
THE STATISTICAL DESCRIPTION OF BANKRUPTCY RISK – FOLLOWING THE EXAMPLE OF ORSOVA SHIPYARD S.A AND S.C SEVERNAV S.A DROBETA TURNU-SEVERIN

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ABSTRACT

The motivation of the present research is that the profound transformations that the economic and social fields are facing and their rapidity are main elements of the risk manifestations that could affect the activity of economic operators.

No matter the type of activity, the moment of adopting decisions of development, modernization or reorientation, the necessity of identification, evaluation and avoidance or cancellation of risks at a level that might affect the company's activity in a lower degree, becomes compulsory.

In this situation, the importance of analyzing and evaluating the risks of economic agents cannot be contested, being absolutely necessary a correlation with the economic-financial performance condition. This was also a motivation for choosing the subject and it determines the objectives of the article.

Keywords: *Altman model, Conan-Holder model, Z-score*

1. Introduction

The company's capacity to liquidate in time its obligations depends on the concrete economic-financial conditions in which the activity takes place. A company may have temporary or occasional difficulties caused by the non-payment in due time of an outstanding debt or the forwarding of payments in a period of activity development. In this case, payment difficulties appear as a result of a temporary disaccord which does not affect the company's image. Some simple solutions might allow the overcoming of these difficulties and the re-entry of payment continuity: obtaining extra terms from suppliers, postponing financial debts, obtaining short-term loans. (Colasse, 2009)

The permanent difficulties of paying the debts represent the expression of an economic and financial structural fragility, that could generate activity restriction, adjustment of the number of employees, restructuring of the system of management or, in the most serious cases, the company's bankruptcy. (Isaic-Maniu, 2006)

The financial unbalance represents the preliminary phase of bankruptcy and is the effect of the incapacity of liquid current assets to pay the existing current debts on the basis of financial contracts. Some authors consider bankruptcy as being (Jaba, E. et al., 2009):

- *The negative net worth;*
- *The cease of payments to the creditor / the non-payment of creditors;*
- *The incapacity of paying the debts;*
- *The non-payment of equities for preferential shares.*

The causes of bankruptcy are various (Isaic-Maniu, 2006):

- *The management's inefficiency*, which seems to be the cause for more than 50% of the cases of bankruptcy. The main managerial errors would be: misleading financial consultancy; lack of communication with the employees; the loss of control on costs; inappropriate marketing politics; super capacity of production etc.
- *Internal failures*: non-qualified workforce; the loss of important projects; the deterioration of image; frauds; more wastes than the maximum admitted level.;
- *External factors*: competition; the company's life cycle; it is well known that all products, services and even enterprises have a limited life duration; economic recession; calamities etc.

The state of financial difficulty of an entity can be considered as a preliminary state to bankruptcy when the entity becomes incapable of paying the debts from current operations or former engagements that came to their term and might affect the activity's continuity. (Vintilă et al., 2012)

The bankruptcy issue is among the most important problems for investors, shareholders or competitive companies, the issue being part of the decision making process and also of the development of the company's strategies. Regarding this problem, investors are the most interested in a possible bankruptcy of a company, while the competitive firms can develop new marketing strategies in order to influence the market, if a big company collapses. From this point of view, the prediction of bankruptcy becomes necessary, but is a difficult to achieve objective. (Colasse, 2009)

The necessity of approaching the issue of risks on the level of economic agents is not a new problem to discuss.

The appreciation and evaluation of financial health of an entity regarding the financial-accounting diagnosis require the evaluation of risks that are involved in the activity, risks that might highlight its fragility (vulnerability), or foreshadow bankruptcy (insolvency) that threatens its survival (perenniality). The concept of risk appears to be linked to the financial strategy of the enterprise, of the capital cost (ownership equity or borrowed capital) and may be evaluated through the operating risk and financial risk, which express a state of difficulty that characterizes its vulnerability through the productivity fluctuation at the variations of the activity's capacity. (Vintilă et al., 2012)

The bankruptcy risk (insolvency) expresses the possibility of emergence of the incapacity to pay all outstanding debts as a consequence of closing the previous taxable years with losses that totally ran down the ownership equity.

Onofrei et al. (2012) state that the Altman model can be used on economies such as "Great Britain, Australia, Canada, Finland, Germany, Israel, Norway, India and South Korea", having an accuracy of more than 80%. They used a set of data made of 100 companies, with relevant results for just 52 of them, this meaning a total accuracy of the model of 52%.

Rascolean et al. (2012) developed a software in which they implemented the Altman model that predicts the area (grade) of bankruptcy for a company, using the financial reports of the model. They started from the assumption that the Altman model is widely used, tested, with very accurate results and that a function for calculating the Z-score is necessary.

The calculation of a score-function is based on a series of financial rates obtained on certain groups of enterprises that behaved in different ways concerning bankruptcy. There are many more scoring methods of evaluation and early prediction of the bankruptcy risk, but we emphasized and analyzed in our research the Altman model and the Conan-Holder model.

2. Research methodology

In this empirical study, we have analyzed the bankruptcy risk for Orsova Shipyard S.A. and S.C. Severnav S.A. Drobeta Turnu Severin, using two statistic methods: the Altman model and the Canon-Holder model.

These methods are based on the scores' method, more exactly, on a range of indicators statistically determined, which can define with certain probability the future state of health of the analyzed companies.

2.1. Research materials and information processing methodology

2.1.1. Sources of information

In the present research, the necessary financial-accounting information of Orsova Shipyard S.A. and S.C. Severnav S.A. Drobeta Turnu-Severin, have been obtained from various sources:

- Internet websites that provide information regarding the stock exchange, such as: : www.bvb.ro or www.kmarket.ro from where we took a part of the financial-accounting information on the basis of balance-sheets, of the profit-and-loss account and of the annotations;
- Internet websites that provide financial-accounting information processed on the analyzed companies, such as: www.snorsova.ro (for Orsova Shipyard S.A.) and www.severnav.ro (for S.C. Severnav S.A. Drobeta Turnu-Severin);

2.1.2. The information processing methodology

The scores' method has as objective the providing of certain models necessary to the evaluation of the bankruptcy risk of an enterprise. This method represents a statistic method which helps to establish some characteristics on the basis of observations of an object, phenomenon or process. (Jaba, E. et al., 2009)

The results obtained through this method allow both to describe in a synthetic way the characteristics of powerless companies and to emphasize the bankruptcy risk.

For each analyzed enterprise, after applying the discrimination analysis, a Z score is obtained, according to set of rates,. The distribution of different scores allows to distinguish healthy companies from the weak ones.

The Z score assigned to each enterprise is determined by the following function (Vintilă et al., 2012):

$$Z = a_1 * x_1 + a_2 * x_2 + \dots + a_n * x_n, \quad (1)$$

Where:

x_i = represents the rates involved in the analysis;

a_i = represents the weighing factor for each rate.

The estimated discriminant function represents the straight line that separates in the most correct way the companies that hit the skids, on one side, from the ones that don't face bankruptcy, on the other side.

2.1.3. Statistic models

In this research we made an evaluation of the bankruptcy risk by using two statistic methods. The Altman model, implies the calculation of five variables of the partial financial state of a company, variables that when replaced in a formula, generate an indicator named „Z score” and which allows the estimation of the bankruptcy state of the entity.

The other foreign statistic method that we used was the Conan-Holder model, which is based on „liquidity-exigibility” financial rates.

➤ *The Altman model*

The Altman statistic model represents one of the first score models used in the analysis of the bankruptcy risk that allowed the prediction of 75% of the bankruptcy cases, 2 years before they had been produced.

The function used by Altman is the following (Altman, 1968):

$$Z = 1,2 * X1 + 1,4 * X2 + 3,3 * X3 + 0,6 * X4 + 0,999 * X5, \quad (2)$$

Where:

$X1 = (\text{Current assets})/(\text{Total assets});$

$X2 = (\text{Self-financing})/(\text{Total assets});$

$X3 = (\text{Operating result})/(\text{Total assets});$

$X4 = (\text{Ownership equity})/(\text{Short term debts});$

$X5 = (\text{Rate of turnover})/(\text{Total assets}).$

The indicators show that their levels are better when they have a higher absolute value. From this point of view, the Z score is interpreted as follows:

If $Z < 1,8$; then bankruptcy is imminent;

If $Z < 1,8$; then the financial position is difficult, performances are diminished and very close to the state of bankruptcy;

If $Z > 3$, then the financial position is good.

➤ *The Conan-Holder model*

The Conan-Holder statistic model is applied for manufacturing companies, transport or building companies, with a number of employees between 10 and 500.

The model presents the following score function (Conan et al., 1979):

$$Z = 0,24 * X1 + 0,22 * X2 + 0,16 * X3 - 0,87 * X4 - 0,1 * X5, \quad (3)$$

Where:

$X1 = (\text{Gross operating surplus})/(\text{Total debts});$

$X2 = (\text{Long-term capital})/(\text{Total liabilities});$

$X3 = (\text{Current assets} - \text{Stocks})/(\text{Total liabilities});$

$X4 = (\text{Financial expenses})/(\text{Rate of turnover});$

$X5 = (\text{Personnel expenses})/(\text{Gross added value}).$

From this point of view, the Z score is interpreted as follows:

If $Z \leq -0,05$, failure results;

If $-0,05 < Z \leq 0,04$, a danger results;

If $0,04 < Z \leq 0,1$, an alert results;

If $0,1 < Z \leq 0,16$, a good situation results;

If $Z > 0,16$, very good situation results.

Considering this criteria, the informational valences of the scores' method must not be overestimated, fact that emphasizes the decreasing of main information through the discriminant analysis, on the basis of the most significant rates which are considered to be constant in time.

2.2. Analysis of the bankruptcy risk

The analysis of the bankruptcy risk for the analyzed companies reflects a major importance for various business partners among which we mention (Barbuță-Mișu et al., 2010) :

- *investors*, who have as an objective the knowingness of analyzed companies before investing owned capital.
- *shareholders*, who are interested in protected their invested capital and in obtaining dividends;
- *clients, suppliers*, who aim to establish relations with safe companies which can comply with their contractual terms;
- *banks*, which are concerned with the quality of credit portfolios;
- *creditors*, interested in recovering the capital they offered as loan.

There are many more methods of evaluation for the bankruptcy risk, each one of them highlighting different aspects.

After making calculations, we emphasized the evolution of the bankruptcy risk, using a series of specific indicators.

Table no. 1 Analysis of the evolution of bankruptcy risk – Altman model - Orsova Shipyard S.A

Variables	Orsova Shipyard S.A				
	2009	2010	2011	2012	2013
$R_1 = \frac{\text{Current assets}}{\text{Total assets}}$	0,46	0,49	0,56	0,58	0,56
$R_2 = \frac{\text{Self-financing}}{\text{Total assets}}$	0,16	0,13	0,03	0,04	0,02
$R_3 = \frac{\text{Operating result}}{\text{Total assets}}$	0,19	0,19	0,08	0,03	0,06
$R_4 = \frac{\text{Ownership equities}}{\text{Total debts}}$	7,71	12,48	7,87	4,03	5,21
$R_5 = \frac{\text{Rate of turnover}}{\text{Total assets}}$	0,97	0,63	0,60	0,51	0,56
Z score - function	6,99	9,51	6,29	3,77	4,58

Source: Own projection considering the information obtained from Orsova Shipyard S.A. during 2009-2013

Table no. 2 Analysis of the evolution pf bankruptcy risk – Altman model - S.C Severnav S.A Drobeta Turnu-Severin

Variables	S.C Severnav S.A Drobeta Turnu-Severin				
	2009	2010	2011	2012	2013
$R_1 = \frac{\text{Current assets}}{\text{Total assets}}$	0,72	0,42	0,22	0,15	0,17
$R_2 = \frac{\text{Self-financing}}{\text{Total assets}}$	0,45	0,34	0,19	0,12	0,02
$R_3 = \frac{\text{Operating result}}{\text{Total assets}}$	0,43	0,35	0,18	0,14	0,01
$R_4 = \frac{\text{Ownership equities}}{\text{Total debts}}$	0,20	0,85	2,73	3,37	2,98
$R_5 = \frac{\text{Rate of turnover}}{\text{Total assets}}$	1,02	0,56	0,86	0,39	0,29
Z score - function	4,05	3,20	3,62	3,22	2,34

Source: Own projection considering the information obtained from S.C. Severnav S.A. Drobeta Turnu-Severin during 2009-2013

Table no. 3 Analysis of the evolution pf bankruptcy risk – Conan-Holder model - Orsova Shipyard S.A

Variables	Orsova Shipyard S.A				
	2009	2010	2011	2012	2013
$R_1 = \frac{\text{Gross operating surplus}}{\text{Total debts}}$	2,51	3,03	1,23	0,69	0,76
$R_2 = \frac{\text{Long-term capitals}}{\text{Total assets}}$	0,87	0,92	0,88	0,80	0,83
$R_3 = \frac{\text{Current assets}-\text{Stocks}}{\text{Total assets}}$	0,13	0,19	0,23	0,15	0,17
$R_4 = \frac{\text{Financial expenses}}{\text{Rate of turnover}}$	0,02	0,04	0,06	0,05	0,02
$R_5 = \frac{\text{Personnel expenses}}{\text{Added value}}$	0,51	0,50	0,57	0,48	0,55
Z score - function	0,74	0,87	0,41	0,27	0,31

Source: own projection considering the information obtained from Orsova Shipyard S.A during 2009-2013

Table no. 4 Analysis of the evolution pf bankruptcy risk – Conan-Holder model - S.C Severnav S.A Drobeta Turnu-Severin

Variables	S.C Severnav S.A Drobeta Turnu-Severin				
	2009	2010	2011	2012	2013
$R_1 = \frac{\text{Gross operating surplus}}{\text{Total debts}}$	0,57	0,68	0,84	0,59	0,14
$R_2 = \frac{\text{Long-term capitals}}{\text{Total assets}}$	0,14	0,49	0,71	0,76	0,70
$R_3 = \frac{\text{Current assets-Stocks}}{\text{Total assets}}$	0,07	0,03	0,04	0,01	0,02
$R_4 = \frac{\text{Financial expenses}}{\text{Rate of turnover}}$	0,003	0,005	0,001	0,024	0,021
$R_5 = \frac{\text{Personnel expenses}}{\text{Added value}}$	0,37	0,30	0,43	0,48	0,69
Z score - function	0,14	0,24	0,32	0,24	0,10

Source: own projection considering the information obtained from S.C. Severnav S.A. Drobeta Turnu-Severin during 2009-2013

In the case of Orsova Shipyard S.A. and S.C. Severnav S.A. Drobeta Turnu Severin, indicators are presented in Table no. 5:

Table no. 5 Determining bankruptcy risk

Indicators		The analyzed period of time				
		2009	2010	2011	2012	2013
Altman model – score function	<i>Orsova Shipyard S.A</i>	6,99	9,51	6,29	3,77	4,58
	<i>S.C Severnav S.A Drobeta Turnu-Severin</i>	4,05	3,20	3,62	3,22	2,34
Conan-Holder model – score function	<i>Orsova Shipyard S.A</i>	0,74	0,87	0,41	0,27	0,31
	<i>S.C Severnav S.A Drobeta Turnu-Severin</i>	0,14	0,24	0,32	0,24	0,10

Source: Own projection on the bais of data from Orsova Shipyard S.A. and S.C. Severnav S.A. Drobeta Turnu-Severin, during 2009-2013

According to the Altman model:

For Orsova Shipyard S.A., durig 2009-2013, we draw the following conclusions:

- The value of the score function, superior and increasing compared to the minimum limit 3, renders the company a favourable financial position, without any bankruptcy risk;
- The company is solvable, creditworthy for bankers, who have the possibility to benefit from loans, as the bankruptcy risk is non-existent.

For S.C. Severnav S.A. Drobeta Turnu-Severin:

During 2009-2012:

- The value of the score function, superior and increasing compared to the minimum limit 3, renders the company a favourable financial position, without any bankruptcy risk;
- The company is solvable, creditworthy for bankers, who have the possibility to benefit from loans, as the bankruptcy risk is non-existent.

In 2013:

- The value of the score function, inferior and decreasing compared to the minimum limit 3, renders the company a disadvantageous position.
- The company is not solvable and cannot benefit from loans, as bankruptcy risk is existent.

According to the Conan-Holder model:

For Orsova Shipyard S.A., during 2009-2013, we draw the following conclusions:

- The value of the score function, superior compared to the minimum limit 0.16 and increasing from 0.74 to 0.87 during 2009 and 2010, followed by a decrease until the end of the analyzed period, also superior compared to the minimum limit 0.16, renders the company a favourable financial position;
- The company is solvable and can benefit from loans, as bankruptcy risk is non-existent.

For S.C. Severnav S.A. Drobeta Turnu-Severin, during 2009-2013, we draw the following conclusions:

- The value of the score function during 2009-2013 has inferior values compared to the minimum limit 0.16, fact that reflects certain financial difficulties for the analyzed company;
- The company is not solvable and cannot benefit from loans, as bankruptcy risk is existent.

3. Recommendations and Concluding Remarks

The importance of predicting bankruptcy and understanding the economic failure is afterwards a pragmatic issue. The direct costs of insolvency or bankruptcy are decreased compared to the losses that may be registered by shareholders/creditors as a result of the decrease of the company's value decrease.

Also, indirect costs such as the losses form managers, business partners, financial institutions, state institutions etc. are considerable. All these aspects have been strongly felt on the Romanian market in the latest years. Any progress in identifying the causes and in predicting bankruptcy can minimize the implied costs.

Taking into account the actual economic context, it is a real challenge trying to build a score function for predicting the bankruptcy of Romanian companies, mainly because of the bankruptcy process that has other coordinates in Romania compared to the biggest part of the countries which benefit from developed Z-score methodologies.

The accounting methods (quantitative and analytical) are used for comparative analysis in time, in order to estimate the evolution of the future activity. In this respect, the analysis of the company's capacity to be solvable and to avoid bankruptcy aims at the financial balance on the basis of financial working capital, that margin of financial security which ensures long-term and short-term payment capacity as well as the mentioned solvability-liquidity rates.

The study of the causes of bankruptcy led to the conclusion that bankruptcy is not a brutal phenomenon, imputable only to conjectural fluctuations, but is a result of a progressive depreciation of the financial status, the insolvency risk being predictable some years before payments cease.

The permanent depreciation of the companies' results, the difficulties they are facing and which are not only financial ones, have provided the financial analysis with a series of investigations extremely useful for finding certain methods of precocious detection and prediction of the bankruptcy risk subsequent to financial difficulties.

As a conclusion, the causes that may lead to bankruptcy are numerous and aim at the decrease of activity, of margins and profitability rates, specific problems linked to treasury, management, an also accidental causes of the bankruptcy of certain clients, the decrease of markets, illiquidity etc.

Many studies in which models were tested take into account much more consecutive financial years and prove the long-term depreciation of their accuracy. That is why we may conclude that for every economy (even economic area) is the estimation of some new Z-score coefficients from the Altman model is necessary, idea that is subject to future research.

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