Research of Budget Risks as a Factor of Influence on the Sustainable Development of Territories

Irina Terentieva*, and *Andrey* Svistunov

Murom Institute, Vladimir State University n.a. A.G. & N.G. Stoletovs, 23 Orlovskaya Street, 602264 Murom, Vladimir Region, Russia

Abstract. This article presents an overview of modern scientific research on budget risks as a factor influencing the sustainable development of territories. Certain aspects of the budget risk category were clarified based on an analysis of the existing conceptual framework of budget risk theory. The main types of budget risks are highlighted and the relationship between them is reflected. The main risk factors of the municipal budget corresponding to each type of risk were also identified. Also, recommendations on the methodology for assessing budget risks are provided. They are based on the use of correlation and regression analysis methods, as well as the simulation modeling of budget risk indicators. This methodological approach will allow for scenario analysis, stress testing of key budget indicators, and improvement of the quality of financial management. This will increase the resilience of budgets to the impact of uncertainty and risk factors.

1 Introduction

Scientific interest in the study of budget risks and their management mechanisms has increased significantly at present. This is due to the need to develop practical recommendations for managing budget risks, ensuring the financial and economic security of territories and their sustainable development under the current conditions of increased uncertainty and instability of the economic environment.

The effectiveness of the budget risk management mechanisms used depends largely on the theoretical development of the budget risk category itself, a comprehensive study of risk factors, and the scientific justification of the budget risk assessment methodology [1].

The topic of budget risks has received wide coverage in the works of domestic and foreign scientists. Some studies have been devoted to the theory of budget risks and their assessment (Gamukin [2]; Solomkoi I., Solomko M. [3]; Omelyohina [4]; Frumina [5]; Kot, Zyryanova, Terekhova [6]; Khanina [7]; Yanov [8]). Other studies have revealed the specificity of budget risks at the territorial level and ways to minimize them (Lebedeva [9]; Korobko [10]; Chernyakova [11]; Gorokhova [12]; Stepanova [13]; Ok, Moo-Seok [14]). Some researchers consider methodological approaches to assessing budget risks at the

* Corresponding author: terentieva-murom@yandex.ru

regional level (Yashina, Pronchatova-Rubtsova [15]; Pazdnikova, Shipitsyna [16]; Cherkasova, Makarova, Gordeyeva [17]; Galukhin, Uskova [18]). However, the problem of developing a science-based methodology for budget risk management has not been fully resolved. In particular, there is no single position in the category of «budget risk» in modern research. Budget risk factors are not well understood. There is insufficient methodological support in the field of real assessment of budget risks, especially at the municipal level [1]. This leads to the need for the further scientific development of these issues and determines the relevance of the study.

2 Materials and methods

This work is a review of modern scientific research on budget risks as a factor influencing the sustainable development of territories. We were guided by the following criteria when choosing a research base on the problems of the article:

– similar research problems have been raised;

– the essence of budget risk is revealed and the classification of budget risks at the territorial level is carried out;

– risk factors of the territory's budget are identified;

– justification of the methodology for assessing the budget risks of the territory.

We also took into account the author's specialization in the problems of budget risks and the level of citation of his articles in this area when choosing the works of a particular author.

This study used different research methods. The classification method was applied to budget risks and budget risk factors. The system analysis method is used to identify the main budget risks and the nature of the relationship between them. The methods of generalization and comparative analysis are used to study the theoretical and methodological approaches for assessing the budget risks of the territory. The logical method and the method of critical analysis were used to study the existing conceptual apparatus of the theory of budget risk.

3 Results and discussion

The category of budget risk is usually associated with the probability of deviation of actual budget indicators from their planned values under the influence of risk-forming factors. Some researchers [13] associate budget risks with deviations of actual budget indicators from their potential values, rather than from the planned values. However, the risk is a consequence of the management decision. All decisions of State and local government bodies are reflected in the budgets they develop. Therefore, it is necessary to compare the actual indicators with the planned ones, and not with the potential ones when assessing budget risk.

Deviations can be both positive (in the case of an increase in actual budget revenues compared to the planned values) and negative (for example, in the case of an increase in the budget deficit). Some researchers associate budget risk with any possible deviations of the actual budget indicators from the planned values [2]. In our opinion, only negative deviations of budget indicators lead to the emergence of budget risk, since the risk category itself means the possibility of loss, failure, or loss.

It is important to determine the budget indicators that will be used to calculate deviations of the actual indicators from the planned ones for the practical assessment of budget risks. Many researchers [3, 9, 11, 12, 19] allocate budget revenues and expenditures as such indicators. Negative deviations of actual indicators from the planned ones are

associated with the risk of non – receipt of income and the risk of underfunding expenses, while positive deviations are associated with the risk of additional budget expenditures. In our opinion, the budget deficit (the risk of an increase in the budget deficit) should also be taken into account when assessing budget risks. A system of three interrelated indicators for assessing budget risks is presented in Figure 1.

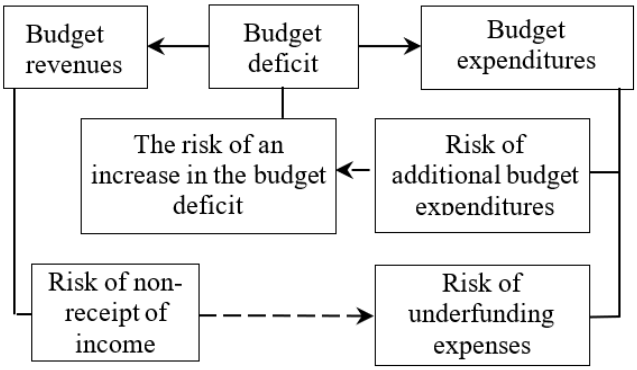

Fig. 1. The main budget risks and the relationship between them [1].

Some researchers [6, 10] admit that budget risks can be formed at any stage of the budget process. In this case, we could talk about the risk of budgeting, the risk of reviewing the budget, the risk of budget execution, and the risk of approving budget statements. However, we will not agree with this. Budget risks are the probability of deviation of actual budget indicators from their planned values. Accordingly, it can be implemented only at the stage of budget execution. In our view, risk factors, rather than budget risks, arise at the remaining stages of the budget process.

Budget risk factors are events and phenomena that affect the deviation of actual budget indicators from the planned values. Risk factors vary depending on the level of the budget system. Table 1 shows the main budget risk factors at the municipal level. They affect the state of the economic environment of the local community, the legal regulation of the budgetary sphere, inter-budgetary relations, the quality of financial management at the municipal level.

Factors such as the size of the average wage, the number of people employed in the economy, and trade turnover can be quantified and predicted. Other factors are not quantifiable. Accordingly, it is impossible to predict their impact on risks (for example, the quality of budget planning, changes in the legal framework) [1].

Since the risk factors may change over time, the assessment of budget risks will also be different at different points in time.

Budget risks are unavoidable. In our opinion, they should not be perceived as an obstacle to improving the efficiency of budget management. Rather, this is one of the reasons for the formation of an effective budget mechanism that can monitor and assess budget risks, as well as take measures to reduce their negative impact. This makes it highly practical to develop a methodology for assessing budget risks and managing them [1].

In most existing studies, the development of a methodology for assessing budget risks is based on statistical or expert methods. For example, Yashina, Pronchatova-Rubtsova chose such statistical indicators as the standard deviation and the coefficient of variation as a tool for assessing the risk of execution of the revenue and expenditure parts of the regional budget [15]. The value of the coefficient of variation allows you to give a qualitative assessment of the risk of budget execution at the following levels: low, medium, high.

Cherkasova, Makarova, Gordeyeva proposes to conduct a risk assessment of the territory's budget in two phases using statistical methods [17]. The first stage involves the use of the method of approximation (smoothing the curve) of a time series of deviations of the actual budget parameters from the planned ones. The second stage involves the calculation of the approximation error, the value of which is used to assess the risk. At the same time, the risk assessment is carried out to budget revenues by the level of risk of their under-receipt and budget expenditures by the level of risk of their under-financing.

Table 1. The main risk factors of the municipal budget.

Indicator	Types of risks	Risk factors
Budget revenues	Risk of non-receipt of income	The decrease in business activity of enterprises (decrease in revenue/trade turnover, financial result, reduction of retail space, etc.)
		Reduction in employment
		Lower average wages
		Reducing the level of tax collection
		Reduction of funding from the higher budget
		Poor quality of budget planning
		Making changes to legal acts during the budget period
Budget expenditures	Risk of additional budget expenditures	The occurrence of unforeseen expenses
		Growth of recipients of social benefits
		The growth of the debt burden of the budget
		Poor quality of budget planning
		Making changes to legal acts during the budget period
	The risk of underfunding budget expenditures	Reduction of budget revenues
		Poor quality of budget planning
		Making changes to legal acts during the budget period
Budget deficit	The risk of an increase in the budget deficit	Influence of factors that lead to the risk of non-receipt of income and the risk of additional budget expenditures

Guluhin, Uskova estimate the risk of sustainability of the revenue base of regional budgets based on the integral index, which includes three private types of risk: risk of default of budget revenues, the risk of imbalance, the risk of default of budget expenditures in connection with the repayment of the debt of the region [18]. At the same time, the gradation of the level of budget risks is based on the hierarchy of groups of budget expenditures that can be reduced with minimal consequences for the socio-economic development of territories.

Pazdnikova, Shipitsyna used the stress-testing method to assess budget risks [16]. The method assumes the calculation of Value at Risk (VaR). VaR is the expected largest size of the deficit that the region's budget can sustain with a given probability. In this case, VaR can be determined by parametric and historical methods.

Expert methods are based on an intuitive and logical analysis of budget risks by specialists and experts. Expert methods are used when the lack of information does not allow you to use other opportunities. The method involves interviewing several independent experts to assess the level of risk or determine the degree of influence of various factors on the level of risk.

However, expert methods are known to have some subjectivity, which can influence the assessment of budget risks. Statistical methods are generally used for historical budget performance data. Therefore, they do not take into account atypical changes in risk factors or the appearance of new risk factors and their impact on budget parameters in the forecast period. Accordingly, this budget risk assessment is very approximate and cannot be a real budget risk management tool [1].

It seems that it would be more effective to use several research methods at the same time to assess budget risks. For example, the assessment of budget risks can be based on the

use of regression and correlation methods of analysis, as well as simulation of budget risk indicators. Regression and correlation methods of analysis allow us to assess the relationship between the indicators of budget risk and the factors affecting them. And the Monte Carlo simulation of budget risk indicators allows you to estimate the magnitude of specific budget risks with a given probability.

Simulation modeling is a series of numerical experiments, usually performed on a computer. It is used to obtain an empirical estimate of the degree of influence of various factors on some results that depend on them. Monte Carlo simulation provides more realistic risk estimates compared to other methods, which is due to the search for intermediate options. The Monte Carlo simulation method is a combination of sensitivity analysis and scenario analysis methods based on probability theory. The result of such a complex analysis is the probability distribution of the possible values of the resulting indicator.

The proposed approach will allow both to assess budget risks and to identify the causes of their occurrence. It will also allow you to model various scenarios of budget execution, taking into account the risk and calculate the expected effectiveness of management measures to reduce budget risks. A computer model of budget risk management can be created based on the proposed approach. It can be used by the authorities as information and analytical support for making management decisions in the budget sphere. The budget risk management model will improve the quality of financial management and the budget's resilience to the impact of uncertainty and risk factors [1].

Thus, this study clarifies certain aspects that characterize the category of budget risk. The main types of budget risks are identified and the relationship between them is reflected. The main risk factors of the municipal budget corresponding to each type of risk are also identified. Also, recommendations on the methodology for assessing budget risks are given. The proposed methodological approach will allow us to identify the causes of risks, as well as to model budget execution scenarios taking into account the risk and calculate the expected effectiveness of management measures to reduce budget risks.

The study expands the theoretical knowledge about the budget risks of the territories. The further direction of research may be directly related to the development of a model of budget risk management at the territorial level, which makes it possible to assess the main budget risks, «play» various scenarios of budget execution, taking into account the impact of risks, perform stress testing of budget indicators and evaluate the expected effectiveness of management measures to reduce budget risks.

4 Conclusions

So, we came to the following main conclusions in the course of the study.

The budget risk can only be discussed in the case of negative deviations of the actual indicators from the planned indicators.

It is logical to compare the actual budget indicators with the planned ones, and not with the potentially possible values, to assess the budget risk.

The study identified the following types of risks: risks of revenues (the risk of non-receipt of income), risks of budget expenditures (risk of additional budget expenditures, the risk of underfunding budget expenditures), and risks of the budget deficit. The paper reflects the relationship between them.

The main risk factors of the municipal budget are identified. They include socio-economic, regulatory, and managerial aspects that affect budget execution.

Budget risks are realized at the stage of budget execution. Risk factors are formed at other stages of the budget process.

Recommendations on the methodology for assessing budget risks are given. Budget risk assessment is based on the use of regression and correlation analysis methods, as well as simulation modeling of budget risk indicators. The computer model of budget risk management will allow performing scenario analysis, performing stress testing of budget indicators, improving the quality of financial management, and the budget's resilience to the impact of uncertainty and risk factors.

References

1. I. V. Terentieva, Econ. and Management: Problem., Solution, **5-2(4)**, 267 (2017)
2. V. V. Gamukin, *Theory of budget risk assessment of regions of the Russian Federation* (Ph.D. thesis, Tomsk, 2016)
3. I. M. Solomko, M. N. Solomko, Bull. of PNU, **2(21)**, 175 (2011)
4. N. V. Omelyohina, J. of Russ. Law, **8(260)**, 77 (2018)
5. S. V. Frumina, Finan. Analytics: Sci. and Exp., **3(345)**, 313 (2018)
6. E. M. Kot, T. V. Zyryanova, O. E. Terekhova, Agr. Bull. of the Urals, **12(203)**, 83 (2020)
7. E. V. Khanina, Newman in Foreign Policy, **52(96)**, 63 (2020)
8. V. V. Yanov, Economic Sci., **166**, 105 (2018)
9. O. I. Lebedeva, *Methodological bases of assessment and management of budget risks: on the example of the regional budget of the Khabarovsk Territory* (Ph.D. thesis, Khabarovsk, 2003)
10. S. A. Korobko, Collection of Sci. Papers SWorld, **4**, 3 (2012)
11. M. M. Chernyakova, *Forecasting the main parameters of the regional budget, taking into account risks (on the example of the Zabaykalsky Krai)* (Ph.D. thesis, Novosibirsk, 2009)
12. D. V. Gorokhova, *Budget risk management of the regions of the Russian Federation* (Ph.D. thesis, Moscow, 2013)
13. E. A. Stepanova, *Risk management of changes in territorial budget revenues* (Ph.D. thesis, Krasnodar, 2011)
14. Ok, Moo-Seok, LGLJ, **4(19)**, 3 (2019)
15. N. I. Yashina, N. N. Pronchatova-Rubtsova, Vest. of Lobachevsky Univer. of Niz. Novg., **4(36)**, 16 (2014)
16. N. P. Pazdnikova, S. E. Shipitsyna, Economy of Region, **3**, 208 (2014)
17. Yu. I. Cherkasova, S. N. Makarova, G. P. Gordeyeva, Bull. of KrasGAU, **11**, 46 (2014)
18. A. V. Galukhin, T. V. Uskova, Econ. and Soc. Changes: Facts, Trends, Forecast, **6(48)**, 162 (2016)
19. V. M. Fedosov, *Budget system* (Center for Educational Literature, Kyiv, 2012)