

# MODELING A REGION'S TAX POTENTIAL ALLOWING FOR THE UNIFORMITY RATIO

Murzina Elena Aleksandrovna, Volga State University of Technology

## ABSTRACT

*Development of scholarly knowledge about economic research methods is very relevant in modern management science. It is also of great importance in the strategic tax administration sphere. The article analyzes modern methods for determining tax potential used by both corporate entities and the state tax service.*

*The paper presents the authors' methods to assess different techniques of determining tax potential. The authors have developed their own classification of tax potential evaluation methods, where all methods are divided into factual, heuristic and complex ones. The critical analysis made it possible to find out the most efficient forecasting methods. The modeling of tax potential allowing for the uniformity ratio is tested by the example of one of the Russian administrative units-the Mari El Republic.*

**Keywords:** Modeling, Strategic Management, Tax Potential, Taxpayer, Management.

## INTRODUCTION

The budget of any state consists of tax revenues. Evaluation of their amounts and the potential of their increase, as well as search for effective management tools, is the hot topic for current studies of tax potential.

The authors think that tax potential shall be practically evaluated based on the definition of its content as maximum potential tax revenues in the budget system within the specific area received under the current conditions of formation of taxation bases when using the legal tax mechanism. The working hypothesis of the research: regional tax potential shall be forecasted based on taxes, the share of which in the tax revenue structure does not change or change insufficiently. If tax revenues are equal, the tax potential of each group can be determined based on the average share of taxes in the total volume over the same periods, when the amount of annual revenues is known.

Uniformity of tax revenues is assessed by analyzing the structure of tax revenues in the consolidated budget of the Russian Federation, which makes it possible to find out the dynamics of collection of taxes and fees and to define the vector of future development for tax services with regard to their collectability.

In this article, the authors conduct the critical analysis of current tax potential evaluation methods, as well as forecast it by one of the methods under review in the context of the Mari El Republic (Russia). Using modeling to build forecast tax capacity is an important task for the strategic management of regional economies. The proposed methods can also be used to model the tax potential of taxpayers (Shemyakina et al., 2019).

## REVIEW OF LITERATURE

The problem of modeling is of interest to many scientists (Yoon, 2017; Burkov & Murzina, 2016). Modeling is a universal method of economic research. In this article, the authors

applied the modeling method to tax potential management. Rao (1993) evaluates tax potential as the totality of two constituents: as a measure of revenue (state and local tax and other non-tax revenues) and as total tax revenues (tax potential is identified as resources, that is, tax revenue forecast). Brehm (2013) defines tax potential as the tax burden. By “*taxable capacity*”, Le et al. (2012) understand the forecast value of tax burden (tax to GDP ratio), evaluated by regression analysis taking into account national features, and tax potential is regarded as the constituent of financial (revenue) potential. It can also be noted that in the scientific literature, as applied to regional multiclusters, a system of indicators of economic efficiency has been developed by Napolskikh et al. (2016).

Stochastic frontiers of tax potential were studied by Alfirman (2003). At that, he defines tax potential as tax capacity that can be achieved, if the economy uses all its resources and capacities to mobilize all potential tax revenues taking into account key features. Demenko & Islamutdinov (2018) propose to describe the used tax potential as a measure of inefficiency.

## METHODOLOGY

The variety of tax potential calculation methods preconditions their systematization. There are two key approaches to classify the tax potential evaluation methods: first, to divide all methods into groups based on actual and macroeconomic data; second, to divide all methods into direct (based on tax revenue formation data) and indirect (based on the economic activity of the region).

At that, there are methods that cannot be expressly attributed to one of the groups above. So, it is required to find other criteria to classify and group the tax potential evaluation methods.

All methods can be grouped as factual methods, because they are based on the analysis of facts, statistic data, and forecasts applying different models. Note that at tax potential evaluation, the Delphi approach can be applied both independently and in the aggregate with one of factual methods. It causes the division of all regional tax potential evaluation methods into three groups: heuristic, factual, and complex.

Heuristic methods are based upon research and discovery of previously unknown facts. The Delphi approach is most widely used. It is based upon the professional intuition of experts and applied, when neither factual method can be used to evaluate tax potential. For example, in the absence of verified methods of scoring of potential tax revenues resulting from uncertain development of the economic system influenced by the crisis phenomena. Complex methods represent the integrated use of two above-mentioned groups.

The variety of tax potential evaluation methods necessitated the definition of their basic advantages, disadvantages, as well as the application area. Thus, the authors have developed a system of criteria comprising of 6 groups:

1. Evaluation information system;
2. Indicator system in the methodology;
3. Method verification system;
4. Evaluation considerations in the context of different taxes and areas;
5. A system of tax service efforts referred to the application of the evaluation method;
6. Method applicability.

The authors have identified criteria, their characteristics, and a point scale of evaluation in each group. The results of the research are shown in Table 1.

<b>Table 1</b>			
<b>APPLICABILITY OF THE TAX POTENTIAL EVALUATION METHOD</b>			
<b>No.</b>	<b>Criterion</b>	<b>Characteristics</b>	<b>Point scale</b>
<b>1<sup>st</sup> group: Evaluation Information System</b>			
1.1	Federal State Statistic Service data usage	Priority	1
		Not applicable	0
1.2	Federal Tax Service data usage	Priority	1
		Not applicable	0
1.3	State bodies cooperation arrangements	Evaluation data are provided by FTS	1
		Evaluation data are provided by FTS	0
<b>2<sup>nd</sup> group: Indicator System in the Methodology</b>			
2.1	Number of parameters in the methodology	Limited calculations due to the small number of used parameters	0
		Optimum quantity of parameters	1
		Need in large data volumes	0
2.2	Parameters		
2.2.1	Incomes of non-residents	Used	1
2.2.2	Inflation	Disregarded	0
2.2.3	Tax evasion		
2.2.4	Additional payments resulting from control measures		
2.2.5	Underlying tax and fee debts		
2.2.6	Shortfall in income		
2.2.7	Additional income due to the broadening of the tax base	Used	1
2.2.8	Collectability index	Disregarded	0
2.2.9	Parameters of socio-economic development of the area		
2.2.10	GDP (GRP for the region) inclusive	Used	1
		Disregarded	0
2.3	Time nature of data	Historical, current and future tax system data are taken into account	1
		One type of data is not taken into account	0
2.4	Seasonal nature of data	Seasonal nature of data is taken into account at evaluation within one fiscal year	1
		Disregarded	0
<b>3<sup>rd</sup> group: Method Verification System</b>			
3.1	Degree of determinateness	Strong connection between evaluation and observations	1
		Partial connection between evaluation and observations	0
		Weak object predictability	-1
3.2	Evaluation accuracy at different periods of time	High accuracy at short-term evaluation	1
		High accuracy at medium-term evaluation	1
		High accuracy at long-term evaluation	1
<b>4<sup>th</sup> group: Evaluation Considerations in the Context of Different Taxes and Areas</b>			
4.1	Differentiation of taxation bases	Used	1
		Disregarded	0
4.2	Differentiation of taxation rates in different regions	Used	1
		Disregarded	0
4.3	Method adaptivity under essential asymmetry of tax potential in the regions	Adaptive	1
		Non-adaptive	0
<b>5<sup>th</sup> group: System of Tax Service Efforts Referred to Application of the Evaluation Method</b>			
5.1	Evaluation complexity	High	0
		Low	1
5.2	Evaluation method investment	High	0
		Low	1
<b>6<sup>th</sup> group: Method Applicability</b>			
6.1	Evaluation period (horizon)	Evaluation is made for one period	0
		Evaluation is possible for several periods	1
6.2	Tax risk identification at method usage	Tax risks can be formalized	1
		Task risks are not identified	0

Note: Author's research

The forecasting extrapolation and modeling methods were ranked first in the course of analysis. At that, the modeling methods are rather labor-intensive and complicated. So, special attention should be paid to the method of correlation and regression analysis at tax potential evaluation. With the purpose of improving its accuracy, one should use indices of economic activity in the regions, taking into account the representative tax system method. The model resulting from such an approach can be used for short-term, medium-term and long-term forecasting of tax potential.

## RESULTS

The research resulted in the identification of the tax potential evaluation method allowing for the uniformity ratio. The calculations have been made with regard to tax revenues of the consolidated budget in the Mari El Republic. The analysis of tax revenues from 2014 to 2018, presented in Table 2, shows their stable positive dynamics. At that, the share of three basic taxes (personal income tax, corporate income tax, corporate property tax) averaged to 84% from 2014 to 2018, and the uniformity ratio amounted to 0.85 from 2014 to 2018. Calculations are shown in Table 2.

It seems that evaluation of the consolidated budget of the Mari El Republic and forecasting of regional tax potential should be made by three basic taxes: personal income tax, corporate income tax, corporate property tax. The authors have used the forecasting method based on extrapolation taking into account the uniformity of tax revenues.

<b>Parameter</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Variation	0.50	0.47	0.45	0.53	0.51
Mean deviation	0.13	0.13	0.13	0.13	0.13
Mean-square deviation	0.05	0.05	0.05	0.05	0.05
Tax revenue conformity ratio	0.84	0.84	0.85	0.85	0.85

Note: Author's research

The authors have forecasted tax revenues to the consolidated budget of the Mari El Republic based on the method of linear approximation on the grounds of data from Table 3.

<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Revenues (Thousand dollars)	3006.2	3599.2	4812.2	6592	7943	7601.2	8935.9	9730	11,009.6	11,435.4

Note: Author's research based on data of the Federal state statistic service of Russia

Tax revenues to the consolidated budget of the Mari El Republic are calculated by the following equation:

$$y = 963.72x + 2166$$

Where,  $x$  is the time factor (1 to 10).

The forecast of tax revenues to the consolidated budget of the Mari El Republic based on the above equation is shown in Table 4.

<b>Table 4</b>	
<b>THE FORECAST OF TAX REVENUES TO THE CONSOLIDATED BUDGET OF THE MARI EL REPUBLIC</b>	
<b>Year</b>	<b>Tax revenues to the consolidated budget of the Mari El Republic (Thousand dollars)</b>
2018	13,730.64
2019	14,694.36

Note: Author's research

## CONCLUSION

Deviation of the forecast results from actual values amounts to less than 5%. It means that the forecast model is adequate. Nowadays, the «TAX-Nalog» automated information system (TAX-3 inclusive) and its analytical subsystems, used by tax services, have the resources needed for the above analysis (the system contains a database referred to socio-economic indicators and detailed data on all tax revenues), but it has no features needed to conduct such analysis and forecast. Thus, the authors offer to add the following tools to the block Analytical and Forecast Activities of Tax Service: a) formation of the register of socio-economic indicators having statistic relations with tax revenues (by types); b) model analysis; c) tax revenue forecast; d) forecast data monitoring (comparison with basic data in the statistic reports of tax services).

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