ASSESSMENT OF THE INSOLVENCY RISK IN COMPANIES LISTED ON THE BUCHAREST STOCK EXCHANGE

Nicolae Balteş[*]
Faculty of Economics, „Lucian Blaga" University of Sibiu, Romania
E-mail: baltes_n@yahoo.com

Ruxandra Maria Pavel
Faculty of Economics, „Lucian Blaga" University of Sibiu, Romania

Abstract: The present study presents, from the theoretical and pragmatic point of view, 6 of the established score models regarding the assessment of the insolvency risk, belonging to the Anglo-Saxon, Continental and Romanian schools. The research sample is made up of 26 companies belonging to the hotel industry and restaurants, listed on the Bucharest Stock Exchange. The research was carried out over a period of 11 years (2007-2017). Following the application of the score models, it was found that during the period covered by the research, a number of 14 companies had a relatively high insolvency risk and 12 of them had a relatively low insolvency risk.

Keywords: insolvency risk, bankruptcy, financial difficulty, score models, financial performance

JEL Codes: G32, G15

1. Introduction

The risk of insolvency is a large area of study, investigated for over 50 years. Over the years numerous researches have been carried out and papers have been published in which different results have been presented. The holder of the studies is considered to be the researcher Edward I. Altman, who used statistical methods as a basis for investigating the risk of insolvency, his work being developed and subsequently used in other research. Although some of the research had a high accuracy and probability, they could not be used as a universal tool for predicting insolvency risk.

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[*] Corresponding author: Nicolae Balteş. *E-mail: baltes_n@yahoo.com*

According to the provisions of Law no. 85/2014 regarding the insolvency prevention and insolvency procedures, as subsequently amended and supplemented, the insolvency constitutes the state of the patrimony of a debtor company which is in difficulty due to the insufficiency of the money funds needed to pay the debts incurred. The financial difficulty of an entity may be considered as a state preceding the bankruptcy insofar as the entity's inability to meet the obligations arising from current operations or past commitments that may affect its business continuity appears.

The insolvency risk of an entity may be caused by external and/or internal causes (Petrescu et al., 2009):

a) External causes: the loss or bankruptcy of an important client; aggressive competition policy that leads to the elimination of the company from the market; failure to keep up with technological changes, etc.;

b) Internal causes: improper management of the investment policy; repeated losses in the operating activity; inadequate debt policy in unstable economic periods; deterioration of the rotation of current assets; wrong policy in the field of commercial credit, etc.

2. Literature review

Karels and Prakash (1987) explain insolvency as follows: "Insolvency is a process that begins financially and is legally consumed." Lam (1994) defines insolvency as representing the discontinuity of a business society. Foster (1986) defines insolvency as a financial difficulty of a company that faces liquidity problems that cannot be solved without significant intervention in the operations of the company.

Jones (1987) points out that some companies may file for insolvency for reasons other than financial difficulties. A similar view is expressed by Gilbert et al. (1990) when they state that not all companies in financial difficulty are motivated to declare their insolvency. The management of a company can consider the insolvency as a possible strategic decision regarding the realization of mergers, restructuring or voluntary liquidation. Jordan et al. (2008) states that the term "insolvency" provides "a legal procedure of liquidation or reorganization of a business" and Altman (1993) describes the term "insolvency" may refer to a situation where the net value of the company is negative or to a situation in which the company declared its insolvency entering into a judicial process of reorganization.

3. Insolvency risk assessment methods and models

The importance of insolvency risk analysis is high, especially for stakeholders who have claims against a particular company, such as creditors, investors, employees, suppliers, etc. (Petrişor & Lupu, 2013).

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The literature has devoted four methods used to analyze the risk of insolvency (Balcaen & Ooghe, 2004):

• Method of comparison or analysis of dynamic indicators: the indicators presented in the annual financial statements in a year to year dynamics or in comparison with the indicators of other companies in difficulty, are taken into account;

• Rate-based methods: it has the advantage of providing a comprehensive comparative analysis in time and space;

• The method of financial flows, which highlights the impact on cash, which has a decisive influence in the case of insolvency risk;

• The scoring method emerged in response to the classical methods of analysis, having the advantage of using a diverse range of financial and non-financial rates.

In our opinion, the scoring method (regardless of the model chosen) makes the greatest contribution to the assessment of insolvency risk, because it is based on a series of indicators that can cover all the sensitive areas of a company: working capital, assets, profits, debts, turnover etc.

In the economic theory, a series of models based on the scoring method have been developed, among which the best known are: Altman model, Springate model, Fulmer model, French Commercial Credit model, Taffler model, Gheorghe Băileşteanu model.

The Altman model (1968), called the Z-score model, employs 66 companies, of which 50% were successful and 50% were bankrupt, a system of 22 indicators (rates), considered to be the most significant for the prediction of insolvency. Altman aggregated only 5 indicators to present a model that was considered to have the best performance, with a 95% accuracy rate. The model proved to be correct, from the point of view of many analysts, regarding the estimation of the insolvency risk.

Calculation formula (Altman, 1968):

$$Z = 1{,}2*X_1 + 1{,}4*X_2 + 3{,}3*X_3 + 0{,}6*X_4 + 1*X_5$$

$$\mathbf{X_1} = \frac{\text{Current assets}}{\text{Total assets}}; \ \mathbf{X_2} = \frac{\text{Reinvested profit}}{\text{Total assets}} \ \mathbf{X_3} = \frac{\text{Operating result}}{\text{Total assets}}; \ \mathbf{X_4} = \frac{\text{Market capitalization}}{\text{Total debts}}; \ \mathbf{X_5} = \frac{\text{Turnover}}{\text{Total assets}}$$

The interpretation of the result implies the classification of the analyzed company in one of the three risk categories proposed in the model, as follows: Z <1.8 - imminent risk; 1.81 <Z <2.99 - gray area; Z> 2.99 - safe area.

The Springate model was created in 1978 by Gordon L.V. Springate, which has continued to develop the Altman model. However, it is a less popular model for the

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prediction of insolvency risk than the one developed by Altman. The data required for the calculation of the indicators are collected from the balance sheet, profit or loss account and from the statement of cash flows. The model is important for investors and creditors, as it provides information on the insolvency risk of an entity, with an accuracy of 92.5%.

Calculation formula (Peyman, Mehdi, Petro, 2011):

$$Z = 1,03*X_1 + 3,07*X_2 + 0,66*X_3 + 0,4*X_4$$

$$X_1 = \frac{\text{Working capital}}{\text{Total assets}}; \quad X_2 = \frac{\text{Operating result}}{\text{Total assets}}; \quad X_3 = \frac{\text{Gross profit}}{\text{Current debts}}; \quad X_4 = \frac{\text{Turnover}}{\text{Total assets}}$$

If the value of Z <0.862, then the company is classified as having a high insolvency risk. Otherwise it can be considered financially healthy.

The Fulmer model (1984) uses multivariate analysis to collect data on 40 financial indicators for 60 companies, of which 30 have declared insolvency and 30 companies are active. The model includes 9 indicators and has an accuracy rate between 81% - 98%, depending on the estimated duration. Calculation formula (Fulmer et al., 1984):

$$Z = 5,52*X_1 + 0,212*X_2 + 0,073*X_3 + 1,27X_4 - 0,12*X_5 + 2,34*X_6 + 0,575*X_7 + ,083*X_8 + 0,894*X_9 - 6,075$$

$$X_1 = \frac{\text{Non-distributed profit}}{\text{Total assets}}; \quad X_2 = \frac{\text{Turnover}}{\text{Total assets}}; \quad X_3 = \frac{\text{Operating result}}{\text{Equity}}; \quad X_4 = \frac{\text{Cash}}{\text{Total debts}}; \quad X_5 = \frac{\text{Total debts}}{\text{Total assets}}$$

$$X_6 = \frac{\text{Current debts}}{\text{Total assets}}; \quad X_7 = \text{Log (Total assets)}; \quad X_8 = \frac{\text{Working capital}}{\text{Total debts}}; \quad X_9 = \text{Log} \frac{\text{Operating result}}{\text{Interest rate}}$$

If a value of Z <0 is recorded then the company will be classified as having a high insolvency risk.

The Taffler Model (1997), was created by economists Taffler and Tisshaw who examined a sample of small and medium-sized companies in the United Kingdom. The model applies to companies organized in the form of joint stock companies, whose financial securities were subject to the public offer and traded on the stock exchange. Calculation formula (Kubecová & Vrchota, 2014):

$$Z = 0,53*X_1 + 0,13*X_2 + 0,18*X_3 + 0,16X_4$$

$$X_1 = \frac{\text{Gross profit}}{\text{Current debts}}; \quad X_2 = \frac{\text{Current assets}}{\text{Total debts}}; \quad X_3 = \frac{\text{Current debts}}{\text{Total assets}}; \quad X_4 = \frac{\text{Turnover}}{\text{Total assets}}$$

The score level Z ≤ 0.2 indicates a high insolvency risk, the one between 0.2 and 0.3 indicates an average insolvency risk and a level Z ≥ 0.3 shows a low insolvency risk.

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The French Commercial Credit Model (1985) was developed following a study on a sample of 3,000 industrial companies, with less than 500 employees, for 1977-1979. The Z score determined by this model has the following calculation formula (Ion, Anghel, 2002):

$$Z = 6{,}47 - 9*X_1 - 1{,}1*X_2$$

$$X_1 = \frac{\text{Financial expenses}}{\text{Operating result}}; \quad X_2 = \frac{\text{Loans + interest}}{\text{Equity}}$$

The values of the Z score separate the companies into two categories: - without financial difficulties (Z> 0), respectively with financial difficulties (Z <0).

Model B - Gheorghe Băileşteanu (1998). Based on traditional studies, the author found that the occurrence of insolvency depends on the following factors: inability to pay current obligations, lack of funds for repayment of loans, delays in collecting receivables and losses. The Z-score function used has the following relation (Băileşteanu, Gh., 1998, p.294):

$$Z = 1{,}414 + 0{,}444\ X_1 + 0{,}909\ X_2 - 0{,}0526\ X_3 - 0{,}0333\ X_4$$

$$X_1 = \frac{\text{Net profit}}{\text{Income}}; \quad X_2 = \frac{\text{Cash flow}}{\text{Total assets}}; \quad X_3 = \frac{\text{Total debts}}{\text{Total assets}}; \quad X_4 = \frac{\text{Current Debts}}{\text{Turnover}} * 360$$

Depending on the value of Z is considered: Z <0.5 - high risk of insolvency; 0.5 <Z <1.1 - restricted area; 1.1 <Z <2.0 - intermediate zone; Z> 2.0 - favorable area.

4. Research regarding the assessment of the risk of insolvency in companies belonging to the hotel and restaurants industry listed on the Bucharest Stock Exchange, 2007-2017, through established score models

The evolution of the total number of insolvent companies in Romania, 2007-2017, is shown in figure 1.

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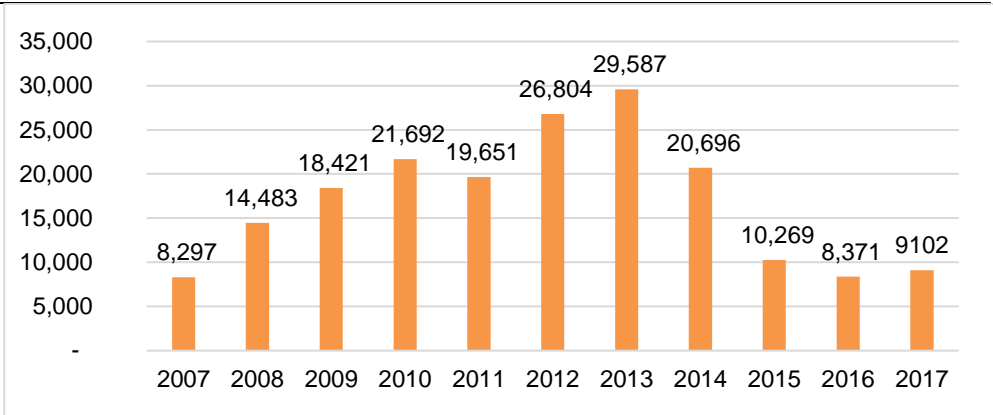Web: publicatii.uvvg.ro/index.php/studiaeconomia. Pages 58 – 71

Figure 1 Evolution of the total number of insolvent companies in Romania
Source: Authors processing based on data provided by the National Trade Register Office
(https://www.onrc.ro/index.php/ro/statistici?id=252)

There is a considerable increase (over 350%) of the number of companies that went into insolvency, in 2013 compared to 2007, except for 2011, when there was a slight decrease in their number. At the same time, in the last three years included in the research, the situation is improving, meaning that the number of companies entering the insolvency procedure is significantly reduced from year to year. The most pronounced decrease, of about 50%, in the number of companies in this situation was registered in 2015 compared to 2014.

Figure 2 shows the evolution of the number of companies, belonging to the hotel industry and restaurants, at the level of Romania, in insolvency, 2007-2017.
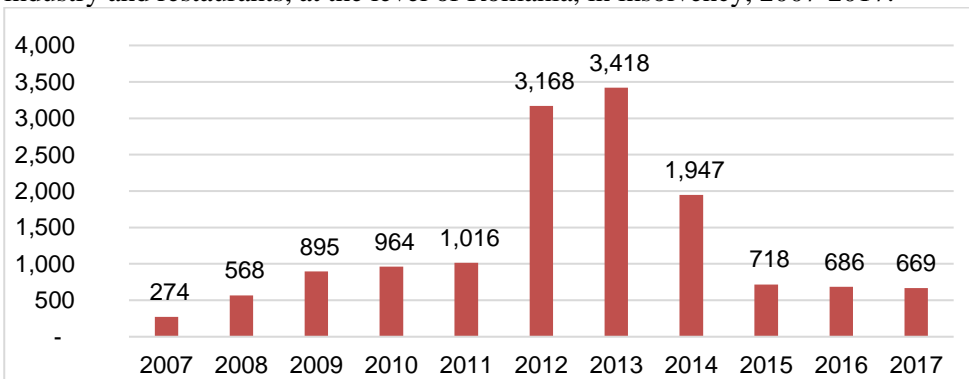

Figure 2 Evolution of the number of companies, belonging to the hotel industry and restaurants, insolvent
Source: Authors processing based on data provided by the National Trade Register Office
(https://www.onrc.ro/index.php/ro/statistici?id=252)

The number of insolvent companies in the hotel and restaurants industry shows an upward trend from 2007 to 2013. The sharp increase in the years 2012-2013, is explained by the increase of the debt caused by the non-performing loans contracted. In fact, at the end of 2013, Romania ranked fourth in the European Union and sixth in the world in terms of non-performing loans (Brîndescu, 2014).

The grouping of companies according to the insolvency risk, determined by the Altman model, 2007-2017, is presented in figure 3.
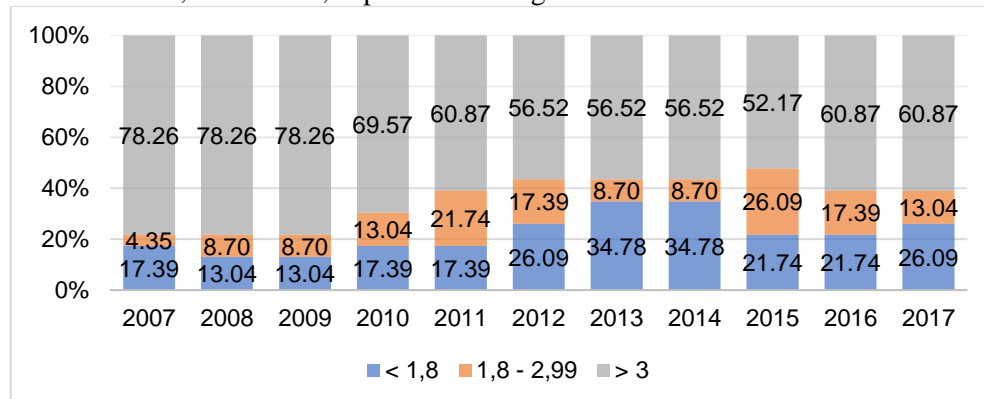

Figure 3 Grouping of companies according to the insolvency risk, determined by the Altman model, 2007-2017

Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

According to the Z score obtained by the Altman model, it is noted that the share of healthy companies from a financial point of view is decreasing from the beginning of the analyzed period until the end of 2015. The highest share of companies with the value of Z score below 1.8 units, respectively with a high risk of insolvency, is registered between 2012 and 2014. We can appreciate the fact that in the hotel industry and restaurants the effects of the economic-financial crisis were more pronounced during this period.

In Figure 4, the grouping of companies is presented according to the insolvency risk, determined by the Springate model, 2007-2017.
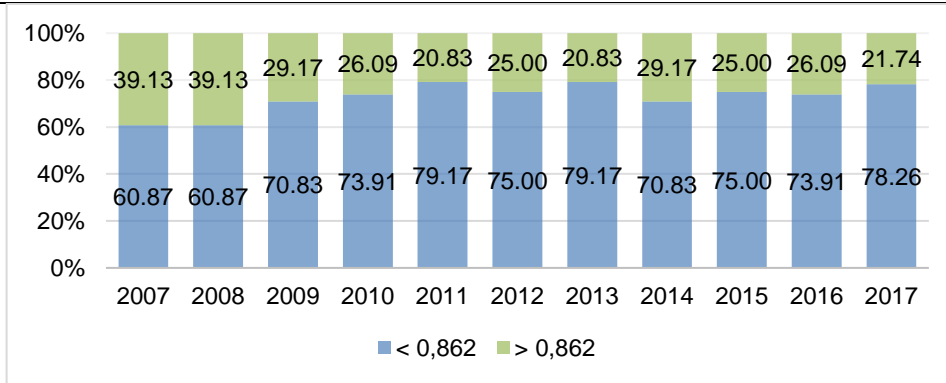
Figure 4 Grouping of companies according to the insolvency risk, determined by the Springate model, 2007-2017
Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

It can be seen that at the level of the entire period covered by the research, the share of companies with high risk of insolvency is between 60.87% and 79.17%. The main cause was determined by the decrease of the turnover, the slowing down of the speed of rotation of the commercial debts and receivables, having consequences on the financial performance of the entities.

Figure 5 shows the grouping of companies according to the insolvency risk determined by the Fulmer model.
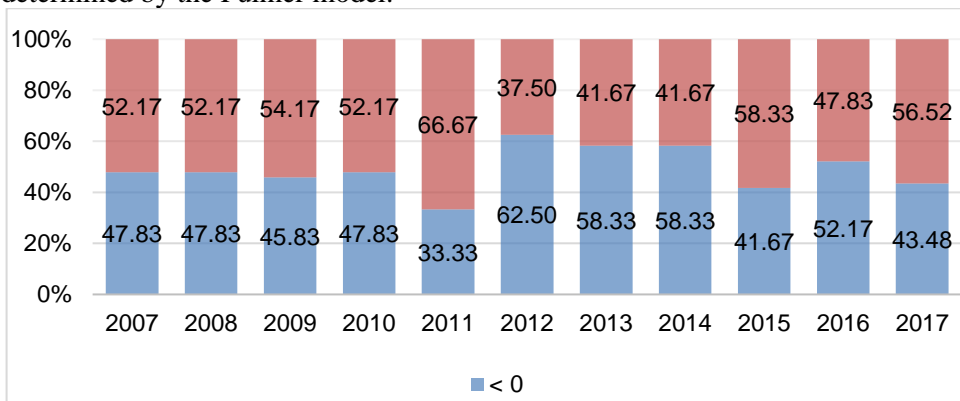

Figure 5 Grouping of companies according to the insolvency risk, determined by the Fulmer model, 2007-2017
Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

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Compared to the Z score determined by the Springate model, the Z score determined by the Fulmer model is much more permissive, so that the share of companies with insolvency risk is lower, being during the period under investigation between 33.33% and 62.5%.

The grouping of companies according to the insolvency risk, determined by the French Commercial Credit model, 2007-2017, is shown in figure 6.
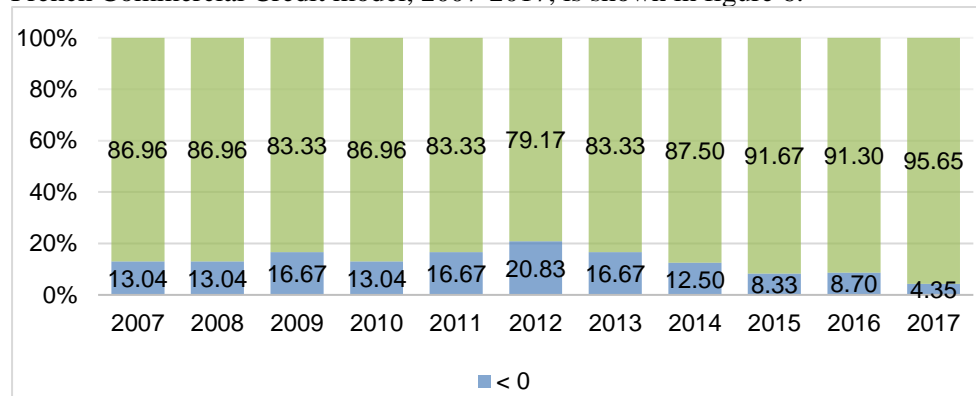

Figure 6 Grouping of companies according to the insolvency risk, determined by the French Commercial Credit model, 2007-2017
Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

The high share of companies that registered a minimum risk of insolvency (Z> 0) is due in large part to the fact that more than 50% of the companies did not have bank loans and consequently they did not register financial expenses from interest rates. However, it is noted that during 2012-2013, the share of companies with financial difficulties was between 16.67% and 20.83%. Figure 7 shows the evolution of the companies grouped according to the insolvency risk, determined by the Taffler model, the period 2007-2017.

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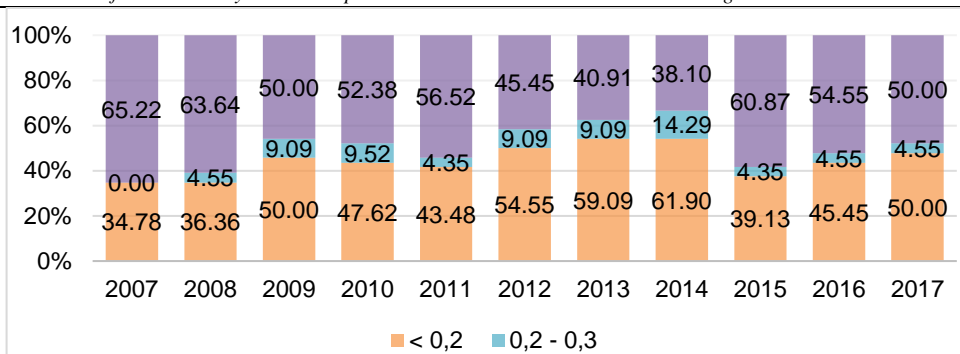
Figure 7 Grouping of companies according to the insolvency risk, determined by the Taffler model, 2007-2017
Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

It is found that the share of companies that registered a value of Z score over 0.3 follows an oscillating evolution. At the same time, the share of companies with a low insolvency risk was over 50%, except for the period 2012-2014, during which the economic crisis made its presence felt at the level of the hotel and restaurants industry, listed on the Bucharest Stock Exchange. In this period, there is an increase in the share of companies that present a high risk of insolvency, reaching in 2014 more than 61%.

The grouping of companies according to the insolvency risk, determined by the Băileșteanu model, 2007-2017, is shown in figure 8.
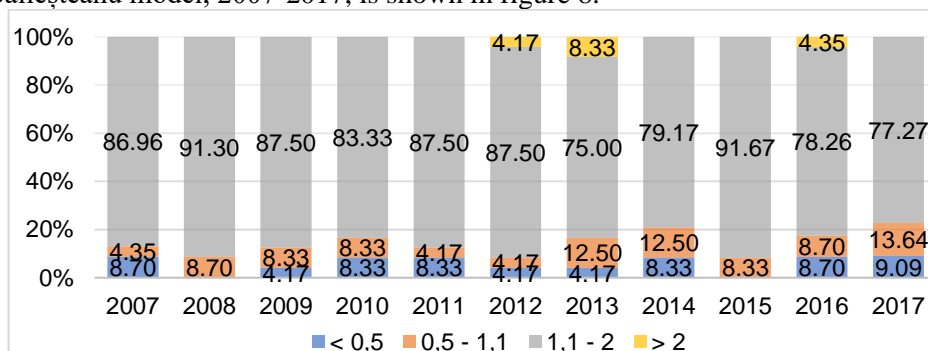

Figure 8 Grouping of companies according to the insolvency risk, determined by the Băileșteanu model, 2007-2017
Source: processing of authors based on the annual financial statements for 2007–2017 of companies listed on the BSE, the hotel industry and restaurants, available on the website at www.bvb.ro

The highest weight is held by the companies that were in the range 1.1-2, the intermediate zone, respectively between 75% - 91.67%. Between 2013-2014 and 2016, it is noted that there were companies in a favorable area, with relatively low insolvency risk.

Table 1 presents the grouping of companies with high insolvency risk, depending on the risk models applied.

Table 1 Grouping of companies with high insolvency risk, 2007-2017

	of the 6 models	-
	5 of 6 models	Prahova Estival 2002 SA (PRAH)
	4 of 6 models	Dorna Turism SA (DOIS)
	3 of 6 models	Hotel Club Estival 2002 (CLUB) Balea Estival 2002 SA (BLEA) Banat Estival 2002 (BNAT)
Companies evaluated as risky as a result of the application:	2 of 6 models	Tuşnad SA (TSND) Romanţa Estival 2002 SA (ANTA) Compania Hotelieră Intercontinental Romania SA (RICHI) Parc SA (PARC)
	1 of 6 models	Cicero SA (CICE) SIF Hoteluri SA (CAOR) Tratament Balnear Buziaş SA (BALN) Clăbucet Estival 2002 SA (UCET) Nord SA Bucureşti (NORD)

Source: processing of authors based on the results recorded by companies following the application of models

By applying the 6 models to determine the risk of insolvency, it resulted from the 26 companies in the hotel and restaurants industry, listed on the Bucharest Stock Exchange included in the research, 14 had a relatively high insolvency risk between 2007 and 2017.

The grouping of companies with relatively low insolvency risk following the application of the 6 models is presented in table 2.

Table 2 Grouping of companies with reduced insolvency risk, 2007-2017

	of the 6 models	Turism Felix SA (TUFE)
Companies with a low risk of insolvency following the application:	5 of 6 models	Regal SA (REGL) Euxin SA (EUXI)
	4 of 6 models	Casa de Bucovina-Club de Munte SA (BCM) Turism, Hoteluri, Restaurante Marea Neagră SA (EFO)
	3 of 6 models	SIFI Cluj Retail SA (ARCU) Palace SA Sinaia (PACY)
	2 of 6 models	BTT SA București (BIBU) Athenee Palace SA (ATPA) Turism Covasna SA (TUAA)
	1 of 6 models	Neptun Olimp SA Neptun (NEOL) Aro-Palace SA Brașov (ARO)

Source: processing of authors based on the results recorded by companies following the application of models

According to table 2, it is observed that a number of 12 of the 26 companies included in the research registered during 2007-2017, relatively low risk of insolvency.

5. Conclusions
The results of the research by applying the score models, showed that during the period 2007-2017, a number of 14 of the 26 companies belonging to the hotel industry and restaurants included in the research (53.8%) had a relatively high insolvency risk. The remaining 12 companies, representing 46.2%, presented relatively low insolvency risk in the period 2007-2017.
The relatively high insolvency risk in the 14 economic entities during the period covered by the research, found following the application of the presented risk models, was mainly caused by the adverse effects of the economic-financial crisis, consisting in the diminishing of the turnover, slowing the turnover rate of trade receivables and debts, increase of financial expenses, increase of debt, etc., all having negative consequences on the financial performance of the entities.

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Author Contributions
The authors conceived the study and were responsible for the design and development of the data analysis, also are responsible for data collection and analysis and also for data interpretation.

Disclosure Statement
The authors have not any competing financial, professional, or personal interests from other parties.

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