MEASURING THE RISK OF BANKRUPTCY IN THE COMMERCIAL SECTOR IN ROMANIA

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In this paper, the author presents ways to evaluate the rating of commercial entities based on logit model. On this basis were determined the ranges of financial security and was set the probability of failure of these firms in Romania.

1. Introduction

Managerial or financial analysis methods of risk allow measuring past performance of the company, informing at a small extent on its future. Financial results can degrade very quickly over time. The need for more specific information about the future, about the risk of failure becomes increasingly obvious.

As a response to these practical requirements, the risk of failure diagnosis has undergone a significant development due to the use of statistical methods for analyzing the financial situation from a set of rates.

2. Knowledge Level

"Credit scoring" method aims to provide predictive models for assessing risk of failure of an enterprise. This method is based on statistical techniques of discriminant analysis of information provided by the transformation of economic and financial indicators in a score able to predict success or failure of a business.

All forecasts and predictions are based on published financial statements. Appling "credit scoring" method involves observing a set of enterprises consisting of two distinct groups: a group of enterprises with financial difficulties and a group of healthy firms. For each of the two groups is established a set of rates (5-8 financial ratios), the most relevant in terms of predictability of failure, then it's determined the best linear combination of rates to distinguish the two groups of firms. In the failure prediction models are met the most important financial ratios such as return on assets, asset turnover rate, leverage, liquidity, interest coverage, etc.

Following the application of discriminant analysis, for each company is obtained a "Z" score, linear function of a set of rates. The obtained scoring function allows the issuance of a value judgment which estimates the likelihood of risk occurrence in the analyzed firms, allowing distinguishing the healthy firms from the ones in difficulty.

"Z" score assigned to each company is determined by the function:

$$Z = a\,x_1 + a\,x_2 + \ldots + a\,x_n$$

(1)

where:
Z – score function;
x – represents the rates involved in the analysis;
a – is the weighting coefficient of each rate.

In an extensive research study, William H. Beaver used financial indices that are used to avoid failure. The study contains a sample of 79 relatively well-capitalized firms that went failed. For each of these firms another company which didn't go failed was selected, but which was part of that economic segment, and had approximately the same size as those that failed, in the same time period. These samples were used to test the capacity of 30 financial ratios. Average values of the indices for the two samples (failed firms and non-failed firms) were compared over a period of five years before the failure took place. An example of such a comparison, using cash flow/total debt indices is shown in the following figure (Fig. no.1). It may be noted that the average index of firms that failed differs significantly from that of firms that didn't fail.
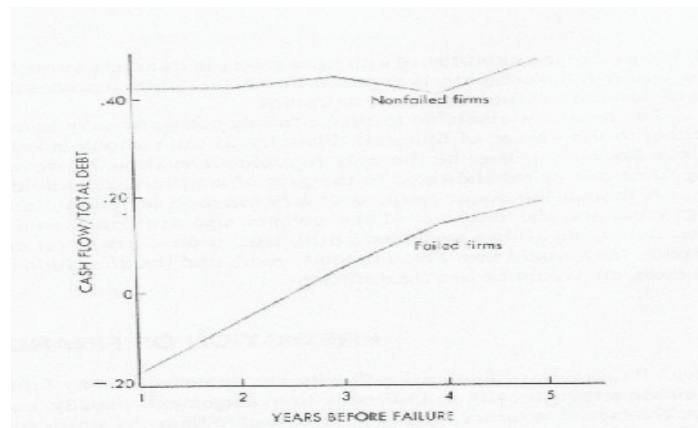

Figure no.1. Comparison between failed firms and non-failed ones

In addition to comparing average values, Beaver tested the samples, using multiple discriminant method and continued his investigations analyzing the samples using probability indices. Not all examined financial ratios predicted failure as good as others; many rates have shown a great power of prediction. In an article about comparison, Beaver investigated the ability to predict the failure in changes in stock market share prices of these companies. He established that the median price of the market shares of failed firms dropped more and more as it was closer to failure, compared to prices of the companies which didn't fail. The largest price decrease for bankrupt firms' shares took place in the final year of research. Beaver concludes that investors adjust the share price to the deterioration condition of the financial situation of companies that fail. Moreover, he identified the causes to be consistent with investors, to assess the probability of failure on the basis of financial indices.

In a similar study, Edward I. Altman went through multiple comparative analyses to prevent failure, using various financial ratios. Altman worked with a sample of 33 corporations that went bankrupt during the period 1946-1965. Like Beaver, he gathered a couple of samples of 33 companies that didn't fail, randomly chosen. He started with 22 financial indicators, selected five of them who have made a good distinction between failed firms and non-failed ones using information dating 5 years back before failure. Unsurprisingly, the prediction accuracy of the model of multiple differences decreased with the number of years before bankruptcy. However, the model could foresee failure quite quickly, up to two years before bankruptcy occurred. Altman also tested the model with a second standard of samples of non-bankrupt or bankrupt companies. Using estimative parameters derived from the original sample, he found that the model presents accurate predictions when it is used in conjunction with the second standard of samples. In Altman's investigation, like Beaver, it was established that the bankrupt firms' financial indicators have deteriorated near bankruptcy, the largest damage occurred between the

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third and second year. Altman concludes that because of analysis of differences, a creditor may successfully predict a potential bankruptcy.

In a similar study with those of Altman's and Beaver's, Edward B. Deakin used two types of samples of 32 failed and non-failed companies during the years 1964-1970. Using multiple discriminant analysis based on 14 indicators, he found that bankruptcy can be predicted with great precision accuracy even three years before bankruptcy occurs. In essence, Deakin confirmed the hypothesis formulated in Beaver's method and found that multiple discriminant analysis has generated more accurate results.

Worldwide, more models of prediction of success / failure of business are therefore known and we will address the following, namely: Altman Model (1968 and 1983); Springate Model (1978); Conan&Holder Model; Chartered Accountants Model (CA Score – 1987); Fulmer Model (1984); Yves Collongues (1) and Yves Collongues (2) Models etc. All these models were built based on the analysis of a given sample of bankrupt companies and profitable for an extended period of time in which the authors of the models have studied the evolution of their results. Characteristic of all models is that they are meant to predict bankruptcy for a particular type of business in terms of size and profile of activity.

Score function values are compared with certain threshold levels, the uncertainty area being located within the two limits. The higher the score function values are, the more competitive the company is, with a good financial position and a low probability of bankruptcy. Thus, in the Altman model Z score is interpreted as follows: $Z \leq 1.8$ – bankruptcy is imminent; $Z > 3$ – good financial standing; $1.8 < Z \leq 3$ difficult financial situations, with relatively high risk of bankruptcy.

Financial models for predicting bankruptcy apply especially to large companies. Economic practice shows, however, that economic failure is a much more acute problem for small firms, where the rate of failure is very high, around 10% per year, according to studies conducted by British researchers. The need to build bankruptcy prediction models for small and medium category became imperative, but lack of financial and accounting information and their reliability has made this a difficult process. Thus, specialists in the field have developed non-financial models for predicting the bankruptcy of small firms: Cooper Model (1991); Reynolds and Miller Model (1989); Lussier Study etc.

These models are based predominantly on non-financial variables, such as managerial experience and competence, the employed personnel's qualification, business relations, marketing, product quality etc. Certain importance coefficients on which the total score function was calculated were assigned to these non-financial factors. Discriminant analysis is used not only to determine the probability of bankruptcy of companies in difficulty, but also for predicting purchases of companies. This new applicability of the discriminant technique arises on the capital market in order to establish key financial characteristics of companies targeted for acquisition or merger. Among the most popular models for the prediction of mergers and acquisitions we mention: Belkaoni Model (1978); Rege Model (1984); Wanslez and Lane Model (1983); Clayton and Fields Model (1991) etc.

Although worldwide, scoring method application had a success rate of around 75-90%, bankruptcy prediction using these models constructed by various foreign authors is difficult to accomplish in developing countries with fragile economies, such as Romania. On the other hand, building specific models to the Romanian companies is also hampered by economic instability and non application of the bankruptcy law, hence the impossibility of clear separation of the profitable and insolvent companies. However, Romanian economists work is in commendable in establishing such models as: Mânecuţă and Nicolae Model (1996)-model proposed for metallurgy industry; B-Băileşteanu Model (1998); Ivoniciu Model (1998); Anghel Model (2001) etc.

As a conclusion, the scoring method is only a tool to detect early the bankruptcy risk or acquisition prediction, and the information value of the score should not be overestimated. Discriminant analysis actually reduces the basic information by selecting the most significant financial ratios considered constant over time, while the firm is an economic and social system that operates in a complex environment with multiple variables to determine its health or weakness. Because of caution it is recommended to pay attention to the development of the score of the same economic sector companies, as well as to complete the diagnosis with traditional methods of analysis.

3. Methodology and Results

Bankruptcy prediction models are generally known as means of assessing the financial "risks" of the companies. In financial theory three types of evaluation of this financial issue are discussed, namely: *univaried* analysis, *multivaried* analysis and *logit* analysis. Univaried analysis assumes that a single variable can be used in the prediction of a certain objective (Cook and Nelson 1998). Univariate analysis identifies factors related to the dangers to which a company is subject undertaking. However the models in this category are assessment procedures of relevant risk (Stickney 1996: 507). Multiple discriminant analysis (MDA) is an attempt to assess the potential conflict between financial ratios using simple variables. The most common used model was proposed by Edward Altman, Professor of Finance at the Stern School of Business at New York. Starting from Altman Model, Cristine Zavgren (Zagren 1985: 19-46) brought improvements to company's bankruptcy prediction, model that was further developed by Andrew William Lo (Lo, 1986) and Claude Paul Stickney (Stickney, 1996: 510), which is the third way of predicting bankruptcy called the logit model.

In the 1980s and 1990s, the trend was to use the logit models against multiple discriminant analysis. More recently, logit analysis was considered to be more an advanced analytical tool like neural network, being found in recent works of Professors Eduard Altman, Giancarlo Marco and Franco Varetto (Marco and Vareto 1994: 505-530).

Applying this model implies the following four steps:
- seven financial indicators are calculated according to Table no.1:

Table no. 1 Logit Table

Financial Ratios	COEFFICIENTS
	+ 0.23883
Inventory/Turnover	- 0.108
Receivables/Inventory	- 1.583
(Cash + Short-term Investments)/Total Assets	- 10.78
Current Assets/Current Liabilities	+ 3.074
Operating Profit/(Total Assets – Current Liabilities)	+ 0.486
Long-term Liabilities/(Total Assets – Current Liabilities)	- 4.35
Turnover/(Working Capital + Fixed Assets)	+ 0.11
Y =	$\sum$ (Coefficient * Financial Ratio)
Bankruptcy probability =	$1/(1 + e^y)$

Source: Stickney Model

- in the second stage, each rate is multiplied by a coefficient which may take positive or negative values;
- in the third stage, partial products are summed;

- finally, the probability of bankruptcy is calculated as the inverse function $(1+ e^y)$.

For the case study we randomly selected 50 Romanian trading companies. The analyzed data is presented in Table no.2.

Table no.2 Evolution of trade balance sheet aggregates

TOTAL Trade	2005	2006	2007	2008	2009
Turnover	175997997	277549677	400274178	269003979	309051020
Stocks	19071750	28547147	66185618	41225041	46754281
Receivables	19356824	28183611	44238594	43874254	58349549
Short-term investments	487554	154140	266289	812893	100
Cash = Cash and bank accounts	5348370	7109355	7772319	3739599	11901476
Total Assets	62178093	89223753	172250511	135484199	175137098
Current Assets= current assets + expenses in advance	46908761	67818142	124124061	95029150	122854279
Current Liabilities=liabilities < a yea r+ deferred income	39848424	54482802	93061933	82825709	93434052
Operating profit	4049446	3740511	8214764	11649816	17392474
Long-term liabilities	13644660	19382101	33387782	19954786	39078705
Working capital	6270746	11744334	28858798	9713743	26004616
Fixed assets	16058923	22996617	50329780	42944747	55698430

Source: Author's calculation

	Financial Ratios				
	2005	**2006**	**2007**	**2008**	**2009**
Stocks/Turnover	0.108363	0,102854	0,165351	0,153251	0,151283
Receivables/Stocks	1.014947	0,987265	0,668402	1,064262	1,248004
(Cash + Short-term investments)/Total Assets	0.093858	0,081408	0,046668	0,033602	0,067956
Current assets/Current liabilities	1.17718	1,244762	1,333779	1,147339	1,314877
Operating profit/(Total Assets-Current Liabilities)	0.181348	0,107669	0,103737	0,221233	0,212874
Long-term Liabilities/(Total Assets-Current Liabilities)	0.611055	0,557904	0,421624	0,378947	0,478302
Turnover/(Working capital + Fixed Assets)	7.881801	7,989121	5,054696	5,108464	3,782613
y=	-0.71446	-0,12087	1,293386	0,484446	-0,24363
Bankruptcy probability=	0.671386	0,530182	0,21528	0,381203	0,560608

It may be noted that according to the Stickney Model the trade sector in terms of the 50 analyzed companies in the industry records a failure probability of over 60% in the first year. Probability decreases in the second year, third year records the best results, the probability of bankruptcy being much lower (21%) compared to the first year.

4. Conclusions

Business risk assessment methods are varied and complex. Currently, there are no significant differences between the methods and used risk assessment tools. The issue of risk and its approach, causes that generate it and effects it determines, are one of the most important issues in order to improve economic agents' activity for achieving high profitability. Risk is part of the daily work and its approach, the preference for risk or risk aversion is a subjective issue, which pertains to perception, analyzing decision factors, quality of management. Deficiencies in the quality of management will inevitably lead to the emergence of risk factors that cause damage to the business, bankruptcy symptoms, and finally business bankruptcy.

Expectations for future developments in the economic environment and the environment in which businesses operate are an essential coordinate in economic-financial analysis. Market players base their decisions on future expectations, which in turn are determined by the decisions they take today, decisions that may induce or not the subsequent emergence of risk factors.

Analysis of profitability of a company (profitability is in fact the purpose of carrying out business transactions) is incomplete if it does not take into account the risk, which may or may not appear until it has reached that return. Any activity involves in its conduct economic risks that economic agents are willing or not to undertake, to the extent that these risks are offset by a corresponding economic return. The risk is related to the parties who are involved in the business, the nature of business or when it comes to investment to the nature of the subject of investment, the resources involved in the conduct of business or investment, the motivations that exist for all those involved in carrying out the activity and its scope.

If the risk structure is known, the causes that have generated it and the effects, the difficulties it poses, they can be controlled, reduced or even eliminated in the process of economic activity. In an economy where competition governs economic life, one of the ways to reduce an investor's risk is to diversify the business portfolio. But business environment is seriously affected by events occurring in the political arena and therefore political instability is itself a generator factor of risk.

It can be concluded that the risk is one of the broadest concepts, difficult to define by investors and whose analysis is imperative for the purpose to ensure the investment process: ensuring a return and making a profit. Each investor is required to quantify the risk entailed in his commitment to a business once he assesses the resources because risk is equivalent to business vulnerability and can occur in all activity sectors.

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