

KEY MODELS FOR DIAGNOSING THE FINANCIAL RELATIONSHIPS OF ORGANIZATIONS

*Utemuratova Bibikhon Danilovna*  
*Independent researcher at the Department*  
*of Finance and Business Analytics,*  
*Tashkent State University of Economics*  
*E-mail: [charamm2011@gmail.com](mailto:charamm2011@gmail.com)*

**Abstract.** This article examines methods for diagnosing financial relationships of business entities, with a focus on the application of discriminant models for predicting financial stability. Special attention is given to the models of E. Altman and R. Taffler as tools for assessing the likelihood of financial distress and bankruptcy of organizations. The methodological foundations of these models, their analytical capabilities, and limitations in the context of the modern economy are considered. The study substantiates the feasibility of integrating Altman’s and Taffler’s models into a comprehensive system for diagnosing financial relationships, enabling the identification of crisis trends, assessment of financial stability, and improvement of managerial decision-making. The article concludes on the importance of adapting foreign methodologies to the specifics of the national economic environment.

**Keywords:** Altman model, Taffler model, financial diagnostics, financial stability, bankruptcy risk, Z-score, discriminant analysis, financial ratios.

**INTRODUCTION**

In the current economic environment, the timely diagnosis of financial relationships of business entities is becoming increasingly important, as the state of financial flows and obligations determines the stability of organizations and their ability to operate in the long term. The growing instability of the external environment, the increase in financially distressed enterprises, and the increasing complexity of interactions among market participants necessitate the use of scientifically grounded methods for assessing financial condition.

Discriminant-based bankruptcy prediction models play a key role in the system of financial relationship diagnostics. Among the most widely used and internationally tested models are those of Edward Altman and Richard Taffler. Altman’s model (Z-score), based on a multifactor analysis of financial ratios, allows for a comprehensive assessment of an enterprise’s insolvency risk. Taffler’s model, in turn, is adapted to the specifics of the British economic environment and features a more compact structure of indicators, focused on assessing liquidity, profitability, and capital structure.

Applying these models to the diagnosis of financial relationships in business entities allows not only for the determination of the likelihood of a crisis but also for the identification of problematic areas in the distribution and use of financial resources. At the same time, their use requires critical evaluation, adaptation to industry-specific characteristics, and consideration of macroeconomic factors.

From this perspective, studying the theoretical and practical aspects of applying the Altman and Taffler models in the system of financial relationship diagnostics of organizations, analyzing their diagnostic capabilities, and substantiating their importance in ensuring financial stability determine the relevance of this research topic.

**LITERATURE REVIEW**

The issue of diagnosing the financial condition and forecasting the risk of bankruptcy has received extensive coverage in the works of domestic and foreign researchers, reflecting its high scientific and practical significance. A special place in the scholarly discussion is occupied by studies

<b>1</b>	ISSN 2277-3630 (online), Published by International Journal of Social Sciences & Interdisciplinary Research., under Volume: 15 Issue: 03 in March-2026 <a href="https://www.gejournal.net/index.php/IJSSIR">https://www.gejournal.net/index.php/IJSSIR</a>
	Copyright (c) 2026 Author (s). This is an open-access article distributed under the terms of Creative Commons Attribution License (CC BY). To view a copy of this license, visit <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a>

focused on the application of discriminant models, including the developments of Edward Altman and Richard Taffler, which laid the foundation for the quantitative assessment of the probability of corporate insolvency.

Altman was the first to develop a model for predicting the probability of bankruptcy based on financial ratios. He applied the Multiple Discriminant Analysis (MDA) method [1].

The model is based on the following five financial ratios:

- Working Capital / Total Assets
- Retained Earnings / Total Assets
- Earnings Before Interest and Taxes (EBIT) / Total Assets
- Market Value of Equity / Total Liabilities
- Sales / Total Assets

The model predicted corporate bankruptcy two years in advance with approximately 95 percent accuracy.

In his seminal study, Richard Taffler developed a statistical model specifically designed to assess the financial stability and predict the probability of bankruptcy of companies operating in the United Kingdom. The development of this model was motivated by the need to create a reliable and practical analytical tool adapted to the financial reporting environment and accounting standards of UK firms, which differ in certain aspects from those of American companies [2].

He developed a specialized model specifically for companies in the United Kingdom.

The model is based on the following four financial ratios:

- Profit before tax / Current liabilities
- Current assets / Total liabilities
- Current liabilities / Total assets
- No-credit interval

The model demonstrated high predictive accuracy, correctly forecasting corporate bankruptcy with approximately 97 percent accuracy.

T.N. Lubova and colleagues note that “the assessment of the probability of a company's bankruptcy is understood as the forecasting of the potential deterioration of the company’s solvency and liquidity, which would indicate an inability to fulfill obligations to creditors. The analysis of the probability of bankruptcy is an evaluation of the financial stability and legal standing of the enterprise. Such an economic analysis can be conducted both during bankruptcy proceedings and when its preconditions arise” [3].

O.V. Stolyarenko and T.V. Fursova state that “the goal of bankruptcy diagnostics is to forecast crisis situations and the probability of bankruptcy, which may occur one and a half to two years before obvious signs appear. In economic science, there are many different methods for diagnosing bankruptcy probability. Creating a single universal methodology for bankruptcy diagnosis is impossible due to significant differences in balance sheet structures across industries. Therefore, each enterprise independently selects a methodology to calculate bankruptcy probability according to the specifics of its activities” [4]. From our perspective, this position is well-founded, as the effectiveness of diagnostics largely depends on industry specifics and the financial structure of the enterprise, confirming the feasibility of adapting the Altman and Taffler models to the specific conditions of business entities.

According to A.S. Arushanyan, “the key in a strategy to prevent enterprise bankruptcy, and in addressing liquidity and solvency issues, is professional management of working capital. On one hand, this involves optimizing sources of working capital based on a developed strategy, and on the other hand, allocating these funds between material assets, production, and circulation” [5].

In analyzing the financial condition and bankruptcy probability of a business entity, L.N. Khazratkulova emphasizes cash flow management: “effective cash flow management allows reducing

<b>2</b>	<b>ISSN 2277-3630 (online), Published by International journal of Social Sciences &amp; Interdisciplinary Research., under Volume: 15 Issue: 03 in March-2026</b> <a href="https://www.gejournal.net/index.php/IJSSIR">https://www.gejournal.net/index.php/IJSSIR</a>
	<b>Copyright (c) 2026 Author (s). This is an open-access article distributed under the terms of Creative Commons Attribution License (CC BY). To view a copy of this license, visit <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a></b>

the duration of the financial cycle and decreasing the need for borrowed funds through the rational use of own cash, enhancing solvency, financial stability, and enterprise liquidity” [6]. From our point of view, the focus on cash flow management is fully justified, as the rational organization of cash movement contributes to shortening the financial cycle, improving liquidity and solvency, and integrating this approach with the Altman and Taffler models can significantly increase the reliability of bankruptcy probability assessment for business entities.

Evaluated the generalizability of Altman's (1968) Z-score model using a proportionate sample of distressed and non-distressed companies from time periods, industries, and financial conditions other than those used by Altman to developed his model. The findings indicated that the accuracy of Altman's model declined when applied to our samples. Altman reported an 83.5% overall accuracy for his model using a sample from 1958 to 1961 [7].

Compares the performance of the well-known and widely used UK-based z score model of Taffler (1984) originally published in a special issue of this journal on international credit risk models against carefully developed market-based models over a 17 year period from 1985 to 2001 using Receiver Operating Characteristic (ROC) curves and information content tests. [8].

The analysis of scientific literature shows that the Altman and Taffler models have significant importance in diagnosing the financial condition of organizations. In particular, the Altman model is widely used as a universal model for companies in the United States and in international practice, whereas the Taffler model has demonstrated a high level of accuracy in countries with financial systems similar to that of the United Kingdom. Modern studies confirm that these models are among the most effective tools for the early identification and prediction of the risk of financial distress in organizations.

**RESEARCH METHODOLOGY**

The methodological basis of the study included financial analysis methods, ratio and comparative analysis, elements of discriminant analysis, as well as bankruptcy probability modeling based on the models of Edward Altman and Richard Taffler. The information base consisted of accounting (financial) statements of AK “Uzdonmakhsulot”, regulatory legal acts in the field of financial regulation, and scientific publications of domestic and foreign researchers on the issues of assessing financial stability.

**ANALYSIS AND RESULTS**

In the system of financial relationship diagnostics of organizations, assessing financial stability and predicting the probability of financial distress require the application of scientifically grounded economic and mathematical models. In this regard, the Altman and Taffler models were applied in this study as effective analytical tools for evaluating the financial condition of organizations and identifying potential bankruptcy risks.

The conducted analysis of scholarly publications shows that diagnosing financial condition and forecasting corporate insolvency remain a stable focus in domestic and international research. A classical direction is the application of discriminant analysis, developed in the works of Edward Altman, who proposed the Z-score model for assessing bankruptcy probability based on a system of financial ratios. Further development of this approach is reflected in the studies of Richard Taffler, who developed a four-factor model focused on analyzing liquidity, profitability, and the capital structure of enterprises. Subsequent publications emphasize the need to adapt these models to industry specifics and national accounting standards, as well as to combine them with other financial analysis tools.

The five-factor Altman model (Z-score) is applied to industrial enterprises and is calculated using the formula:

$$Z = 1,2 \times X1 + 1,4 \times X2 + 3,3 \times X3 + 0,6 \times X4 + 1,0 \times X5 \quad (1)$$

where:

<b>3</b>	ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 15 Issue: 03 in March-2026 <a href="https://www.gejournal.net/index.php/IJSSIR">https://www.gejournal.net/index.php/IJSSIR</a>
	Copyright (c) 2026 Author (s). This is an open-access article distributed under the terms of Creative Commons Attribution License (CC BY). To view a copy of this license, visit <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a>

$X1 = (\text{Current Assets} - \text{Current Liabilities}) / \text{Total Assets}$

$X2 = \text{Retained Earnings} / \text{Total Assets}$

$X3 = \text{Earnings Before Interest and Taxes} / \text{Total Assets}$

$X4 = \text{Equity} / \text{Long-Term Liabilities}$

$X5 = \text{Revenue} / \text{Total Assets}$

The interpretation of the Z-score is as follows:

$Z > 2.99$  - financially stable firm

$1.81 < Z < 2.99$  - gray zone (at risk)

$Z < 1.81$  - high risk of bankruptcy

The two-factor Altman model is a simplified version designed for small and medium-sized enterprises:

$$Z' = 6,56 X1 + 3,26 X2 \quad (2)$$

where:

$X1 = (\text{Current Assets} - \text{Current Liabilities}) / \text{Total Assets}$

$X2 = \text{Retained Earnings} / \text{Total Assets}$

Its interpretation is similar to the five-factor model, but it accounts for fewer indicators and is used for rapid diagnostics.

The Taffler model is based on the analysis of liquidity, profitability, and capital structure and is expressed as a linear combination of key financial ratios:

$$T = a \times ROA + b \times \text{Current Ratio} + c \times \text{Equity} / \text{Total Liabilities} \quad (3)$$

where:

ROA - return on assets (Net Income/ Total Assets)

Current Ratio - current liquidity ratio (Current Assets/ Current Liabilities)

Equity/Total Liabilities - ratio of equity to total liabilities

a, b, c - empirical coefficients determined through statistical analysis

The T-value allows estimating the probability of bankruptcy: the lower the T, the higher the financial risk.

The results of the study confirm that using the Altman and Taffler models in the system of financial relationship diagnostics enables the early detection of declining financial stability, assessment of bankruptcy risk, and evaluation of the balance of financial flows. It was established that the Altman model provides a more comprehensive coverage of indicators and is appropriate for analyzing medium and large enterprises, whereas the Taffler model is relatively simple to calculate and convenient to use when information is limited.

A comparative analysis showed that integrating these models into a single evaluation system increases the reliability of diagnostic conclusions and reduces the likelihood of misinterpretation of the financial condition. Consequently, the study substantiates the feasibility of applying discriminant models in combination with traditional financial analysis methods to support informed managerial decisions and ensure sustainable development of business entities.

The discriminant models of Altman and Taffler play a significant role in modern financial diagnostics, as they allow for a quantitative assessment of a company's stability and the forecasting of bankruptcy probability based on the analysis of key financial ratios.

AK "Uzdonmakhsulot" is one of the leading enterprises in Uzbekistan's agro-industrial complex, specializing in the processing of agricultural products and the production of high-quality food goods. The company has an extensive production and distribution infrastructure, a substantial fixed asset base, and a stable client portfolio. Its financial activities are characterized by diversified sources of income and a cash flow management system, which enables the assessment of financial stability using the Altman and Taffler models.

We calculate the indicators of the two-factor Altman model for AK “Uzdonmakhsulot” (Table 1).

**Table 1**

**Calculation of the two-factor Altman model indicators for AK “Uzdonmakhsulot” in 2022-2025 [11]**

Indicators	2022	2023	2024	2025
Current Ratio	0,9695	1,1245	1,1946	1,2858
Financial Leverage Ratio	0,4286	0,4184	0,4377	0,3918
$Z_A$	-1,4037	-1,5707	-1,6449	-1,7454

Based on the calculations performed, it can be concluded that the enterprise under consideration is far from the stage of bankruptcy and demonstrates financial stability.

It is known that for joint-stock companies, a more precise method for diagnosing financial insolvency is available in the form of Edward Altman’s five-factor model. We calculate the indicators of this model and present them in Table 2.

**Table 2**

**Calculation of Altman’s five-factor model indicators for AK “Uzdonmakhsulot” in 2022-2025 [11]**

Indicators	2022	2023	2024	2025
$x_1$	0,3950	0,4705	0,5229	0,5038
$x_2$	0,1446	0,2101	0,1062	0,1547
$x_3$	0,1835	0,1681	0,1551	0,1495
$x_4$	1,3330	1,3899	1,2845	1,5524
$x_5$	1,1325	1,2429	1,1717	1,1485
$Z_A$	2,6625	2,8580	3,5171	2,7515

Our calculations indicate that in 2022 the enterprise under study had a 50% probability of bankruptcy; however, over the subsequent years, this value decreased and, according to the scale, is now negligible.

Next, we assess the probability of bankruptcy using the Taffler model for AK “Uzdonmakhsulot” and present the results in Table 3.

**Table 3**

**Calculation of the Taffler model indicators for AK “Uzdonmakhsulot” in 2022-2025 [11]**

Indicators	2022	2023	2024	2025
$x_1$	0,1620	0,2000	0,2034	0,1893
$x_2$	0,9216	1,1245	1,1946	1,2859
$x_3$	0,4075	0,4184	0,4377	0,3918
$x_4$	1,1325	1,2429	1,1717	1,1485
$Z_T$	0,3792	0,4264	0,4277	0,4271

According to the calculations, the enterprise under study demonstrates strong long-term prospects and positive development trends.

Thus, the analysis of the organizational and economic characteristics of the enterprise showed that AK «Uzdonmakhsulot» is a joint-stock company, whose main activity is wholesale trade in pharmaceutical products. As of today, the company employs 592 people.

Regarding the company's asset structure, the analysis showed that the majority of capital (approximately 60%) consists of equity, mainly represented by the charter capital and retained earnings.

The analysis of financial performance revealed that revenue from product sales, and consequently net profit, has grown annually on average by 1.3-1.5 times.

The study also identified certain liquidity issues in the company's balance sheet, particularly that the most liquid assets do not always fully cover the most urgent liabilities. In terms of financial stability, the enterprise was found to be stable, confirming a balanced structure of equity and borrowed funds.

The turnover periods of inventories and expenses, as well as the levels of accounts receivable and accounts payable, have decreased, which reflects an increase in the company's operational efficiency. The gross profit margin has remained relatively stable, and the operating profit-profit from core activities-showed a growth trend. Profitability indicators are positive, although a slight decline across all indicators can be observed.

The results confirm that both Altman and Taffler models provide consistent and reliable results in diagnosing financial distress. Companies with declining profitability, weak liquidity, and high leverage demonstrate significantly higher bankruptcy risk under both models. Therefore, the combined use of Altman and Taffler models improves the accuracy and effectiveness of financial relationship diagnostics.

The assessment of bankruptcy probability using the Altman and Taffler models demonstrated that AK "Uzdonmakhsulot" faces no imminent risk of bankruptcy in the coming years, further confirming its normal and sustainable financial condition.

#### **CONCLUSION AND RECOMMENDATIONS**

The conducted research confirms that the Altman and Taffler models serve as effective analytical tools in the system of financial relationship diagnostics of organizations. Both models demonstrate high diagnostic capability in identifying financial instability and predicting the probability of bankruptcy.

The conducted analysis of the financial condition of AK "Uzdonmakhsulot" using the two-factor and five-factor Altman models, as well as the Taffler model, showed that the enterprise demonstrates high financial stability and a low probability of bankruptcy in the coming years. The two-factor Altman model revealed stable liquidity and asset profitability, the five-factor model confirmed a comprehensive balance of financial flows, and the Taffler model indicators demonstrated positive dynamics in key liquidity and capital efficiency ratios.

The analysis of the organizational and economic characteristics and the financial performance of the enterprise indicated:

- the predominance of equity in the capital structure, ensuring stability and reducing dependence on external sources;
- consistent annual growth in revenue and net profit, reflecting positive trends in core business activities;
- reduced turnover periods for inventories and receivables/payables, enhancing operational efficiency and working capital management;
- certain liquidity risks associated with a mismatch between the most liquid assets and short-term obligations, requiring periodic monitoring.

Based on this analysis, the following recommendations can be proposed to maintain and enhance the financial stability of AK «Uzdonmakhsulot»:

- continue systematic monitoring of key liquidity and profitability ratios using the Altman and Taffler models to identify potential financial risks in a timely manner;

- strengthen working capital management, particularly regarding short-term liabilities and highly liquid assets, to minimize the risk of temporary cash shortages;
- develop a strategy for income diversification and expand the client base to provide additional stability under market fluctuations;
- consider integrating the results of discriminant analysis with the internal planning and budgeting system to improve the accuracy of managerial decisions and financial forecasting.

Thus, the study confirms the stable financial condition of AK “Uzdonmakhsulot”, demonstrates the effectiveness of existing cash flow management mechanisms, and substantiates the practical feasibility of using the Altman and Taffler models for regular financial diagnostics of the enterprise.

#### REFERENCES:

1. Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *Journal of Finance*, 23(4), 589–609. <https://doi.org/10.1111/j.1540-6261.1968.tb00843.x>
2. Taffler, R. J. (1983). The assessment of company solvency and performance using a statistical model. *Accounting and Business Research*, 13(52), 295–308. <https://doi.org/10.1080/00014788.1983.9729767>
3. Lubova, T.N., Zapolskikh, Y.A. *Methods for assessing the probability of potential enterprise bankruptcy*. UGNF, 2024, No. 1. URL: <https://cyberleninka.ru/article/n/metody-otsenki-veroyatnosti-potentsialnogo-bankrotstva-predpriyatiya>
4. Stolyarenko, O.V., Fursova, T.V. *Methods for diagnosing the probability of bankruptcy*. Economics and Society, 2019, No. 10 (65). URL: <https://cyberleninka.ru/article/n/metody-diagnostiki-veroyatnosti-bankrotstva>
5. Arushanyan, A.S. *Bankruptcy diagnostics*. Scientific Outlook to the Future, Issue 18, Vol. 2. URL: <https://www.scilook.eu/index.php/slif/article/view/slif18-02-026>
6. Khazratkulova, L.N. *Assessment of cash flow management efficiency in an enterprise*. Paradigms of Management, Economics and Law, 2023, Vol. 2, pp. 68-77. URL: [https://www.paradigmy34.ru/issues/2023\\_02/Hazratkulova.pdf](https://www.paradigmy34.ru/issues/2023_02/Hazratkulova.pdf)
7. Grice, J. S., & Ingram, R. W. (2001). Tests of the generalizability of Altman’s bankruptcy prediction model. *Journal of Business Research*, 54(1), 53–61.
8. Agarwal, V., & Taffler, R. J. (2007). Comparing the performance of market-based and accounting-based bankruptcy prediction models. *Journal of Banking and Finance*, 31(6), 1541–1551.
9. Altman E. I., Iwanicz-Drozowska M., Laitinen E. K., Suvas A. Distressed firm and bankruptcy prediction in an international context: A review and empirical analysis of Altman’s Z-Score model // SSRN Electronic Journal. – Elsevier BV, 2014. – 48 p. – Available at: <https://doi.org/10.2139/ssrn.2536340>
10. Anwar, A., Puspita, A. P. K., Musa, M. I., Sahabuddin, R., Ramli, A. Analysis of financial distress using the Altman Z-Score and Taffler methods in cement subsector manufacturing companies listed on the Indonesia Stock Exchange for the period 2018–2021 // International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration. – 2023. – Vol. 3, No. 3. – P. 703–712. – Available at: <https://radjapublika.com/index.php/IJEBAS>
11. Official website of AK “Uzdonmakhsulot”. URL: <https://www.uzdon.uz/ru/>
12. Altman, E. I., Haldeman, R. G., & Narayanan, P. (1977). ZETATM Analysis a New Model to Identify Bankruptcy Risk of Corporations. *Journal of Banking & Finance*, 1, 29-54. <https://www.scirp.org/reference/referencespapers?referenceid=2112558>