

Ways of Using Mathematical Analysis Methods to Determine the Impact of Financial Risks on the Economic Security of Enterprises

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Abstract. In modern conditions, effective financial risk management of an enterprise is one of the most demanded types of financial activity for the further functioning of the organization. This is mainly because it enables the evaluation of the financial condition of an economic entity while considering the impact of unpredictable environmental factors, which are challenging to anticipate, particularly when the shifting political landscape necessitates the implementation of unfavorable economic measures against other campaigns. All this entails a negative impact on the internal market of this business entity, which can negatively affect its affiliated structures. The object of the study is an organization - Gazprom Gas Distribution Tambov Joint Stock Company. The subject of the study is the methods of assessing and diagnosing the financial risk of an organization.

INTRODUCTION

Currently, there are many approaches and interpretations to the definition of “financial risk”. We will dwell on some of them below. Domestic and foreign scientific literature interprets the concept of “financial risk” in different ways, there are many different interpretations, let's focus on some below. Thus, T. Coleman considers financial risk as the possibility that realized profits and losses will differ from expected (planned) or projected profits and losses [1]. According to F. Garcia, financial risk acts as the degree of uncertainty that exists regarding the return of future net cash flows generated by specific investments [2]. A. Corelli associates risk with the financial structure of a corporation and defines it as the possibility of a negative result as a result of a specific choice [3].

Summarizing the above-mentioned foreign approaches to understanding financial risk, it can be seen that most authors consider financial risk as a possibility of deviation from the planned profit, loss, and both of these elements. The definitions also note the impact on cash flows, although this is more typical for evaluating innovative projects than for financial condition. It can be noted that these definitions are more general and give a definite idea of what financial risks include.

Now let's look at Russian approaches to understanding “financial risk”. According to Slepukhina Yu.E., financial risk can be understood as any risk that can generate financial consequences for the company [4].

Shapkin A.S. and Shapkin V.A. define financial risks as speculative risks (in which both positive and negative consequences are possible), which are associated with the probability of loss of funds or the risk of not receiving them [5].

A number of authors, represented by Knyazeva E.G., Yuzvovich L.I., Lugovtsova R.Yu. and Fomenko V.V., believe that financial and economic risks include risks that can lead to losses of financial resources, provided that an

economic decision is made [6]. Bogoyavlensky S.B. considers financial risk as a complex system consisting of the risk of external market conditions and the risk of financial planning errors in the enterprise [7]. Pasko E.A. financial risk refers to the risk that arises from instability and losses in the financial market [8]. According to Abasova H.A., financial risk acts as a degree of uncertainty that exists in relation to the return of future net cash flows generated by specific investments [9].

Poleshchuk O.V., Kravchenko O.V. associate risk with the financial structure of the corporation and define it as the possibility of a negative result as a result of a specific choice [10]. According to Fedorov A.V. and Valeev D.R., financial risk is any risk that can generate financial consequences for the company [11].

The definitions also note the impact on cash flows, although this is more typical for the assessment of innovative projects than for the financial condition. It can be noted that these definitions are more general and give a certain idea of what financial risks include.

Avdiysky, V.I., Bezdeneshnykh, V.M. define financial risks as speculative risks (in which both positive and negative consequences are possible), which are associated with the likelihood of loss of funds or the risk of their failure to receive [12]. Author Novak A.V. It has been noted that financial and economic risks include risks that can lead to the loss of financial resources, provided that an economic decision is made [13].

Having assessed Russian approaches to determining financial risks, the following opinion can be formed. It can be seen that the opinions of the authors are similar in the field of understanding this phenomenon. However, the reasons for their occurrence vary, so one group believes that this is purely a consequence of making an incorrect management decision, since the other group claims that the occurrence of financial risks is associated with fluctuations in external financial risk.

METHOD OF RESEARCH

The research employed various general scientific methods, including quantitative and statistical analysis, comparative analysis, problem formulation, and methods for solving it. The study also utilized general scientific abstraction methods. A significant focus was placed on examining the theoretical aspects of assessing financial risks within the enterprise, analyzing the financial condition and risk levels of Gazprom Gazoraspredelenie Tambov JSC, and addressing issues to minimize financial risks.

RESEARCH RESULT

At the initial stage of analyzing the financial condition of PJSC Tambov Energy Marketing Company, we will employ one of the primary methods for assessing the organization's financial situation. This method involves analyzing the solvency of the economic entity, which helps identify key indicators that may signal the potential onset of financial insolvency.

According to the data presented in Table 1, it can be concluded that the organization Gazprom Gas Distribution Tambov JSC had some problems with solvency throughout the analyzed period. The presence of these problems is evidenced by the presence of a payment shortage in two groups of the indicators under consideration. Thus, in the period 2019-2022, the organization under study had a payment shortage of fast-selling assets necessary to repay short-term obligations of the organization, and there is also a shortage of hard-to-sell assets. The size of the payment shortfall for fast-selling products has increased significantly, compared to 2021 by 169,421 thousand rubles [14].

“Gazprom Gazoraspredelenie Tambov” JSC has a payment surplus of slow-selling assets necessary to cover long-term liabilities, which means that the organization we are studying has the opportunity in the short term to repay its long-term obligations with the help of slow-selling assets.

TABLE 1. A model for assessing the liquidity risk (solvency) of the balance sheet using the absolute indicators of gazprom gazoraspredelenie tambov jsc for 2019 – 2022

Active	The value of the indicator, thousand rubles				Passive	The value of the indicator, thousand rubles				Payment surplus (shortfall)			
	2019	2020	2021	2022		2019	2020	2021	2022	2019	2020	2021	2022
The most liquid assets (A1)9	1319	1297	85860	57979	The most urgent obligations (P1)	450323	608617	406326	539231	449004	607320	320466	481252
Fast-selling assets (A2)	434197	416055	499153	598950	Short-term liabilities (P2)	209500	43300	-	146774	-	-	-	-
Slow-selling assets (A3)	109567	98312	124711	132048	Long-term liabilities (P3)	3217808	3184028	3465782	3521061	3108241	3085716	3341071	3389013
Hard-to-sell assets (A4)	5090221	5194272	5285080	5813462	Permanent liabilities (P4)	1635753	1763984	1941039	2232557	3454468	3430288	3344041	3580905
Balance sheet currency	5635304	5709936	5994804	6602439	Balance sheet currency	5513384	5599929	5813147	6439623	-	-	-	-

Further, for a more detailed diagnosis of the financial condition of the Gazprom Gas Distribution Tambov JSC organization from the point of view of its solvency and liquidity, we calculate the following financial coefficients presented in Table 2.

TABLE 2. Analysis of relative indicators of solvency and liquidity of the organization of gazprom gas distribution tambov jsc for 2018-2022

Indicator	The standard	The value of the indicator					Deviation				
		2018	2019	2020	2021	2022	19 to 18	20 to 19	21 to 20	22 to 21	22 to 18
Absolute liquidity ratio	≥ 0.2	0.001	0.002	0.002	0.133	0.08	0.001	0	0.131	-0.053	0.079
Quick liquidity ratio	0.8-1.0	0.775	0.512	0.504	0.902	0.722	-0.263	-0.008	0.398	-0.18	-0.053
Current liquidity ratio	≥ 2.0	0.843	0.643	0.625	1.097	1.15	-0.2	-0.018	0.472	0.003	0.307
The coefficient of total solvency	≥ 1.0	0.253	0.161	0.147	0.245	0.863	-0.092	-0.014	0.098	0.618	0.61

The company can pay off debts through quickly liquid assets.

TABLE 3. Calculation of the amount of sources of funds and the amount of reserves and costs

1. Surplus (+) or shortage (-) of own working capital (ΔOWC)	2. Surplus (+) or shortage (-) of own and long-term borrowed sources of reserves and costs (ΔOLS)	3. Surplus (+) or shortage (-) of the total value of the main sources for the formation of reserves and costs ($\Delta TSFS$)
$\Delta OWS = OWS - C$ 5198137-5813462	$\Delta OLS = OLS - C$	$\Delta TSFS = (TSFS + TSFN - 3)$
-3657470	-72203	-100599
$S = 0; 0; 0$		

The company is completely insolvent and is on the verge of bankruptcy, because the reserves are not secured by sources of financing.

Liquidity and financial stability risks are assessed using relative indicators by analyzing deviations from the recommended values. It is proposed to calculate liquidity and financial stability ratios presented in the table.

TABLE 4. Liquidity ratios and financial stability of the organization jsc gazprom gas distribution tambov for 2022

1. The overall liquidity indicator	$L1 = A1 + 0.5A2 + 0.3A3 / P1 + 0.5P2 + 0.3P3$ 394068.4 / 1668936.3 = 0.24	0,24 < 1 L1 ≥ 1
2. Absolute liquidity ratio	$L2 = A1 / P1 + P2$ 0.08	0.08 < 0.2 L2 > 0.2–0.7
3. The coefficient of "critical evaluation"	$L3 = A1 + A2 / P1 + P2$ 0.96	0.96 > 0.7 L2 > 0.2–0.7
4. Current liquidity ratio	$L4 = A1 + A2 + A3 / P1 + P2$ 1.15	1.15 < 2 The optimal value is at least 2.0
5. The coefficient of maneuverability of functioning capital	$L5 = A3 / (A1 + A2 + A3) - (P1 + P2)$ 1.28	The decrease in the indicator in dynamics is a positive fact
6. The coefficient of provision with own funds	$L6 = P4 - A4 / A1 + A2 + A3$ -4.54	- 4.54 < 0.1
7. The coefficient of autonomy	$U1 = 1300 / 1700$	0.34
8. The ratio of borrowed and own funds	$U2 = 1400 + 1500 / 1300$	1.96
9. The coefficient of provision with own funds	$U3 = 1300 - 1100 / 1200$	- 4.54
10. The coefficient of financial stability	$U4 = 1300 + 1400 / 1600$	0.86

A comprehensive (score-based) assessment of an organization's financial condition involves classifying organizations according to their level of financial risk [15]. This means that each organization can be assigned to a specific class based on the number of points it scores, which is determined by the actual values of its financial ratios. The overall score reflecting the organization's financial condition is presented in Table 5.

TABLE 5. Integral score assessment of the financial condition of the organization jsc gazprom gas distribution tambov for 2022

Financial condition indicator	Indicator rating	Criterion		Conditions for determining the criterion
		Maximum	Minimum	
1. Absolute Liquidity ratio (L2)	20 (0)	0.5 and above (20 points)	Less than 0.1 (0 points)	For every 0.1 point decrease from 0.5, 4 points are deducted
2. The coefficient of "critical evaluation" (L3)	18 (0)	1.5 and above (18 points)	Less than 1 (0 points)	For every 0.1 point decrease from 1.5, 1.5 points are deducted
3. Current liquidity ratio (L4)	16.5 (3)	2 and above (16.5 points)	Less than 1 (0 points)	For every 0.1 point decrease from 2, 1.5 points are deducted
4. The coefficient of autonomy (U1)	17 (0)	0.5 and above (17 points)	Less than 0.4 (0 points)	For every 0.1 point decrease from 0.5, 0.8 points are deducted
5. Own funds ratio (U3)	15 (0)	0.5 and above (15 points)	Less than 0.1 (0 points)	For every 0.1 point decrease from 0.5, 3 points are deducted
6. Financial stability coefficient (U4)	13.5 (13.5)	0.8 and above (13.5 points)	Less than 0.5 (0 points)	For every 0.1 point decrease from 0.8, 2.5 points are deducted

The enterprise belongs to Class 4, which includes organizations with an unstable financial condition. There is a certain level of financial risk when dealing with them. These enterprises have an unsatisfactory capital structure, and their solvency is at the lower limit of what is considered acceptable. Profits are typically absent or minimal.

Thus, financial risks refer to speculative risks for which both positive and negative results are possible. Their peculiarity is the likelihood of damage as a result of such financial transactions, which by their nature are risky.

Financial risk management is based on a targeted search and organization of work to assess, retain, transfer and reduce the degree of risk. A sharp deterioration in indicators, in particular financial autonomy, occurred in 2018. Based on the results of the analysis, it was concluded that the organization faces high financial risks.

But the reason for the increase in the obligations of JSC "Gas Distribution Tambov" is the transaction for the purchase of fixed assets within Gazprom, which are related parties.

In other words, other long-term obligations in the amount of almost 3 billion rubles are such obligations that the creditor will never demand to repay under threat of bankruptcy. We do not know on what terms the contract for the purchase of these fixed assets was signed, what period is set in it. It can be 5 years or 25 years. But this debt in no way increases the financial risks of Gazprom Gazoraspredelenie JSC.

In 2018 and 2017. The following Gazprom Group organizations provided services and supplies to the Company:

1) Gazprom Gazoraspredelenie JSC - lease of gas distribution system facilities in 2018 for the amount of 322,917 thousand rubles, and in 2017 for 298,825 thousand rubles.

2) Gazprom Gazoraspredelenie JSC - sale of fixed assets in 2018 in the amount of 2,910,245 thousand rubles.

3) Gazprom Mezhregiongaz LLC - sale of fixed assets in 2018 in the amount of 331,452 thousand rubles.

The Company is controlled by Gazprom Gazoraspredelenie JSC, is part of a Group of Companies consisting of Gazprom Mezhregiongaz LLC and its subsidiaries and affiliates, and is part of the Gazprom Group of companies consisting of Gazprom PJSC and its subsidiaries and affiliates.

With regard to Gazprom shares, as of 15.06. according to the Moscow Exchange, it amounts to 167.88 rubles. Since January 2023, we have noticed a significant drop in the price of shares. On 05/23/2023, shares fell by 4% after the recommendation of the board of directors not to pay dividends for the second half of 2022.

Taking into account the above, in our opinion, the only way to prevent harm to the energy security of the Russian Federation is to search for new gas markets, in particular to the east, such countries as China, India, Pakistan, Turkey, a number of African countries, etc. since most Western countries have shown themselves to be unscrupulous buyers. This is possible through the modernization of gas pipelines such as the Power of Siberia, the Turkish Stream, and the completion of the construction of the Pakistani Stream.

CONCLUSION

Through the study of the financial condition of the organization and the assessment of financial risks, including the calculation of the variation in indicators characterizing the enterprise's financial state, it was determined that the enterprise has been in a crisis situation since 2018. For 2022, the situation began to stabilize, the company began to stabilize its financial position, while maintaining a crisis situation financial situation. During the financial risk assessment, it was revealed that the following factors determine the highest risk:

1. A high proportion of short-term accounts payable to suppliers and contractors.
2. Low proportion of current assets relative to non-current assets.
3. A high proportion of short-term accounts receivable in the structure of current assets.
4. Low proportion of cash and cash equivalents.

These factors have the most significant impact on the degree of financial risk for a given organization.

Thus, summing up the above-listed analyses, we note that it is necessary to accelerate gasification, since according to Gazprom's plans it will be completed only in 2030. This will help the development of the underdeveloped territories of Russia, in particular Siberia and the Far East, and will also solve the most painful social problem in Russia for this period.

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