# Methodology for assessing the budgetary security of regional infrastructure provision (case study of the Komi Republic)

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**Abstract.** The aim of the study is to analyze methodological approaches to assessing the budget component of financial and budgetary security and to develop a methodology for assessing the budgetary security of a region on their basis. In the process of research, statistical and mathematical methods were used, a comparison method, an indicative method, analysis and synthesis methods. A brief description of the main approaches and methods for assessing the regional budget security is given, and the most significant indicators are selected that allow diagnosing threats to the budget component of the regional financial and budget security. The article presents the author's methodology for assessing the budget component of the financial and budgetary security of the region, a set of indicators and threshold values for its implementation is formed. The proposed methodology has been tested on the example of the analysis of budget security indicators of the Komi Republic.

## 1 Introduction

In recent years, with the introduction of Western countries economic sanctions against Russia, global instability and new challenges associated with the emergence of massive diseases and infections that paralyze the economy, the role of the formation and development of the economic security system has sharply increased. Under the new conditions, especially after the spread of Covid -19 in the world, which led to a reduction in the GDP of a number of countries, including developed economies of the world, the formation of an effective system of financial and budgetary security of the state and its regions, which is an important part of economic security, is of particular importance .

One of the key components of the financial and budgetary security of the region is budgetary security, since the budget is the most important institution, without the normal functioning of which the development of the economy of the regions and the state is impossible[1] . The budgetary security of the region is a state of solvency and stability of the region, which involves the effective and balanced formation of budgets and the use of

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budgetary funds. The creation of an effective mechanism for ensuring budgetary security at all levels, whether it is a state, region, enterprise or an individual person, is a necessary prerequisite for the development of Russia as a great economic power, as well as the conditions for economic growth and development of the region, increasing the level of social protection of the region's inhabitants and ensuring national interests of the country.

An increase in the relevance of issues of ensuring budgetary security at the regional level is mentioned in the main document of strategic planning of Russia in the field of security, approved in the Decree of the President of Russia dated December 31, 2015 No. 683 “National Security Strategies of the Russian Federation”, in which as one of the priority directions in national security called the challenge to address the risks associated with disproportion development of the Russian Federation. One of the most important ways to stimulate the independent economic development of regions is to strengthen the budgetary security of the region.

The existence of such system is impossible without creating an effective mechanism for assessing the state of the budget component of financial and budgetary security, which includes monitoring and express diagnostics of the budget component of financial and budgetary security using a system of indicators and their threshold values [1]. The state of the entire economy of the country ultimately depends on how efficiently the assessment is carried out. Early warning of the occurrence of threats allows preventing their implementation, eliminating the factors that generate them at the stage of occurrence, this significantly reduces the cost of measures to ensure financial and budgetary security.

## 2 Materials and methods

At present, in Russia there is no generally accepted method for assessing the financial and budgetary security of the region, although some scientists have attempted to create such methods.

Methods for assessing the budgetary security of a region include the following:

1) the method of assessing financial and budgetary security using a system of indicators. In this case, the compliance of the indicator in the region with the threshold values of the indicator is analyzed;

2) assessment of the region’s economic growth rates based on basic macroeconomic and integrated indicators and their dynamics;

3) expert method for ranking regions by threat;

4) assessment of caused quantitative damage;

5) applied mathematics methods, such as multivariate statistical analysis, providing data with a high level of reliability, but require a lot of time and quite complex operations;

6) fiscal control [1].

In our opinion, it is advisable to carry out the budget security assessment using the indicative method, which allows you to most accurately diagnose threats to financial and budgetary security. Compared to the methods of applied mathematics, it is much easier to use, and comparing to the expert method, the final assessment looks more objective, since statistics are analyzed during its execution, which exclude the possibility of error in the subjective assessment of a particular threat.

There are various approaches to the formation of a system of indicators of budgetary security.

**Table 1.** Approaches to the formation of budget security indicators [2-10].

| Author | Feature Description |
|---|---|
| E.V. Karanina, D.A. Loginov | Financial security indicators are divided into 4 groups depending on the type of threat. Some indicators characterize the state of budgetary security in the region. Then, using the threshold values of the indicators with the use of the appropriate weights of each indicator, the overall level of financial and budget security is calculated.<br>Indicators: surplus (deficit) of the consolidated budget per capita; the share of gratuitous receipts in the total amount of budget sources; the share of gratuitous receipts in the total amount of sources is budgetary. |
| L.B. Mokhnatkina | The main threat to budget security is an imbalance of the budget system. Budget security assessment is based on an analysis of this threat. Indicators: budget surplus (deficit) in million rubles, % of GRP, The volume of public debt, billion rubles. |
| N.P. Pazdnikova, A.A. Kovsharov , N.G. Glazkova | Criteria of choosing indicators:<br>1) accessibility of statistical databases.<br>2) ratio with relevance to the basic directions strategic development.<br>To assess budget security, the method of weighted average annual data according to the following formula is used:<br>$K\ b.b. = K\ 1 \cdot 0.2 + K\ 2 \cdot 0.15 + K\ 3 \cdot 0.1 + K\ 4 \cdot 0.15 + K\ 5 \cdot 0.1 + K\ 6 \cdot 0.1 + K\ 7 \cdot 0.15 + K\ 8 \cdot 0.05$.<br>K1- autonomy coefficient; K2 - the coefficient of budget provision of the population; K3 - the coefficient of budget performance; K4 - budget balance ratio; K5 - revenue budget execution ratio; K6 - the coefficient of budget execution by expenditure; K7 - the coefficient of balancing (stability) of the budget; K8 - the coefficient of debt dependence of the budget |
| S.N. Grib | Calculation of the integral indicator as the root to the nth degree from the products of the level of the actual values of the coefficients to the threshold values using the weights of each indicator. |
| E.V. Nikulina, I.V. Chistnikova, A.V. Orlova | Comparison of calculated coefficients with normative (threshold) values. |
| D.V. Margasov | Calculation of the integral indicator taking into account the normalized average weighted price of capital. Indicators: coefficients of tax stability , financial independence , property, provision of budget capital, efficiency of use of state budget capital, tax revenue collection, budget debt burden, normalized average weighted price of capital. |
| A.V. Minakov | Algorithm budget security rating the region includes 5 stages:<br>1) Assessment of financial ratios the level of budgetary security in the region.<br>2) Calculation of the level of each coefficient to threshold indicator value: if an increase in the coefficient increases the level fiscal security of the region: determined by the ratio of the actual value to the threshold; if an increase in the coefficient reduces the level fiscal security of the region: determined by the ratio of the threshold value to the actual.<br>3) Calculation of the integral indicator of budget regional security by the formula: calculation of the integral indicator as the root to the nth degree from the products of the level of actual coefficient values to threshold values.<br>4) Determination of the state budget regional security based on the value integral indicator.<br>5) Assessment of the correlation between coefficients and an integral indicator of budgetary security for the selection of areas and models of strengthening fiscal security of the region. |
| E.V. Slesarenko; O.B. Sheveleva | The budget security assessment is based on indicators that are divided into 5 projections. The value of each indicator is divided by the value by threshold values, then the resulting values are multiplied. |
| V.K. Senchagov | The author divides all indicators into ten projections, one of which is financial and budgetary security. Next, the values of the indicators are evaluated by comparing with threshold values and identifying the degree of deviation of the actual values using the normalization function. |

## 3 Results

Based on the considered approaches and methods, an integrated approach was developed to assess the budget component of financial and budget security. On the basis of common requirements and developed system of indicators it appears to be possible to identify 17 indicators of budget security.

It is advisable to subdivide all budget security indicators into five projections:

1) Indicators of the security of the budget of the region - characterize the ratio of income and expenditure of the region, as well as the amount of public debt;

2) Indicators of regional budget independence - characterize the independence of the region from cash receipts from other levels of the budget system;

3) Indicators characterizing the relationship of the regional budget with the level of GRP;

4) Indicators of social orientation and effectiveness of the region's budget - characterize the degree of social protection of the region's population and its provision with budget funds;

5) Indicators showing how well the budget line items for income and expenses are being implemented.

The threshold values of indicators are also defined. The list of indicators and their threshold values is presented in the table 2.

**Table 2.** The system of indicators for the budget component of fiscal security and their threshold values.

| N | Indicator name | Threshold value |
|---|---|---|
| I. | Budget Security Indicators | |
| A1 | The ratio of budget revenues to expenses,% | >= 100 |
| A2 | Coefficient of covering expenses with own tax and non - tax revenues,% | >= 75 |
| A3 | The ratio of public debt to total expenditure,% | <= 30 |
| A4 | Share of expenses on servicing regional debt in the total volume of expenses ,% | <= 13 |
| A5 | The ratio of public debt to own income, % | >= 20% |
| II | Budget Independence Indicators | |
| B1 | The ratio of own income to total income, % | >= 75% |
| B2 | The share of taxes and fees credited to the consolidated budget of the total amount of taxes collected in the region, % | >= 50% |
| B3 | Share of gratuitous transfers from budgets of other levels in the region's total revenues, % | <= 25% |
| B4 | The share of tax revenues in total budget revenues, % | >= 50% |
| III. | The relationship of the budget with GRP | |
| C1 | The ratio of budget revenues to GRP, % | >= 38 |
| C2 | The ratio of budget deficit to GRP, % | <= 3 |
| C3 | The ratio of budget surplus to GRP, % | <= 4% |
| IV. | Indicators of social orientation and budget performance | |
| D1 | Share of expenses on social items to the total amount of expenses | >= 62 |
| D2 | Budget revenues per capita, thousand rubles | >= 20 |
| D3 | The growth rate of the volume of financial resources to ensure social policy, % | >= 100% |
| V. | Budget execution indicators | |
| E1 | Budget execution ratio by income | >= 100% |
| E 2 | Cost performance budget | >= 100% |

Further, for each projection of indicators, indicator values are calculated that are compared with threshold values as follows: if an increase in the indicator value rises the level of budget security, then it is necessary to divide the indicator threshold value by the actual value of the indicator under study, if an increase in the indicator value lowers the budget security level, it is necessary to divide the actual value of the indicator under study on the threshold value of the indicator. Based on this comparison, the risk zone is determined by the risk assessment points (primary point), and then, based on the risk zone, each indicator is assigned a score in accordance with the risk zone on a five-point scale. The correspondence of risk assessment points and risk zones is given in the table 3.

**Table 3.** Score scale.

| Primary point | Risk zone | Score |
|---|---|---|
| > 10 | catastrophic risk zone | 1 |
| >3; <=10 | critical risk zone | 2 |
| > 1.6; <= 3 | high risk zone | 3 |
| > 1; <= 1.6 | moderate risk zone | 4 |
| <= 1 | stability zone | 5 |

The total projection score is calculated by determining the arithmetic mean of the indicators included in the projection. Next, using the arithmetic mean of the projections of budget security, the final budget security score is determined.

Table 4 presents the indicators necessary for calculating the values of indicators of the budget component of the fiscal security of the region.

**Table 4**. Indicators used to calculate budget security indicators.

| N | Index | Value |
|---|---|---|
| 1 | Revenues, million rubles (approved budget) | 84303.32 |
| 2 | Revenues, million rubles (executed) | 86331.89 |
| 3 | Own income (executed) | 76758.91 |
| 4 | Tax revenues, million rubles (executed) | 74809.63 |
| 5 | Remaining arrivals from other budgets of the budgetary system of the Russian Federation, million rubles | 8715.34 |
| 6 | Expenses, million rubles (approved budget) | 85482.22 |
| 7 | Expenses, million rubles (executed) | 82071.79 |
| 8 | Social expenses in 2019, million rubles | 54802.01 |
| 9 | Social expenses in 2018, million rubles | 58408.57 |
| 10 | Balance, million rubles | 4260.10 |
| 11 | State debt of the region, million rubles | 25471.14 |
| 12 | Municipal debt, million rubles | 2996.79 |
| 13 | The total debt of the region | 28467.94 |
| 14 | Servicing of state and municipal debt, million rubles | 2417.28 |
| 15 | The total amount of taxes collected in the region , million rubles | 244625.77 |
| 16 | The amount of taxes credited to the consolidated budget of the entity, million rubles | 89157.63 |
| 17 | GRP, million rubles | 665735.70 |
| 18 | Population as of 01/01/2020 | 820473 |

The summary table of the budgetary security assessment of the Komi Republic for indicator projections is presented in table 5.

**Table 5.** Assessment of budgetary security of the Komi Republic.

| I. Budget Security Indicators | | | | | | |
|---|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | A5 | Score |
| Threshold value | 100 | 75 | 30 | 13 | 20 | |
| Indicator value | 105.19 | 93.53 | 34.69 | 2.95 | 37.09 | |
| The ratio of the indicator value to the threshold value | 0.95 | 0.80 | 1.16 | 0.23 | 1.85 | |
| Score | 5 | 5 | 4 | 5 | 3 | 4.4 |
| II. Budget Independence Indicators | | | | | | |
| | B1 | B2 | B3 | B4 | | Score |
| Threshold value | 75 | 50 | 25 | 50 | | |
| Indicator value | 88.91 | 36.45 | 10.1 | 86.65 | | |
| The ratio of the indicator value to the threshold value | 0.84 | 1.37 | 0.4 | 0.58 | | |
| Score | 5 | 4 | 5 | 5 | | 4.75 |
| III. The relationship of the budget with GRP | | | | | | |
| | C1 | C2 | C3 | | | Score |
| Threshold value | 38 | 3 | 4 | | | |
| Indicator value | 12.97 | -0.64 | 0.64 | | | |
| The ratio of the indicator value to the threshold value | 2.93 | -0.21 | 0.16 | | | |
| Score | 3 | 5 | 5 | | | 4.33 |
| IV. Indicators of social orientation and budget performance | | | | | | |
| | D1 | D2 | D3 | | | Score |
| Threshold value | 62 | 20 | 100 | | | |
| Indicator value | 66.77 | 105.22 | 93.83 | | | |
| The ratio of the indicator value to the threshold value | 0.93 | 0.19 | 1.07 | | | |
| Score | 5 | 5 | 4 | | | 4.67 |
| V. Budget performance indicators: | | | | | | |
| | E1 | E2 | | | | Score |
| Threshold value | 100 | 100 | | | | |
| Indicator value | 102.41 | 96.01 | | | | |
| The ratio of the indicator value to the threshold value | 0.98 | 1.04 | | | | |
| Score | 5 | 4 | | | | 4.5 |
| Final Budget Security Assessment | | | | | | 4.53 |

Table 6 shows the correspondence of the final score to the level of budget security.

**Table 6.** Compliance of the final score to the level of budget security.

| Score | Level of economic security |
|---|---|
| 4,5 - 5 | Stability zone |
| 3,5-4,49 | Moderate risk zone |
| 2.5-3.49 | High risk zone |
| 1,5-2,49 | Critical risk zone |
| 0.5-1.49 | Catastrophic risk zone |

## 4 Discussion

Thus, based on the analysis, it should be concluded that, in general, the level of budgetary security of the Komi Republic corresponds to the minimum values of the final score corresponding to the stability zone. There are significant risks of lowering the level of budgetary security to a zone of moderate risk. In the stability zone there is a level of budgetary security for the projections “indicators of budget independence”, “and indicators of social orientation and budget efficient”, “indicators of budget execution”, a moderate risk zone corresponds to the level of security for other projections. In general, only one indicator C1 “Correlation of budget revenues to the gross regional product” registered a significant level of risk.

Thus, the main risks of the budget component of the financial and budgetary security of the Komi Republic are associated with insufficient budget revenues and non-fulfillment of the budget for expenditures, which leads to the region not fulfilling some of the measures stipulated by the plan.

In the process of searching for data to calculate indicators of statistical information, the data of Rosstat, Komistat, the Federal Tax Service were used. The calculation of indicators was performed using the program using Microsoft Office Excel. Today, a serious stake in science is placed on the development of intelligent technologies for processing big data, applicable both in marketing research of risks and indicators of the effectiveness of the development of regional economic systems, presented in the works of a number of authors [11-15], and, in our opinion, possible for use in the process of diagnosing threats and indicators of financial and economic security at the regional and national levels.

## 5 Conclusions

The feasibility and effectiveness of the proposed methodology was confirmed by testing this approach on the example of assessing the budgetary security of the subject of the Russian Federation - the Komi Republic using the proposed system of indicators. The analysis was performed on 17 indicators. The developed methodology can be used by state and regional authorities in order to assess existing threats in a timely manner, which allows timely measures to be taken to eliminate them and to prevent consequences harmful to the economy of the region.

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