BANKRUPTCY RISK ASSESSMENT FOR THE ENERGY COMPANIES LISTED ON THE ROMANIAN CAPITAL MARKET

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ABSTRACT: *Bankruptcy risk assessment model involves finding a set of economic and financial indicators, which not only have the capacity to show the current financial situation of a company but can also give a forecast about its future financial situation. Using the Altman model and the Taffler model, this study analyzes the bankruptcy risk of companies in the energy field listed on the Romanian capital market for the period 2014-2018. The results show differences between the two applied models. According to Altman model, companies face problems with financial stability, while according to Taffler model, the companies are solvent.*

KEYWORDS*: bankruptcy risk assessment; capital market; energy companies' solvency; z score; financial stability.*

JEL CLASSIFICATION: *G31; G32; M41.*

1. INTRODUCTION

Economic and financial stability are essential factors of sustainable development (Solomon & Tonea, 2019). Uncertainties can be anticipated with the help of risk, by measuring the probability of their occurrence and developing practices to stop or reduce them. Companies face many internal or external risks that can affect their continuity. Optimization of information can lead to better management decisions (Rus et al, 2010). If a company is in a state of bankruptcy, the bankruptcy-recovery decision is a management decision that contributes to the sustainability of the company and that affects the economic environment (Boloş, 2011).

The bankruptcy risk is often analyzed in the literature. Over the last decades, this field has been intensively researched, being developed several methods of measuring or estimating the bankruptcy risk, by assessing the financial stability of companies

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(Armeanu & Cioaca, 2015). These methods are mainly based on discriminatory analysis. In 1968, Altman developed a method of assessing the bankruptcy risk for companies listed on the capital markets, using several key financial indicators (5 variables) to analyze the solvency / insolvency status of companies (Altman, 1968). The method used by him is known as the "score method" or the "Z test method". Over the period followed, Altman published several papers in which he improved the original version of the method. In 1983, another study on the assessment of the risk of bankruptcy was published by Taffler, it analyzes key financial indicators (4 variables) to analyze the solvency of a company listed on the London capital market (Taffler, 1983). The scoring method is based on statistical techniques of discriminated analysis of financial characteristics (Căruntu et al, 2012) and is one of the methods to analyze the solvency of a company and to assess the risk of bankruptcy (Bordeianu et al., 2011).

Numerous studies have been conducted on assessing the risk of bankruptcy of Romanian companies (Lupu & Nichitean, 2010; Răscolean et al., 2012; Robu et al., 2013; Duran & Gogan, 2014, Armeanu & Cioaca, 2015; Balteș & Pavel, 2019; Bărbuță-Mișu & Madaleno, 2020; Anghel et al. 2020). In 2015, Dănescu & Mărginean analyzed the bankruptcy risk for companies in the Romanian industry both through the model developed by Altman (1968) and through the model developed by Holț (2009). Kulcsar (2014) assessed the bankruptcy risk for small and medium Romanian companies in industry and trade, and Popescu (2014) applied the Altman model for Romanian agricultural companies. A recent study conducted by Guda for Romanian companies in the period 2007-2017 shows that, although Romania registered economic growth in the analyzed period, the number of companies with a high risk of bankruptcy increased. Thus, it concludes that Romania's economic growth model is not sustainable in the long run (Guda, 2018).

In this paper, I focus the study on determining the risk of bankruptcy for companies in the energy field, with majority state capital (Romanian), which are listed on the Bucharest Stock Exchange (BVB). Next, the paper is structured as follows: in the second section I present the research methodology, in section III I highlight the results obtained, and then I conclude.

2. RESEARCH METHODOLOGY

In order to determine the risk of bankruptcy for companies listed on the Bucharest Stock Exchange (BVB), I used as selection criteria: companies from sectors of activity vulnerable to current economic conditions; which are directly influenced by recent legislative changes and which are mainly state-owned companies. Thus, I identified the market producing and supplying electricity and heat, gas, hot water and air conditioning, as defined by BVB. Next, I have selected only the companies that trade shares in the energy field, regardless of the segment and category in which they are listed. In the analysis I included the companies in the energy field listed on the Romanian capital market whose majority share capital is owned by the state, namely: SN Nuclearelectrica SA (hereinafter referred to as SNN, as its symbol on BVB) and C.N.T.E.E. Transelectrica SA (hereinafter referred to as TEL, as is its symbol on BVB). These are sound entities with a high market share in the field of electricity. SNN is

focused on the production of nuclear energy, being the only nuclear power plant in Romania, which provides over 20% of national electricity production. TEL is the electricity transmission operator in Romania, being responsible for the electricity transmission in Romania, but also between the countries of Central and Eastern Europe (Dănescu & Popa, 2018). Table 1 contains general information related to the analyzed companies.

Table 1. Summary of analyzed companies

	TEL	**SNN**
Start transaction date	29.08.2006	04.11.2013
Segment	Principal	Principal
Category	Premium	Premium
Share number 31.12.2018	73.303.142	301.513.851
Activity field	Provision of electricity transmission service and system service	Electricity production
Percentage of share capital held by the state on 31.12.2018	58,69%	82,50%
Management	7 Supervisory Board members	7 non-executive Board of Administration members
Identified risks	Market risk; liquidity risk, credit risk	Market risk; operational risk; counterparty risk; risk associated with the lack of specialized labor.

Source: own projection based on information available on BSE website and in companies 2018 annual reports

Because the selected companies are representative of the Romanian economy, it is important to analyze their bankruptcy risk. In this study, I used two of the most well-known bankruptcy risk assessment models for the two companies, the Altman model and the Taffler model. These two models, although based on discriminant analysis, use distinct variables, so the results may be different. Table 2 compares the variables used.

Table 2. Models description

Altman		Taffler	
X1	$\frac{Working\ capital}{Total\ assets}$	X1	$\frac{Profit\ before\ tax}{Short-term\ debts}$
X2	$\frac{Retained\ earnings}{Total\ assets}$	X2	$\frac{Current\ assets}{Total\ debts}$
X3	$\frac{Earnings\ before\ interest\ and\ tax}{Total\ assets}$	X3	$\frac{Short-term\ debts}{Total\ assets}$
X4	$\frac{Market\ value\ of\ equity}{Total\ liabilities}$	X4	$\frac{Liquidity-Short-term\ debts}{Sales-Profit\ before\ tax}$
X5	$\frac{Sales}{Total\ assets}$	-	-

Source: Altman (1968); Taffler (1983)

The analyzed companies are part of different fields of activity (one is a producer of electricity and the other is a provider of electricity transmission services), so the discriminatory function defined for the Altman model is different. For TEL (a service provider company), I used the Altman model for companies that do not operate in the industry, including only four variables in determining the Z score. The calculation method of the Z score, as well as its economic interpretation can be found in Table 3.

Table 3. The final discriminant analysis functions for the models used

Model	**TEL**
Altman	$Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$
Z score interpretation	$1.1 < Z < 2.6$ – *financial difficulties* $Z > 2.6$ – *no bankruptcy risk*
Taffler	$Z = 3.2 + 12.18X1 + 2.5X2 - 10.68X3 + 0.029X4$
Z score interpretation	$Z < 0.2$ – *high bankruptcy risk* $Z \geq 0.3$ – *no bankruptcy risk*
	SNN
Altman	$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.999X5$
Z score interpretation	$1.23 < Z < 2.9$ – *financial difficulties* $Z > 2.9$ – *no bankruptcy risk*
Taffler	$Z = 3.2 + 12.18X1 + 2.5X2 - 10.68X3 + 0.029X4$
Z score interpretation	$Z < 0.2$ – *high bankruptcy risk* $Z \geq 0.3$ – *no bankruptcy risk*

Source: Altman (1968); Taffler (1983); Altman (2000)

I extracted the financial information analyzed from the financial statements of the companies available on the BVB website in order to calculate the variables related to each model in the 5 years included in the study.

3. RESULTS

With the help of discriminating functions, we can quickly reflect on the financial situation of a company, we can assess its financial condition and we can prevent future risks of insolvency / bankruptcy. Next, I present the results obtained by the Altman model, respectively the Taffler model.

3.1 Altman Model

In Table 4 I calculated the variables of the Altman model for the 5 years analyzed period, both for TEL and SNN, according to the rates related to the variables presented in Table 2.

Table 4. Altman variable calculation

Year/Variable	X1	X2	X3	X4	X5
TEL					
2018	0,0816	0,2811	0,0304	0,8460	0,5826
2017	0,0584	0,2792	0,0326	1,0047	0,6787
2016	0,1599	0,3225	0,0497	0,9809	0,5150
2015	0,1478	0,3023	0,0844	0,9503	0,5612
2014	0,1344	0,1250	0,0809	0,8166	0,5084
SNN					
2018	0,3169	0,4126	0,0605	1,4584	0,2402
2017	0,2950	0,4309	0,0409	1,2332	0,2055
2016	0,2545	0,4133	0,0171	0,7879	0,1764
2015	0,2388	0,4119	0,0168	0,9380	0,1831
2014	0,2296	0,2913	0,0179	0,9216	0,1834

Source: own calculation based on financial information available in companies' annual reports

In the case of the Altman model, variable X1 measures the company's net liquid assets relative to total capitalization, variable X2 measures the company's profitability over time, variable X3 measures the productivity of assets held, variable X4 shows the acceptable level of loss of assets over debt, and X5 measures the ability of assets to generate revenue. Thus, it is noted that the discriminant function of the Altman model is more rigid, analyzing complex, dynamic financial indicators of companies, and its results show the general state of stability of companies.

Table 5. Bankruptcy risk assessment through Altman model

Year	TEL		SNN	
	Z	Observation	**Z**	Observation
2018	**2,54**	Medium-high bankruptcy risk	**2,27**	Medium-high bankruptcy risk
2017	**2,57**	Medium-high bankruptcy risk	**2,04**	Medium-high bankruptcy risk
2016	**3,46**	Low bankruptcy risk	**1,59**	High bankruptcy risk
2015	**3,51**	Low bankruptcy risk	**1,66**	High bankruptcy risk
2014	**2,69**	Low bankruptcy risk	**1,48**	High bankruptcy risk

Source: own calculation

In 2017 and 2018, TEL registers a Z score that places it in the "gray" area of bankruptcy, in which the company registers a medium bankruptcy risk, while in previous years it does not face bankruptcy risk. The years 2017 and 2018 mark a difficult period for the energy field, due to the national regulation. Thus, I note that the macroeconomic conditions significantly influence the financial stability of TEL. In contrast, the company SNN registers a high risk of bankruptcy in the first years analyzed (2014-2016), while in 2017 and 2018 it will increase its solvency.

3.2 Taffler Model

In Table 6 I calculated the variables of the Taffler model for the 5 years analyzed, both for TELL and SNN.

Table 6. Taffler variable calculation

Year/Variable	X1	X2	X3	X4	X5
TEL					
2018	0,0776	0,8485	0,2567	-0,2728	0,0776
2017	0,0423	0,7654	0,2457	-0,1949	0,0423
2016	0,2786	0,9192	0,2173	-0,0807	0,2786
2015	0,4046	0,8220	0,1996	-0,0232	0,4046
2014	0,3522	0,7447	0,2253	-0,2185	0,3522
SNN					
2018	1,0994	1,3569	0,0587	-0,0812	1,0994
2017	0,8553	1,3121	0,0451	0,1015	0,8553
2016	0,3502	1,0908	0,0398	-0,0715	0,3502
2015	0,4236	0,9019	0,0440	-0,1041	0,4236
2014	0,3226	0,7482	0,0488	0,4104	0,3226

Source: own calculation based on financial information available in companies' annual reports

In the case of the Taffler model, variable X1 measures the company's profitability, variable X2 measures the company's current liquidity, variable X3 measures the financial risk to which the company is exposed, and variable X4 includes the "no credit interval" indicator, as defined by Taffler (1983). Therefore, the Taffler model analyzes financial indicators that are directly related to the solvency of companies. The Z scores for the two companies analyzed, by applying the final discriminant function (Table 3) are calculated for the variables and are presented in Table 7.

Table 7. Bankruptcy risk assessment through Taffler model

Year	TEL		SNN	
	Z	Observations	**Z**	Observations
2018	**3,52**	The company is solvent	**19,35**	The company is solvent
2017	**3,00**	The company is solvent	**16,42**	The company is solvent
2016	**6,57**	The company is solvent	**9,77**	The company is solvent
2015	**8,05**	The company is solvent	**10,14**	The company is solvent
2014	**6,94**	The company is solvent	**8,49**	The company is solvent

Source: own calculation

The results of the Z score for the 5 years analyzed period show that both companies are in a state of solvency. TEL, during the entire analyzed period, registers lower scores than SNN. Also, similar to the Altman model results, in the period 2017-2018, TEL records lower Z scores than in previous years, while SNN records higher Z scores. However, in this case, both companies have positive scores, so the risk of bankruptcy is assessed as minimal.

Being analyzed through two different scoring methods, but which follow the same phenomenon - identifying the risk of bankruptcy - companies can be analyzed from two perspectives. Applying the Altman model, it can be assessed the company's condition using key financial information from all three balance sheet categories (both assets and liabilities and equity), while using the Taffler model, mainly it can be assessed the company's solvency. Therefore, the results obtained previously differ by applying the two models of bankruptcy risk assessment.

4. CONCLUSIONS

The purpose of the score method, applied by both the Altman model and the Taffler model, is to calculate a score that allows the assessment of a risk of bankruptcy for a company. With the help of discriminant analysis, several variables can be included in the study to obtain scores that can frame a company in several states of fact. However, the classification of the score obtained, but also the extraction of a limited number of financial indicators (included in the calculation of variables that are considered relatively constant over time), the results may differ depending on the applied model.

In this study, I analyzed the bankruptcy risk for companies in the energy field that trade shares on the Romanian capital market whose majority share capital is owned by the state. Through the Altman model application, the results show that these companies present a moderate to high risk of bankruptcy in the analyzed period. Moreover, it is shown that in 2017 and 2018 the Z scores obtained are significantly changed. TEL has a lower Z score than in the period 2014-2016, which places it at a moderate risk of bankruptcy, while SNN has a higher Z score in 2017-2018, thus reducing its bankruptcy risk assessed in the previous period (2014-2016). According to the Taffler model, the two companies are solvent for the entire analyzed period.

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