

## **APPLICATION OF THE Z-SKORE METHOD TO ANALYSE AND ESTIMATE FINANSIAL RISK IN ENTREPRISES**

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### **ABSTRACT**

At present, as a result of the growing global financial crisis, many companies in Bulgaria are in financial difficulties. This situation raises the possibility of insolvency and consequent bankruptcy. To avoid such unfavorable situations managers must continually analyze and assess the degree of financial risk.

This paper considers a possible way to measure financial risk using the forecasting model z-score method of analysis. This method can indicate future problems and predict company bankruptcy up to two years in the future.

**Key words:** Solvency, financial risk, bankruptcy, z-score method of analysis

### **INTRODUCTION**

In a market economy financial analysis is an essential element of the financial management of companies. The financial status of a company is the main purpose of financial analysis. With its help a great number of problems can be solved, mainly connected with the interests of capital owners, potential investors, creditors, financial managers, etc. The significance of this analysis is determined by the fact that companies operate in a market environment which is dynamic and difficult to predict and is accompanied by various risk-market, exchange, interest rate, financial and other risks.

The analysis of financial status makes it possible to assess the economic health of the company as a whole or its individual functional areas. Financial risk is one of the key components of the financial status. Financial risk is usually associated with the degree of indebtedness resulting from the use of foreign capital in the company. In other words, financial risk is defined as the probability of company's insolvency. The last occurs when the financial subject is unable to meet its necessary payments. The

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main reasons for this are insufficient amount of liquid assets and expected cash incomings within a certain period of time.

When a company falls into insolvency, the probability of its bankruptcy is very high if adequate remedial measures are not taken. To avoid such undesirable situations, managers should continuously monitor and evaluate financial risk. The sources of risk can be analyzed by applying various methods (sensitivity analysis, analysis of scenarios, etc.). Risk can be analyzed by the use of a group of indicators as: *profit volatility* (coefficient of profit elasticity, coefficient of profit variation, standard deviation of profit, etc.), *solvency* (coefficient of solvency, coefficient of financial autonomy, coefficient of liquidity, etc.) and *possibility of risk elimination* by adjusting the speed of cash flows under various investment decisions. Over the last fifteen years a very appropriate method is used in the international theory and practice, which allows managers to identify both financial problems and risk of insolvency (also bankruptcy) on time. This is so called Z-score method of analysis.

The information needed for the application of this method for analysis of financial risk is mainly connected with the accounting records - balance sheets, income statements, etc.

## 1 SPECIAL FEATURES OF Z-SCORE METHOD

The Z-score method of analysis was created in 1968 by Professor Edward Altman. This method synthesizes five (four for some companies) financial indicators (coefficients) and determines the probability of insolvency (and eventual bankruptcy) regarding a given company. The method is universal and applicable to any company. Studies conducted to evaluate the effectiveness of the method show that it provides 95% accuracy in respect of bankruptcy prediction within one year and 70% accuracy within two years.

There are three versions of the Z-score method, which correspond to various types of companies. ***The first version of the model*** (original Z-score model) is applicable to public and non-financial companies. The formula for it is the following:

$$Z = 1,2z_1 + 1,4z_2 + 3,33z_3 + 0,6z_4 + 0,999z_5$$

where:

$Z_1$  - net current assets/total assets ratio;

$Z_2$  - undistributed profit/total assets ratio;

$Z_3$  - profit before interest and taxes/total assets ratio;

$Z_4$  - market price of equity/total liabilities;

$Z_5$  - sales income/total assets ratio.

The degree of financial risk can be assessed by the value of Z-coefficient. There are three intervals for risk assessment:

- If  $Z < 1,8$  there is a high level of financial risk with high probability of bankruptcy;
- If  $1,8 < Z < 2,99$  there is a high level of financial risk but without danger of bankruptcy;
- If  $Z > 2,99$  there is a low level of financial risk (no risk of company's bankruptcy).

*The second version of the model* is recommended for non-public and non-financial companies. The formula for this type of model is:

$$Z' = 0,717z_1 + 0,847z_2 + 3,107z_3 + 0,42z_4^* + 0,995z_5$$

where:

$z_4^*$  - book value of equity/total liabilities ratio.

To assess financial risk the Z values should be interpreted as follows:

- If  $Z' < 1,23$  the level of financial risk is high and the company is facing bankruptcy;
- $1,23 < Z' < 2,9$  the financial risk is increased but there is no danger of bankruptcy;
- $Z' > 2,9$  there is no financial risk for the company (so called safe zone).

*The third version of model* is used for companies in the service sector. Its formula includes only four indicators as follows:

$$Z'' = 6,56z_1 + 3,26z_2 + 6,72z_3 + 1,05z_4^*$$

The fifth indicator is not included in the formula because the assets turnovers of companies differ in particular sectors of the economy. The last makes this indicator an unreliable criterion for evaluation.

Here, the interpretation of Z values as follows:

- If  $Z'' < 1,1$  there is a high level of financial risk and imminent bankruptcy of the company;
- If  $1,1 < Z'' < 2,6$  there is an increased financial risk but without risk of bankruptcy;
- If  $Z'' > 2,6$  company is safe (good financial health).

What characterizes this method is that the weights of indicators included in the formulas are defined as an expert value. These weights are various and give various levels of importance to the indicators. Table 1 presents the various indicators and their weights with respect to the three versions commented on above. It can easily be seen

Table1

Weights of indicators	Indikators					
	Z <sub>1</sub>	Z <sub>2</sub>	Z <sub>3</sub>	Z <sub>4</sub>	Z <sub>4</sub> <sup>*</sup>	Z <sub>5</sub>
Z	1,3	1,4	3,33	0,6	□	0,999
Z'	0,717	0,847	3,107	□	0,42	0,995
Z''	6,56	3,26	6,72	□	1,05	□

that the indicator Z<sub>3</sub> has the highest weight, respectively 3,33; 3,107; 6,72 for the three formulas which

means that the greatest importance is attached to the indicator: assets profitability. The indicators included in the model have the next meaning:

➤ The indicator  $Z_1$  expresses that part of the company's capital which is funded by own sources and long-term external sources. At low value of  $Z_1$  there is an increased risk because the working capital is financed mainly by short-term debts. This leads to difficulties connected with the financing of normal current activity of the company – difficulties with salaries payments, difficulties with supplying of raw materials, etc.

➤ The indicator  $Z_2$  determines the level of the company's self-financing, i.e. it determines this part of assets which is financed by reinvested profit. The low values of this indicator indicate that the company is incapable of self-financing. In such a situation, the company relies on financing by either credit institutions or additional contribution of the owners.

➤ The indicator  $Z_3$  expresses the company's profitability. At low values of this indicator, the current activity of the company is ineffective.

➤ The indicator  $Z_4$  shows the market value of the company which is the multiplication of the market price of a share by the total number of all issued shares. The low values show a large financial debt.

➤ The indicator  $Z_4^*$  applies to the following companies: 1) companies whose shares are not exchange marketable (without established market price); 2) companies which are not stock companies. This indicator is computed by the use of the carrying amount of equity.

➤ The indicator  $Z_5$  measures the ability of the company's assets to generate sales revenues. A low values indicate an ineffective utilization of the assets.

The indicators described above consider various aspects of the financial status of a company and provide a clear and accurate picture of its financial stability.

## **2 ADVANTAGES AND DISADVANTAGES OF THE METHOD**

The Z-score method of analysis has some advantages and disadvantages. The advantages can be generalized as follows:

➤ Z coefficient is a complex one and characterizes the level of financial risk. By using this coefficient the signs of future problems can be identified without the need to analyze multiple indicators. In this sense it is a more precise coefficient leading to clearer conclusions than the study of various indicators.

➤ The obtained final assessment is a value which may be compared with that computed for other companies.

➤ Because Z coefficient is a combination of several indicators, the probability that the obtained results may be influenced by fraudulent information regarding financial statements is minimized. Moreover, each indicator can be used alone to determine the financial status of the company.

➤ The properties of Z coefficient shown above - both measuring the financial stability of company and positioning the company with regard to its competitors – make this method very useful in decision-making regarding investment in the company.

The disadvantages of Z-score method can be summarized as follows:

➤ Z-score method for analysis is mainly applicable for large companies. It is not appropriate to use this method for analysis of companies with small profits or for the analysis of companies which have started their activities recently. In this case, the Z values will be very low but this does not mean that the company will not be in good financial health in the future.

➤ It is striking that the Z-score method does not take into account the indicators of liquidity. Sometimes, in order to assess the potential of the company the business risk should be also assessed. It is defined as the probability of sales and profit reduction. In this case, to supplement the assessment of the financial risk the coefficients of liquidity should be computed - in particular: total liquidity (TL) and absolute liquidity (AL):

TL = current assets/current liabilities;

AL = cash/current liabilities.

These indicators provide information concerning the level of coverage of current debts with circulating capital, respectively with cash in the company. The company is considered to be illiquid for values of the total liquidity under 2 and respectively under 0,5 for the absolute liquidity. For greater precision of the analysis of data, it is necessary to calculate their average annual values. These values can be presented as average chronological values based on the monthly balances:

$$X = \frac{\frac{x_1}{2} + x_2 + x_3 + \dots + \frac{x_n}{2}}{n-1},$$

where:

X - average annual liquidity;

$x_1$  - liquidity on 31st of December of the previous year;

$x_2 \dots x_n$  - liquidity at the end of each month of the current accounting year.

## CONCLUSION

Modern companies operate in competitive conditions and continuously changing market situations. It requires the combined application of many internationally accepted methods for analysis such as: “SWOT and PEST Methods of Analysis”, “Sensitivity Analysis”, “Z-Score Method of Analysis”, etc. Moreover, in implementation of the Z-score method, the z-coefficient should be calculated based on both current and predicted accounting information.

At the same time, to manage the financial risk it is necessary to investigate the factors which influence it. These factors can be divided into objective and subjective. The objective factors (level of economic development, inflation, level of competition,

etc) are difficult to influence. The company's management can only take into account their presence. Influence can be exerted only on subjective factors (capital, financial or material structure, experience of financial experts, etc.). A continuous monitoring regarding the financial risk in all its diversity is necessary.

Only on the basis of such a multifaceted approach may a reliable system of analysis and assessment in respect of the financial stability of the company (in the conditions of dynamics and financial risk) be established.

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