Assessment of the regional tax potential and its role in the formation of the budget system of the Russian Federation

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Abstract. In this work, a study of tax revenues to the budgets of the Russian constituent entities for the fulfillment of state obligations by the Russian regions is carried out. The assessment of the regional tax potential as a key indicator of budgetary provision is determined on the example of the subject of the Russian Federation – Chuvash Republic – using the methodology of correlation and regression analysis. As a result, to improve the optimality of the regional tax policy in terms of current and forecast planning of tax payments to the budget of the Chuvash Republic, it is established which factors have a greater impact on the amount of tax revenues of a given constituent entity of the Russian Federation, and which to a lesser extent. It seems appropriate to use the author’s model for calculating tax revenues to the budget of the Chuvash Republic as an example of budgeting for other Russian entities. The process of modeling the tax potential of a region is indicated not only by an assessment of its current state, but also as part of project management for forecasting tax policies and tax reserves. The practical application of the tax potential with the available information base and regional government’s own instruments argues for the effectiveness of the fiscal policy of the Russian Federation, which is aimed at implementing tax regulation of economic processes while improving the quality of life of the population of Russia.

1. Introduction

Achieving sustainable economic development of the Russian Federation is the stability and balance of budget policy. Russian regions are characterized by a large number of territorial formations, which determines their different socio-economic level. The problems of gradation of tax revenues in the budgets of domestic entities with an increase in their financial self-sufficiency should be taken into account when forming the tax policy of the Russian Federation, which is the main component of the state budget.

The currently significant gap between the tax base of tax payments and the actual state of taxable objects and tax liabilities leads to incomplete tax revenues to regional budgets of different levels, the lack of an objective assessment of the actual financial capabilities of the territories, as well as an increase in the cost of compensation measures for filling regional budgets with tax income. As a consequence of
this, the problem of replenishing the revenue side of the regional budget and, consequently, the budget system of the Russian Federation as a whole, is relevant.

Scientific research on the problems of regional development is usually associated with the formation of the revenues of the consolidated budget of the region. The main indicator of the maximum amount of tax revenues to the regional budget, taking into account both external and internal factors, the tax potential of the region is determined. In order to develop common methodological approaches to the modern assessment of the regional tax potential, tax concepts have been studied from the scientific point of view of foreign scientists: A Laffer, M Alle, D Brummerhoff, S Barro, R Bird, A Wagner, M Dever, J M Keynes, A Laffer, A Marshall, W Petty, D Ricardo, J Schumpeter, J Stiglitz, K Heidi, M Friedman, and domestic tax specialists: O V Bogacheva, M A Bogatyreva, I V Gorsky, V I Elagin, O V Kalinina, A S Karataev, E I Tsaregorodtsev, F F Hanafeev.

The determination of the optimal tax or fiscal policy has been given and is being given great attention in the works of foreign economists. So, P Dutkevich, R Sakva, according to the analysis of the tax systems of European countries, indicate a “strong statistical relationship between the volume of foreign direct investment and the tax regime of the country” [1]. Researcher from Armenia E G Petrosyan also notes this connection “within the framework of tax harmonization in the countries of the Eurasian Economic Union (EAC) and emphasizes the consideration of socio-economic, geographical and resource components of each EAC region” [2]. A critical assessment of the tax integration of the EU countries was noted by D Gutmann [3], according to which "harmonization of the tax systems of European countries requires refinement and optimization." A number of similar domestic studies [4-6] determined the subject, purpose and objectives of the “analytical assessment of the effectiveness of tax policy” of the regions of the Russian Federation.

The current situation in the Russian economy on a number of risks of socio-economic development of our state and its regions argues the importance of the problem of sustainable budget formation at the expense of the tax potential of the Russian Federation. As noted by A A Kuklin and K S Naslunga, the economic and financial situation of some regions of Russia are at a low level, which does not allow the authorities to exercise their powers and ensure a normal standard of living of the population [7]. As a result, the regional tax potential should prevail in the formation and implementing an effective fiscal policy of the Russian Federation.

The budget system of the region is characterized by certain parameters, among which the key is the tax potential. Currently, the use of indicators of tax potential at the regional level of management can be considered as a promising task [8]. Hence, the problem of replenishment of the budget revenues from tax revenues, both regions and the Russian Federation as a whole, is relevant.

A comprehensive assessment of the regional tax potential, which is characterized by the economic structure of a certain region of the Russian Federation and revenues of taxable resources, contributes to the solution of the problems of maximum filling of the Russian budget. The value of the tax potential of the Russian region is determined by the amount of income to the consolidated budget of the subject of the Russian Federation and, consequently, the potential of the regional authorities to replenish their budgets.

Therefore, the relevance of this article to the study of the most advanced domestic and foreign methodological approaches to assessing the regional tax potential to determine the harmonization and effectiveness of fiscal policy is undeniable not only for the Russian Federation, but also for the world economy.

2. Materials and methods of research

The role of assessing the regional tax potential in the formation of the budget of the Russian Federation was determined by methods of economic analysis, mathematical statistics, methods of comparison, synthesis and synthesis of scientific results. Empirical methods such as literary, retrospective, and statistical analysis were used. Correlation and regression analysis were used as a method of mathematical modeling. The adequacy of the model was evaluated by the significance and mutual influence of statistical coefficients and parameters.
Economic growth is possible only if the financial resources necessary to ensure the reproduction and quality of life in the region, and are part of the economic potential. It is noteworthy that financial resources are considered in the form of not only the budget mechanism but also the tax potential in the works of foreign scientists: I Bostan [9], G Reshin, A Vocish [10], M O Pintea, S A Akim, V Laketush [11].

When determining the role of the tax potential, it is clarified that the budget is replenished not only at the expense of tax revenues, which are only the realized part of the tax potential [8]. The method of calculating the tax potential should include the parameters of growth of tax debt, the effectiveness of the control work of the tax service, the share of the shadow economy.

Thus, the tax potential of the region is a key vector of formation and development of the subject of the Russian Federation, because the purpose of the regional budget policy is to achieve strategic and tactical objectives of socio-economic development of each Russian region.

Therefore, it can be stated that the tax potential justifies the ability of the territorial economic system to reproduce tax revenues [8]. Therefore, the definition of an effective method of assessing the regional tax potential is of key importance both for the regional budget and for the entire budget system of the Russian Federation.

A number of scientists determine methods for assessing the tax potential of the region on the basis of:
– the concept of economic income as a resource of budget revenues;
– building a representative tax system;
– transformation of official data of tax reporting forms;
– adjustment of the amounts actually collected in the region of payments [4, 5, 7].

The analysis of existing approaches to the assessment of tax potential has determined that two groups of methods are used:
1) direct methods related to the forecasting of tax bases for the entire list of taxes and being the most accurate;
2) indirect methods based on the forecast of economic gross indicators.

One of the more accurate, despite the high labor intensity, is the method using a representative tax system (RTS), in which indicators of the size of tax bases are formed on the basis of tax returns, and the average tax rate is used to calculate the tax potential. In turn, this method in economic literature is represented by two varieties:
– regulatory and legislative method;
– advanced method.

The first of these methods, the regulatory and legislative method, is based on information on actual tax revenues and tax bases available in the reporting of tax authorities. The expanded method is aimed at indirect assessment of tax bases and provides for the use of macroeconomic indicators as a characteristic of the tax base of all taxes in the region.

On the other hand, the tax policy of the Russian Federation, as well as the tax policy of its particular region, determines the volume and growth rate of the tax potential by a number of factors. It should be noted that the dependence of the resulting amount of tax revenues on the influence of factors is an example of the so-called stochastic or correlation dependence, which stems from the specificity of tax relations.

Methods of correlation and regression analysis allow us to calculate the existing relationship between the change in tax revenues to the regional budget and various factors that affect their value, which increases the reliability of the strategic forecast of tax payments to the regional budget.

The determination of the linear dependence of the number of tax revenues on the influencing factors justifies the assumption that the total amount of tax revenues to the regional budget consists of separate tax payments, each of which, based on its tax base, acts as its percentage value. Such indicators are determined from the shares of other indicators, which leads to the understanding of the linear dependence of the volume of tax payments on the socio-economic parameters of the region. The resulting indicator is the value of the tax potential of the region for the analyzed period of time. The
correctness of the tax potential assessment results is ensured by the fact that the calculation formula does not include the amounts of regional and local benefits.

According to this methodology, it is established which factors have a greater impact on the number of tax revenues of the region, which – to a lesser extent, which ensures the reliability of not only current calculations but also the forecast of tax payments to the regional budget.

It should be noted that the correlation and regression analysis is used not only to identify the relationship between the studied indicators of the tax potential of the subject of the Russian Federation but also for their quantitative assessment [12]. As a result, the influence of certain factors on the resulting indicator is determined in the correlation model only with a certain degree of probability, since it is impossible to take into account the influence of all existing factors. The definition of correlations allows revealing only the influence of factors taken into account in the model under the condition of abstraction from other arguments. This method of scientific abstraction, although it leads to the approximation of the real mechanism of communication, but rather accurately reveals the patterns of interaction of the studied indicators.

The implementation of the method of correlation and regression analysis illustrates that the amount of tax revenues increases with the growth of gross regional product (GRP) in a directly proportional relationship, i.e. the regression equation has the form:

\[ II = a + bDRP_k \]  

where \( P \) – the projected value of tax revenues by type of tax; \( a \) and \( b \) – regression coefficients; \( k \) – forecast period; \( DRP_k \) – projected value of the domestic regional product in the \( k \)-th forecast period.

The regression coefficients \( a \) and \( b \) are calculated by the corresponding formulas of mathematical statistics [13], as well as the correlation coefficient, showing the closeness of the relationship between the sum of tax revenues and the gross regional product of GRP [13].

The level of GRP, as a factor in the socio-economic state of the region, lies at the heart of forecasting the prospects for the development of the regional economy and inter-regional comparisons. The definition and economic essence of GRP are given in the method of calculation of Rosstat, common for all regions. GRP is determined by summing the gross value added produced by regional residents for the reporting period. In this case, the value added is defined as the difference between the output of goods and services and their intermediate consumption [5, 8].

The indicators of the following tax reporting forms are used as initial information for correlation and regression analysis:

- Report on the accrual and receipt of taxes, fees and other obligatory payments to the budget of the Russian Federation in the form No. 1-NM;
- The report on receipt of tax payments in the budget system of the Russian Federation on the main types of economic activity in the form No. 1-NOM;
- Information on the number of taxpayers who submitted tax returns on taxes paid in connection with the application of special tax regimes, or received patents for the right to apply the simplified tax system on the basis of a patent in the form No. 1-SNR;
- Report on the results of inspections of compliance with the legislation on taxes and fees conducted by the tax authorities independently and with the participation of the internal Affairs bodies in form No. 2-NM;
- Report on the results of the control work of the tax authorities in the form No. 2-NK, etc.

3. Results and discussion

Analysis and calculations on the proposed method were carried out on the example of the region of the Russian Federation – the Chuvash Republic.

An objective assessment of the regions ability to mobilize taxes and fees in the budget system of the Russian Federation contributes to the harmonization of the interests of all levels of government for the purposes of financial support of the functioning of public authorities and local governments [6].
For example, in solving the problems of socio-economic development of the Chuvash Republic, tax revenues play a leading role as the main sources of budget revenues of different levels (figure 1). The remaining stable proportion of tax revenues for the five analyzed years is clearly visible, with a slight decrease in tax revenues to the local budgets of the Republic of Chuvashia.

![Figure 1](image.png)

**Figure 1.** The structure of tax revenues to the budget of the Chuvash Republic for 2013-2017 years.

On the other hand, the efficiency of the regional economy is assessed by a number of macroeconomic indicators [6], among which the gross indicator, the structure of which is given in table 1, is the main indicator determining the development potential of the industries and the Chuvash Republic as a whole.

Assessment of the gross regional product of Chuvashia makes it possible to plan financial flows (including tax payments) to the economy of the region.

**Table 1.** Structure of the domestic regional product (GRP) of the Chuvash Republic in the context of the types of economic activity for 2013-2017

| Activities                        | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------------------------|------|------|------|------|------|
| Manufacturing industries, %      | 24.8 | 27.0 | 25.5 | 28.0 | 26.3 |
| Wholesale and retail trade, %    | 14.2 | 14.2 | 13.5 | 15.1 | 13.7 |
| Agriculture, %                   | 9.7  | 7.6  | 11.2 | 9.3  | 9.0  |
| The property, %                  | 8.8  | 8.7  | 9.5  | 10.5 | 7.8  |
| Building, %                      | 7.8  | 9.1  | 9.8  | 9.4  | 5.9  |
| Transport and communication, %   | 7.1  | 8.1  | 7.6  | 7.6  | 5.7  |
| Other activities, %              | 27.6 | 25.3 | 22.9 | 20.1 | 20.5 |

In the structure of GRP (table 1) the largest share is occupied by manufacturing (average 26.3%), trade (14.1%), agriculture (9.4%) and construction (8.4%).

GRP parameters are one of the most important for the calculation of the assessment of the realized part of the tax potential in the tax revenues of the territory, which are given in table 1.

During the period under review, the regional tax potential increased on average by 13.4%, which was affected by the growth of the domestic regional product (GRP) of the Chuvash Republic by an average of 3.2% and the increase in the representative tax rate by 9.9% (table 2). Undoubtedly, the growth of the tax potential of the Chuvash Republic confirms the effectiveness of the regional tax and budget policy of this subject of the Russian Federation.
Table 2. Analysis of the tax potential of the Chuvash Republic for 2015-2017 by the method of the representative tax system (RTS).

| Factors | 2015 | 2016 | 2017 | 2016 to 2015 | 2017 to 2016 |
|---------|------|------|------|--------------|--------------|
| Tax payments to the budget of the Russian Federation, mln. rub. | 13 720 353.3 | 14 482 900.9 | 17 343 400.0 | 105.6 | 119.8 |
| Tax arrears in the Russian Federation, mln. rub. | 1 155 200.0 | 1 402 100.0 | 1 576 600.0 | 121.4 | 112.4 |
| Increase in tax debts in Russia, mln. rub. | 240 663.1 | 246 900.0 | 174 500.0 | 102.6 | 70.7 |
| Gross domestic product (GDP) of Russia, mln. rub. | 83 232 600.0 | 85 880 600.0 | 92 819 000.0 | 103.2 | 108.1 |
| Tax payments, % of GDP | 16.5 | 16.9 | 18.7 | 102.4 | 110.7 |
| Debt growth, as % of GDP | 0.3 | 0.3 | 0.2 | x | x |
| Gross regional product (GRP) of the Chuvash Republic, mln. rub. | 251 307.0 | 261 574.3 | 269 944.7 | 104.1 | 103.2 |
| Tax potential of the Chuvash Republic, mln. rub. | 42 219.6 | 44 990.8 | 51 019.5 | 106.6 | 113.4 |

The calculation of the regional tax potential with the determination of the influence of factors on the actual tax revenues to the budget of the Chuvash Republic is presented by a preliminary grouping of data for correlation and regression analysis (table 3). To perform correlation and regression analysis, the built-in Microsoft Excel "Analysis Package" was used.

Table 3. Indicators of factors of correlation and regression analysis of the regional tax potential of the Chuvash Republic for 2012-2016.

| Factors | 2012 | 2013 | 2014 | 2015 | 2016 |
|---------|------|------|------|------|------|
| Taxable capacity, mln. rub. (Y) | 32 995.9 | 34 104.3 | 38 623.3 | 41 495.7 | 42 945.4 |
| The population of the Chuvash Republic, thousand people (X1) | 1 245.2 | 1 242.4 | 1 240.2 | 1 241.1 | 1 239.2 |
| "Per capita" gross regional product, thousand rubles (X2) | 173.0 | 177.3 | 181.5 | 189.2 | 193.5 |
| The average income of the population. (X3) | 13 754.9 | 14 586.3 | 16 065.8 | 16 374.0 | 17 752.7 |
| Cost of works performed by type of activity "construction", mln. rub. (X4) | 28 400.1 | 28 517.7 | 29 501.5 | 33 046.7 | 35 803.7 |
| The average annual number of employed in the economy, thousand people (X5) | 569.7 | 577.1 | 574.6 | 572.0 | 571.3 |
| Average monthly nominal accrued salary, rub (X6) | 17 187.4 | 18 528.0 | 19 046.2 | 19 896.9 | 20 853.2 |
| The balanced financial result of enterprises, mln. rub. (X7) | 10 548.0 | 11 307.0 | 13 972.1 | 15 684.3 | 17 630.3 |
| The volume of retail trade turnover, mln. rub. (X8) | 109 301.0 | 107 596.3 | 112 901.6 | 116 045.1 | 119 851.4 |
| Per capita investment in fixed capital, rub. (X9) | 47 482.0 | 48 390.0 | 51 003.0 | 53 461.0 | 57 274.5 |
| Number of unemployed, thousand people (X10) | 38.4 | 37.2 | 36.0 | 36.3 | 35.6 |
| Number of enterprises and organizations, units (X11) | 22 609.0 | 22 663.0 | 22 983.0 | 22 042.0 | 21 843.5 |

The calculation of the impact of the factors presented in table 3 on the tax potential of the Chuvash Republic is obtained in the form of a matrix of paired and partial correlations (table 4).

Highest coefficients of pair correlation indicators show the relationship between the tax potential of the region and its gross "per capita" regional product (X2) and investments in fixed capital (X9).

Thus, the direct dominance of the tax potential of the region over the level of development of the regional economy and its key role in the formation of the budget of the Russian Federation is proved [14].
Table 4. Matrix of paired and partial correlations of the studied factors of tax regional potential of the Chuvash Republic.

|      | Y       | X1      | X2      | X3      | X4      | X5      | X6      | X7      | X8      | X9      | X10     | X11     |
|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Y    | 1       |         |         |         |         |         |         |         |         |         |         |         |
| X1   | -0.69826| 1       |         |         |         |         |         |         |         |         |         |         |
| X2   | 0.93739 | -0.89756| 1       |         |         |         |         |         |         |         |         |         |
| X3   | 0.742407| -0.99396| 0.916334| 1       |         |         |         |         |         |         |         |         |
| X4   | 0.638047| 0.091714| 0.356579| -0.0347| 1       |         |         |         |         |         |         |         |
| X5   | -0.19182| 0.833347| -0.5094| -0.79825| 0.613221| 1       |         |         |         |         |         |         |
| X6   | 0.829246| -0.97638| 0.916861| 0.98667| 0.11726 | -0.70643| 1       |         |         |         |         |         |
| X7   | 0.796234| -0.14579| 0.566476| 0.19536| 0.968871| 0.416486| 0.342692| 1       |         |         |         |         |
| X8   | 0.726112| -0.99791| 0.916861| 0.993128| -0.04301| -0.81033| 0.985199| 0.192343| 1       |         |         |         |
| X9   | 0.961301| -0.65174| 0.902031| 0.673446| 0.650022| -0.13287| 0.769465| 0.817297| 0.678697| 1       |         |         |
| X10  | -0.98844| 0.754507| -0.9517| -0.79239| -0.54897| 0.72796 | -0.86197| -0.7275 | -0.73356| -0.96303| 1       |         |
| X11  | -0.29994| 0.010212| -0.2424| 0.041107| -0.50811| -0.28387| -0.07242| -0.56036| -0.04369| -0.52576| 0.279102| 1       |

4. Conclusion
Taking into account the peculiarities of regional management is of fundamental importance in determining the effectiveness of the fiscal policy of a constituent entity of the Russian Federation. In order to solve such problems, the article examines the main methods of assessing the regional tax potential in order to determine among them the most optimal for improving the replenishment of the budget of the region of the Russian Federation.

Determining the magnitude of the tax potential is not an end in itself, but acts only as a unique mechanism for making effective decisions on the development strategy of both regional and national tax revenue systems. It is recommended to carry out measures to improve the reliability of the assessment of the tax potential and its increase:

1. to expand the rights of regional authorities to an independent decision on granting tax benefits;
2. clarify and specify statistical and tax reporting;
3. systematize and unify indicators of tax reports published by various departments of the Russian Federation and regional authorities;
4. apply new areas of settlement of debts of the taxpayers together with the development of aspects of tax culture [4, 14].

The assessment of the tax potential of the region is proposed on the basis of the method of a representative tax system using a regression analysis of the relationship of tax revenues and macroeconomic indicators of the region with a sample size equal to the number of cities and districts of the Chuvash Republic.

Multi-factor correlation and regression analysis with a regression equation are recommended to use as a model of the tax potential of the Russian region for clear financial reasoning of tax revenues of regional and federal budgets when developing tactics and strategy of the budget policy of the Russian Federation. When interpreting the indicators of the regional tax potential model, it was taken into account that with an increase in the number of explanatory variables, the coefficient of determination, showing the degree of influence of one or another indicator, or their combination, on the resulting variable, also increases. That is, the coefficient of determination reflects an increase even when a non-essential indicator is added to the model, which means a significant complication of the model, not accompanied by a significant increase in accuracy. Such "usefulness" of each factor is determined by statistical calculations of student's $t$-criterion [7]. It is established that if the value of this indicator is less than 2.443 modulo, the value was formed under the influence of random causes, so the factor $x$, the force of influence of which estimates $a$, is excluded as insignificantly influencing, uninformative. This is also indicated by the probability of random values of regression parameters: if the $P$-value is less than the accepted level of 5%, it is concluded that the non-random nature of this parameter value, i.e. that it is statistically significant and reliable. It is also undesirable to use closely related indicators in a set of...
explanatory variables, as this can distort the relationship. Since the coefficient of partial correlation is less, the better the model. Evaluation of the reliability of the regression equation as a whole and the index of tightness of $R_{xi}$ (multiple correlation coefficient) gives Fisher's $F$-test, the significance of which should not exceed the permissible level of 5% [13].

Thus, the direct dominance of the tax potential of the region over the level of development of the regional economy and its key role in the formation of the budget of the Russian Federation in the future as part of project management. The priority directions of increasing the regional tax potential on the basis of the proposed methodology of its assessment are substantiated. As a result, the conceptual approaches to the development and implementation of the fiscal policy of the Russian regions for the effective use of budgetary resources and the creation of tax conditions for the development of the business environment are clarified.

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