PREDICTIVE ANALYSIS SOFTWARE FOR MODELING THE ALTMAN Z-SCORE FINANCIAL DISTRESS STATUS OF COMPANIES

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ABSTRACT: *Literature shows some bankruptcy methods for determining the financial distress status of companies and based on this information we chosen Altman statistical model because it has been used a lot in the past and like that it has become a benchmark for other methods. Based on this financial analysis flowchart, programming software was developed that allows the calculation and determination of the bankruptcy probability for a certain rate of failure Z-score, corresponding to a given interval that is equal to the ratio of the number of bankrupt companies and the total number of companies (bankrupt and healthy) interval.*

KEY WORDS: *scoring method; bankruptcy risk; predictive flowchart; LabView software.*

JEL CLASSIFICATION: *D50; G32.*

1. INTRODUCTION

An organization may have temporary or occasional difficulties caused by the incapacity of covering claims within a major or accelerate payments in a period of rapid increase in activity. In this case, payment difficulties arise as an expression of a time inconsistent that doesn't affect the company image. Simple solutions can allow crossing and restore the continuity of payments difficulties: obtaining additional terms from suppliers, deferred debts, obtaining short-term loans.

Permanence difficulty of paying obligations is the expression of a structural economic and financial fragility, which can generate restricting, reducing the number

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of employees, management restructuring or very severe cases and loss of the business. The method used by the financial media for their own credit assessment method is "scores" based on the "Z", which allows rapid positioning bankruptcy risk posed by borrowers.

The scoring method calls for consideration of relevant economic and financial indicators, with great power of synthesis of economic phenomena both from a static and dynamic point of view and the importance weight of selected indicators. On this basis and on mathematical relationships between indicators there can be determined a total score, according to which the company in question is assessed in terms of its viability in the competitive environment.

Following the application of the discriminated analysis, the Z score is obtained for each company, which is a linear function of a set of ratios. The distribution of different scores allows distinguishing between „healthy" enterprises from enterprises in difficulty. Z score attributed to each enterprise is determined by means of the following function:

$$Z = \alpha_1 x_1 + \alpha_2 x_2 + \ldots + \alpha_i x_i + \ldots \alpha_n x_n + \beta \qquad (1.1)$$

where: α_i – represents ratios involved in analysis;
x_i – percentage coefficient of each ratio.

2. ALTMAN BANKRUPTCY PREDICTION MODEL

In the financial and economic methods of analysis, the function Z is considered as part of an overall assessment, analysis and critical appreciation supplemented with the following elements: business management, financial management, reporting accountants, relations with creditors, media statements; conditions under which the activity, and so on.

Model		Variables	Acronym	Financial rates/Z score
ATMAN Model	Stock exchange listed companies	Working capital	**WC**	X_1: *Net liquidity assets relative to total capitalization (X1=WC/AT)*
		Total Assets	**AT**	X_2: *Cumulative profitability in relation to total capitalization (X2=RE/AT)*
		Retained earnings	**RE**	X_3: *True productivity of the firm's (X3= EbIT /AT)*
		Earnings Before Interest and Taxes	**EbIT**	X_4: *Gap at which assets can decline in value before they are exceeded liabilities (X4=MVDLT)*
		Market value equity	**MV**	X_5: *The ability of a firm's assets to generate sales (X5=Tov/AT)*
		Debts On Long Term	**DLT**	$Z_{Al}=1,2 \cdot X_1+1,4 \cdot X_2+3,3 \cdot X_3 +0,6 \cdot X_4+0,9 \cdot X_5$
	Stock exchange unlisted companies	Turnover	**Tov**	$Z_{Al}=0,717 \cdot X_1+0,847 \cdot X_2+3,107 \cdot X_3+ 0,42 \cdot X_4+0,998 \cdot X_5$

In economic theory and practice there were several developed analysis models based on score function of which we shall approach Altman model, and investigate their suitability for different types of companies. Following the customization model of bankruptcy risk ratios, further is treated the Altman model which use the score technique and are a five rates depending function, as shown in Table 1.
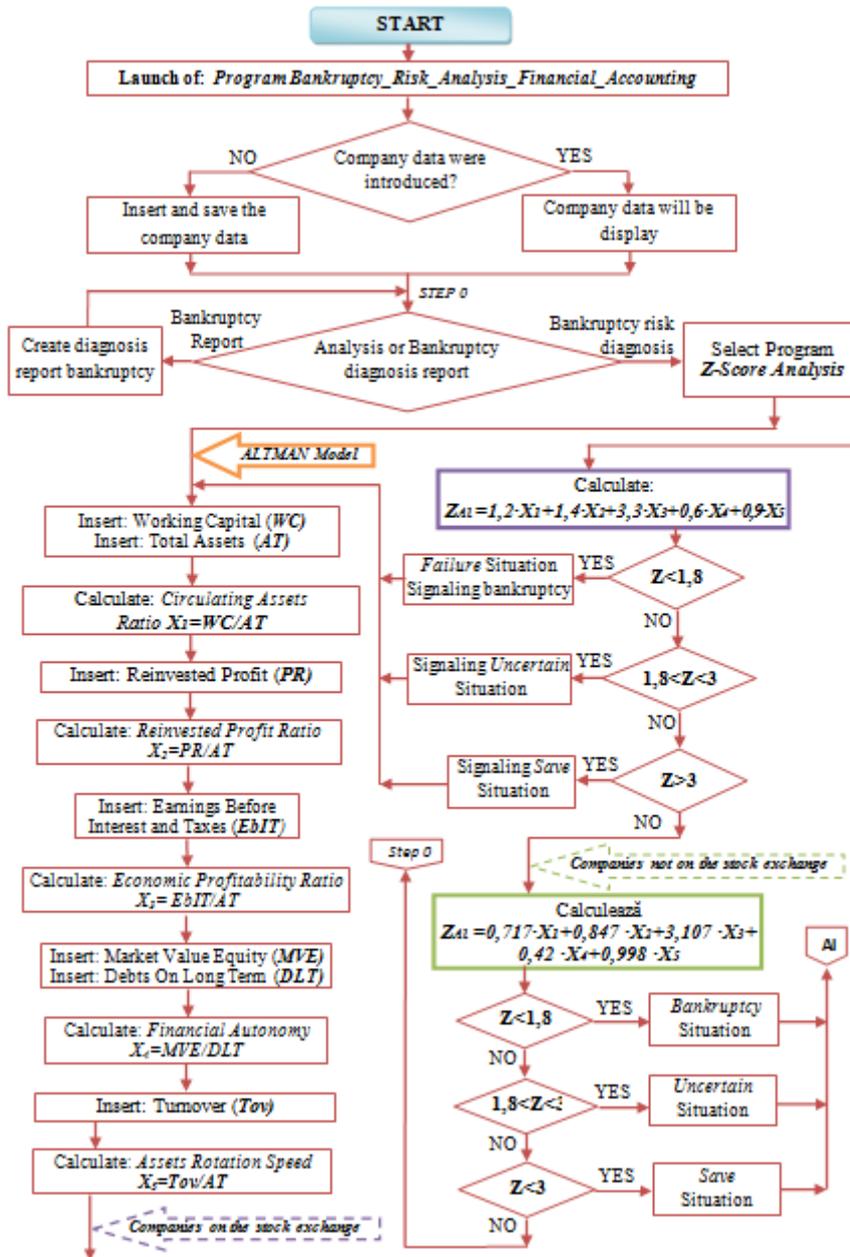
Figure 1. Risk of bankruptcy prediction flowchart using Altman Z-Score

        The following is an example of creating a synthetic flowchart analysis and of bankruptcy risk prediction, which accurately models a method belonging to Altman analyst. The diagnosis flowchart sequentially travels through the programmed steps, in order to calculate the bankruptcy risk indexes required by the chosen method.

        Also, in the prediction flowchart were added subroutines dedicated for interpretations of the obtained results, as shown in figure 1. All programs consist in a few modules linked between them, the end of one representing the start for another.

        This bankruptcy risk prediction flowchart is based on some rates (indicators) determined statistically weighted to certain coefficients in a mathematical model can determine some likely future health of the company. Based on this risk analysis algorithm a software can be develop to allow the initial data entry company to be analyzed, then from 0 label program allows bankruptcy risk analysis itself or create a risk analysis report bankruptcy which can be printed and made available to interested persons. After selecting, the scores analysis program will introduce all the variables required by the Altman method, taking into account the typical firm analyzed of the bankruptcy risk. Depending on the outcome of bankruptcy Z index, the program will display a financially favorable or less favorable situation.

Nr.	Variables	Acronym	Analyzed Period		
			First year	Second year	Third year
1.	Total Assets	AT	173.893.878	189.137.161	211820738
2.	Turnover	Tov	121.495.052	136.028.515	163497747
3.	Debts On Long Term	DLT	14.506.999	4434342	1825211
4.	Working Capital	WC	104.751.871	108154522	126.224475
5.	Earnings Before Interest and Taxes	EbIT	11.863.805	12.424.687	19678661
6.	Retained Earnings	RE	16.077.551	17576961	23724855
7.	Market Value Equity	MV	77.440.000	194898000	438976000

Table 2. The company's real data

        This method is a tool for detecting risk of bankruptcy for a company and its implementation requires observing a group of companies consists of two distinct groups: a group of companies with financial difficulties and a group of companies without financial problems. For each of the two groups established a set of rates and then determines the best linear combination of rates that distinguish the two groups of firms.

3. LABVIEW SOFTWARE FOR FINANCIAL BANKRUPTCY RISK DIAGNOSIS

In the modeling stage, computerization facilitates customization of specific diagnostic analysis model based on information available at this stage. According to these criteria analysis invalidates the model considered irrelevant or supplemented with other criteria analysis not accounted for in the specific model. In this chapter we will determine the company's bankruptcy risk taking into account the rate method. This method results in determining a score function that considers the company's financial difficulties in a period of three years analyzed.

The main information source is the financial performance analysis of profit and loss account plus the balance information. We analyze the probability of bankruptcy using the Altman method and in table 2 are presented the analyzed company real data, whereby software designed to calculate the index Z. From figure 2 it is observed that Z score for analyzed company obtained is 2.95 at the end of the first year analyzed (smooth bankruptcy), the company has a good financial standing, posing a risk of bankruptcy less than 10%, and the trend is widening its favorable situation.
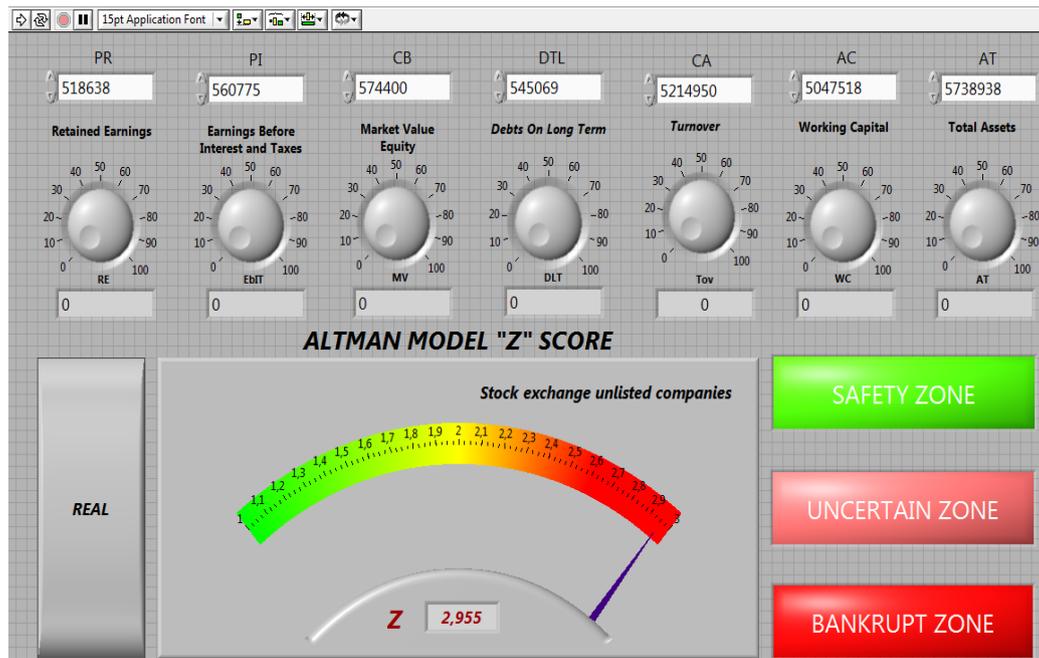
Figure 2. Graphical interface of the preventive diagnostic software based on *Altman model*

To perform this analysis should launch the LabVIEW graphical program designed, developed under financial forecasting algorithm described in Figure 3.
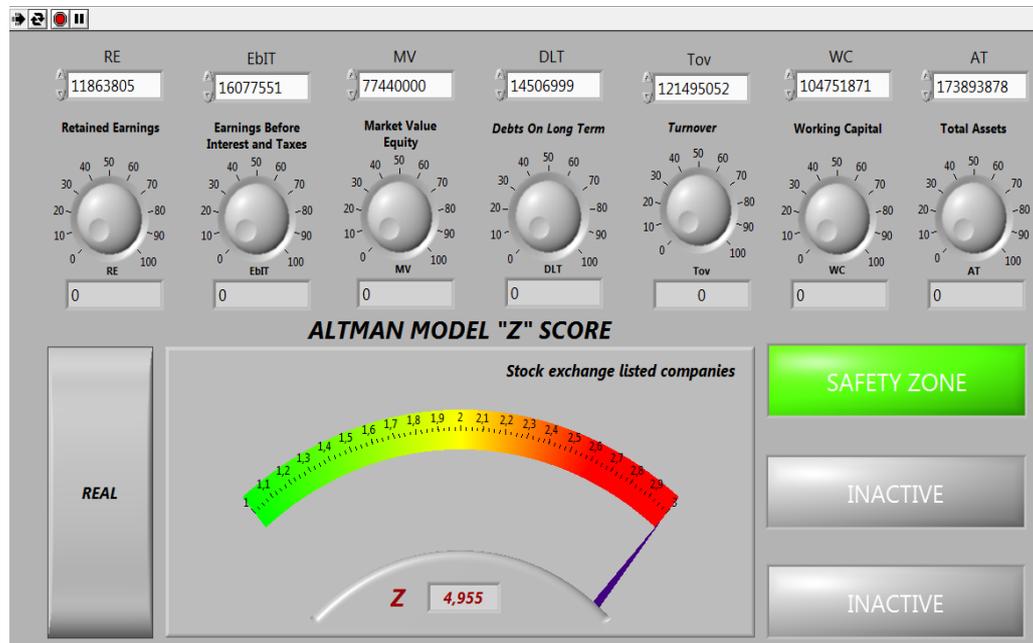
Figure 3. Graphical interface of the preventive diagnostic software based on Altman model (First year)
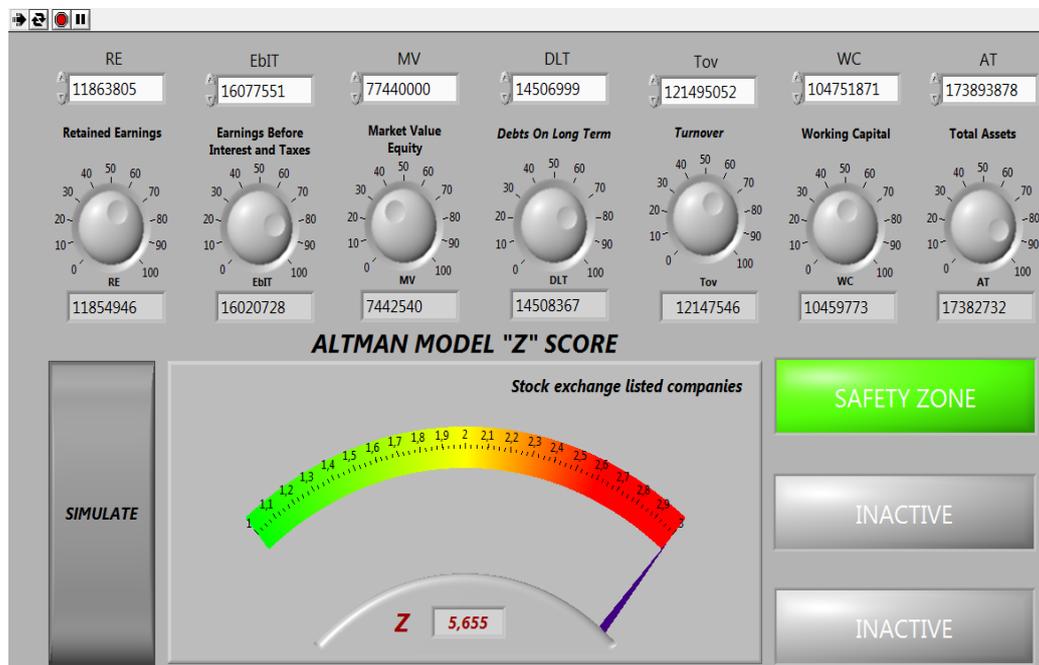
Figure 4. Graphical interface of the preventive diagnostic software based on Altman model (First year – Simulated model 1)

We have used actual values taken from the balance sheet of the company, i.e. the Profit and Loss Account shall be entered in the top of the program. At this stage for the program to automatically calculate Z score index must be select the "Real". Interface shown in figure 4-6 is a software simulation designed, by pressing the "Simulate" each of the 9 variables can be varied between a minimum and maximum n imposed.
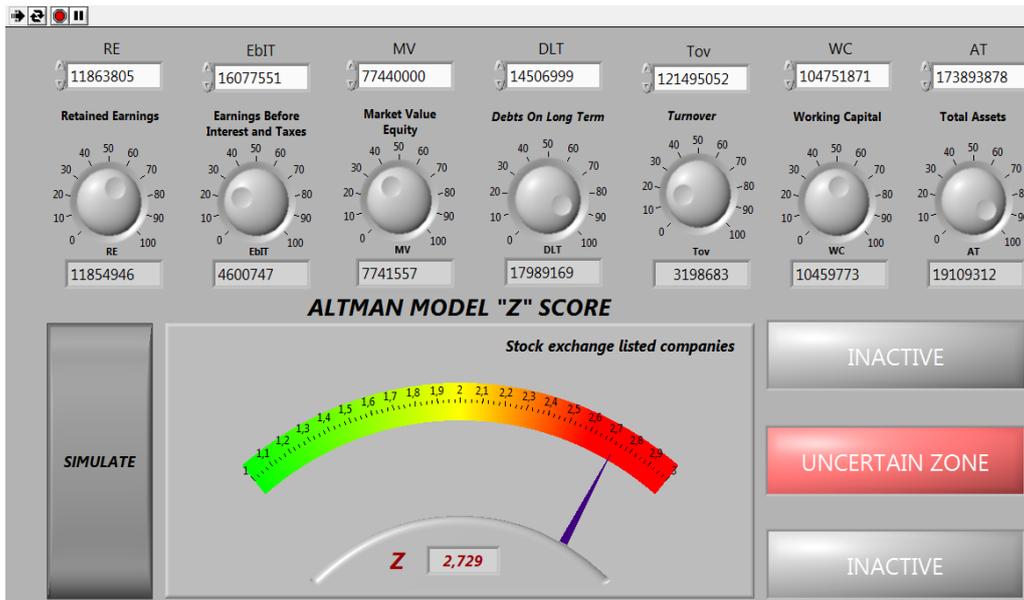
Figure 5. Graphical interface of the preventive diagnostic software based on Altman model (First year – Simulated model 2)

For example in the figure below is simulated a situation where personal expenses wave grow to 130 million, in which case the probability of bankruptcy risk is between 10 and 30%.

The models that are considered in this paper are developed by using specific statistical techniques, namely univariate and multivariate approaches or step-wise multiple discriminate analysis. Step-wise multiple discriminate analyses gives weight to the system of financial ratios used in order to differentiate or discriminate failed enterprises from successful enterprises that are being analyzed. The calculate Z ratio for Altman model is displayed in the center of graphical interfaces using Numeric Indicators. Using the developed graphical program the operator will be able to insert the company variables in the static values. By pressing the "Start" button the program allows modification of these variables between a minimum and a maximum value.

Financial statements may be issued in various forms (in addition to those covered by the legislation in force) and are usually meant to emphasize only certain aspects of the overall financial situation all these purposes based on certain rates and ratios are calculated as that it is possible to compare the different periods of business activity to highlight its trends over time and that these results, obtained in the form of

rates to be comparable with results of other economic entities competing in order to determine the position or its market value.
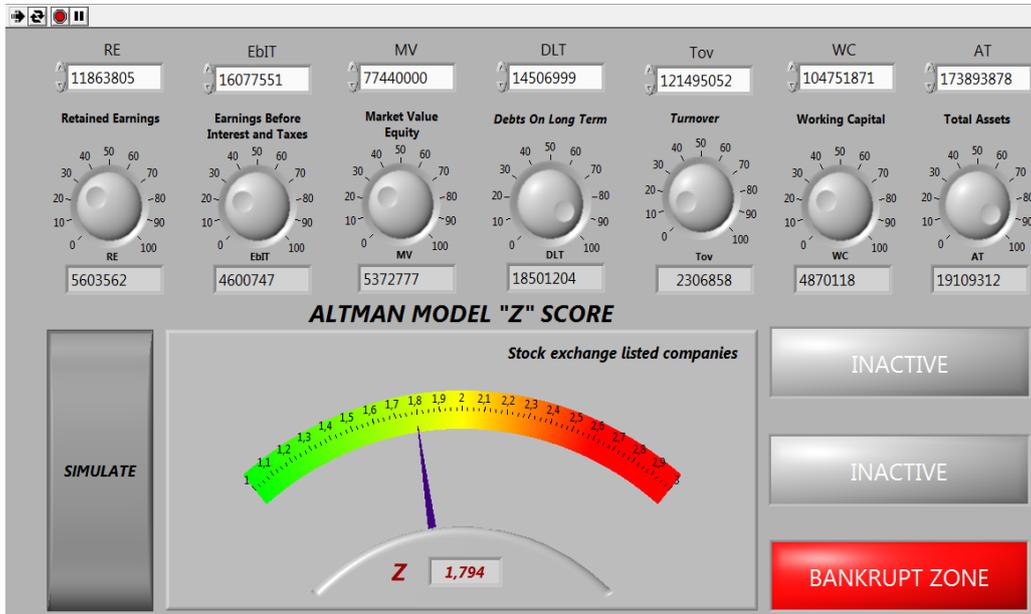
Figure 6. Graphical interface of the preventive diagnostic software based on Altman model (First year – Simulated model 3)
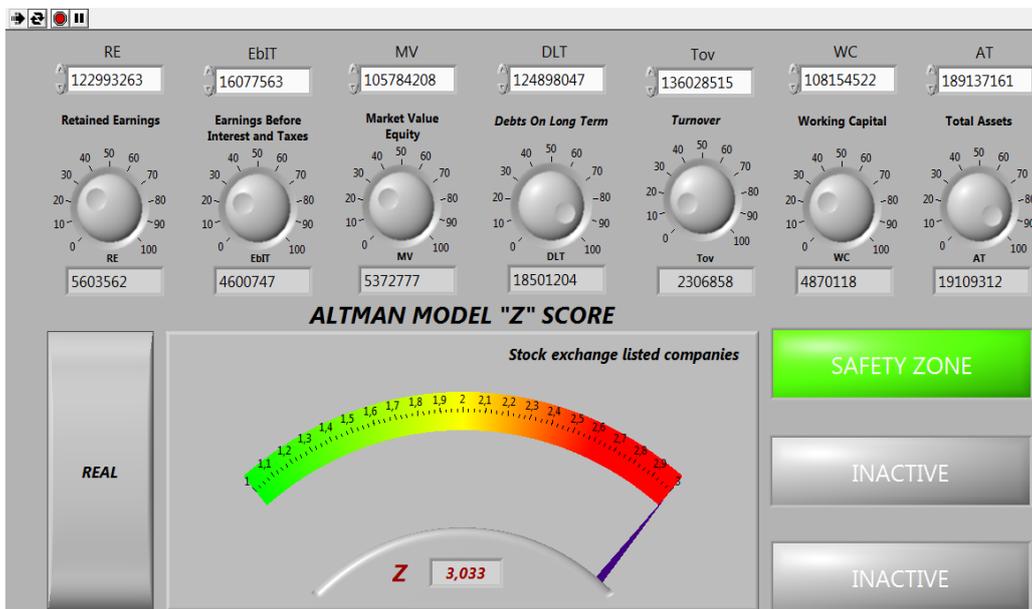
Figure 7. Graphical interface of the preventive diagnostic software based on Altman model (Second year – Real model)

Information that we provide financial analysis are very important and suggestive administrators considered economic entities so that they are able to take preventive measures to improve or maximize profitability by reducing business activity that possible unprofitable activities and balance and financial stability. Detailed analysis, financial statements and information upon which they draw their limited access, which is why speculation appear OTC options, are of particular interest for brokers, and investors tend to transform financial potentialities capabilities economic exercise so that funding be mutually beneficial and low risk.

4. CONCLUSIONS

All analysis models of the bankruptcy risk have at their basis a score function according to which it is determined with approximation whether the company would get bankruptcy or would have performing economic results, in a period immediately following the analysis. The manner used is the statistical technique of analyzing the financial features of normally functioning societies and of the companies with difficulties in economic and financial administration. A company's capacity to adjust the obligations in time is estimated according to specific economic and financial conditions in which they operate. In close correlation with economic risk and financial risk falls to enterprises bankruptcy. Financial risk is a function of debt ratio, financial risk depends on the ratio between fixed costs and variable costs range. Generally speaking knowledge of certain risk rates allows detection of an enterprise failure.

In the paper was modeled a main method of analysis and prediction of bankruptcy risk in using Z-Score Altman method. For bankruptcy risk identification a project was synthesized in order to carry out real or simulated data company variables. A Z-Score prediction system on Altman model was developed by using LabView graphical program. By developing the principle of virtual programs in economical systems, we are opening new opportunities limited by the imagination of the application architect, in order to realize intelligent instruments capable to simulate and to analyze data concerning the prediction of bankruptcy risk. Based on the reasoning that permanently maintain solvency appears as a major constraint, we can conclude that a correct and complete bankruptcy risk diagnosis flowchart, allows removal of the risk of bankruptcy and implicitly avoiding the enterprise disappearing.

Current methods presented in the economic literature used in enterprise level risk analysis uses a number of strategies that have been crystallized in several models Diagnostic and bankruptcy risk analysis: static analysis based on patrimonial balance, functional analysis based on functional balance, dynamic analysis, strategic analysis, analysis of scores etc. Since financial results "degrade" very quickly, is increasingly obvious need for more accurate information about the future, the risk of bankruptcy. As a practical response to these requirements, researchers have been concerned with developing a method for predicting the risk of bankruptcy, called scoring method, which is undoubtedly traditional enrichment analysis by installments.

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