestic product (GDP)

Source: compiled by the authors on the base of the data of the federal laws on the execution of the federal budget and the data of the Rosstat.

Conclusions on graph of dispersion:

1. Each point gives the information about unit weight of federal budget non-tax revenues in total federal budget revenues and the GDP, like as about one-dimensional aggregates and the relationship between these indicators.

2. The values of the unit weight of federal budget tax revenues in total federal budget revenues distributed in the range from 52.7% to 73.4%, and the values of the unit weight

of federal budget non-tax revenues in total federal budget revenues were from 26.4% to 47.1%.

3. The amount of GDP was distributed in the range from 38 807 to 103 876 billion rubles.

4. The relationship between the unit weight of federal budget tax revenues in total federal budget revenues and the GDP estimate as positive, because the points are lined up mainly from left to right from bottom to top. Therefore, the higher the unit weight of federal budget tax revenues in total federal budget revenues (points to the right), the higher the GDP (points above) (Fig. 1).

5. The relationship between the unit weight of federal budget non-tax revenues in total federal budget revenues and the GDP estimate as negative, because the points are lined below mainly from left to right from top to bottom. Therefore, the lower the unit weight of federal budget non-tax revenues in total federal budget revenues (points to the right), the lower the GDP (points above) (Fig. 2).

The correlation analysis showed the following results (Table 4).

TABLE IV. THE CORRELATION ANALYSIS RESULTS

Indicators	Unit weight of federal budget tax revenues in total federal budget revenues	Unit weight of federal budget non-tax revenues in total federal budget revenues
Correlation coefficient	0.7855	-0.7852
T-Student	3.8075	-3.8041
T-Student (tabl.)	2.228	2.228
Correlation relation	significant	significant
Relevance	absent	absent

Source: compiled by the authors

The analysis showed the following results:

1. The existence of a positive correlation between the unit weight of federal budget tax revenues in total federal budget revenues and the GDP, that is an increase in the rate of unit weight of federal budget tax revenues in total federal budget revenues to an increase in GDP.

2. The existence inverse correlation between the unit weight of federal budget non-tax revenues in total federal budget revenues and the GDP, that is a down in the rate of unit weight of federal budget non-tax revenues in total federal budget revenues to an increase in GDP.

3. The unit weight of federal budget tax (non-tax) revenues in total federal budget revenues is significant related to the GDP and determines it by 78% in both cases.

4. The obtained values of T-statistics are less than the calculated (tabular) value, therefore, it is concluded that there are no statistically significant differences between the unit weight of federal budget tax (non-tax) revenues in total federal budget revenues and GDP.

V. CONCLUSION

The initial statistical analysis of the impact of the unit weight of federal budget tax (non-tax) revenues in total federal

budget revenues and GDP showed a significant correlation between them. In addition, the assessment of the significance of the correlation coefficient showed that there is a close statistical relationship between the studied indicators. The relationship between tax revenues of the federal budget and GDP is quite close and significant. However, non-tax revenues are related to GDP, but this connection is opposite. The efficiency of use of federal property is inversely proportional to the dynamics of GDP. As the correlation analysis showed, a decrease in the unit weight of non-tax revenues in the structure of the federal budget is accompanied by an increase in GDP. Non-tax revenues include customs duties on the export of oil and gas, and their revenue is closely related to GDP, but in inverse proportion. Thus, non-tax revenues do not increase GDP, while tax revenues have a positive effect on GDP.

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