ARE BANKRUPTCY MODELS A GOOD PREDICTOR OF FIRM FINANCIAL DISTRESS OF TRAVEL AGENTS IN THE CZECH REPUBLIC?

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Abstract

Assessing financial performance of the firm and diagnosing and predicting the potential financial distress is very important for good firm governance. The bankruptcy models are one of the relative simple methods for testing the firm financial health. This study aims to test the reliability of selected bankruptcy models as a predictor of financial distress of Czech travel agencies and tour operator. Altman Z´-Score, Z´´-Score models and index IN05 are employed as the tested bankruptcy models. The data are obtained from the database Albertina CZ Gold Edition and the final sample contains data for 368 firms which represent approximately 9 percent travel agencies and tour operators in the Czech Republic. The results show that the predictive ability of the individual bankruptcy models vary significantly for the subsector of Czech travel agencies and tour operators. Altman Z´´-Score model and index IN05 prove to be relative suitable predictor of financial distress under certain conditions. On the other hand, the reliability of Altman Z´-Score model is weak.

Keywords: *tourism, tour operators, travel agencies, financial distress, bankruptcy models*

1. INTRODUCTION

Tourism industry is the relative young and dynamically expanding sector of economy in the Czech Republic. According to Eurostat data, the number of travel agencies and tour operators is high in this country and its number converted per capita is one of the highest in the European Union. How is the financial performance and financial health of these firms and how to estimate it?

As a result of growing globalization and internationalization of the business environment, the issue of enterprise performance management is becoming more and more important, as constantly monitoring, analyzing and increasing performance is a key tool in the current competitive struggle (Čabinová et al. 2018). Assessing financial performance of the firm and diagnosing and predicting the potential financial distress is very important for good firm governance. The bankruptcy models are one of the relative simple methods for testing the firm financial health. Economic theory offers more variants of bankruptcy models and Altman's Z-score model and its modifications belong to the most commonly mentioned and used models. We can also find the bankruptcy models that reflect the specificities of a particular country or industry. These include, for example, index IN05 which was composed for the Czech Republic.

This study aims to test the reliability of selected bankruptcy models as a predictor of financial distress of Czech travel agencies and tour operator. Altman Z´-Score, Z´´-Score models and index IN05 are employed as the tested bankruptcy models.

Predicting the potential firm financial distress is very important. The bankruptcy of travel agents can mean a number of complications for its clients. Bankruptcy models offer a relative simple way to evaluate the potential financial distress. The paper provides information on whether these models give reliable results for travel agents.

2. MATERIALS AND METHODS

2.1. Materials

The data are obtained from the database Albertina CZ Gold Edition. This database contains information on profit and non-profit entities in the Czech Republic, which have been assigned

personal identification number (IČ). The data about travel agencies and tour operators (group 79.1 Travel agency and tour operator activities; 79.11 Travel agency activities; 79.12 Tour operator activities) according to Statistical classification of economic activities in the European Community Rev.2 (NACE Rev.2) for the period 2009-2012 is used.

To analyze the predictive ability of selected bankruptcy models, the data for firms that went bankrupt in 2012 is examined. This year is chosen because of relative large number of bankruptcies in this year compared to newer data (for years 2013-2015). The number of firms in bankruptcy in individual years is shown in Table 1. To be able to test the reliability of bankruptcy model, we need the time series. We chose the data for period 2009-2012.

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
N	27	25	24	17	17	12	9	3

Table 1. The number of firms in bankruptcy

Source: Database Albertina Gold Edition

We only selected companies for which all needed data were available in the dataset to calculate all three tested bankruptcy models (Altman Z´-Score, Z´´-Score models and index IN05). Because these models are relatively data intensive, there left only 368 companies in the dataset for period 2009-2012, with 11 firms out of bankruptcy in 2012. According to Eurostat data reporting the number of travel agents in selected countries, our final sample of 368 firms represents approximately 9 percent of travel agencies and tour operators in the Czech Republic (Eurostat 2019).

2.2. Methods

The aim of the paper is to assess the reliability of selected bankruptcy models as a predictor of financial distress of the companies. There are more methods to assess the financial condition of the companies where most of them are based on a combination of financial ratios (Kmeťko & Škriniar, 2014). Bankruptcy models represent methods that are the frequently to evaluate financial health of the companies. They belong to common tools of the firm financial analysis and are based on summarization of selected aspects of business (most often profitability, liquidity, indebtedness and activity).

These models enable to simply distinguish the firms having good financial health, and businesses that are in financial distress and are threatened by bankruptcy. And just these models we employ in this study, specifically two variants of Altman's Z-Score model (specifically Z'-Score model and Z´´-Score model) and index IN05 (Altman 1968; Altman 1983; Neumaierová & Neumaier 2005). The last mentioned model titled index IN05 is the bankruptcy model that was designed by Inka Neumaierová and Ivan Neumaier for Czech conditions (Neumaierová & Neumaier 2005). According to previous studies testing the reliability of the selected bankruptcy models in the Czech Republic, these three models become to the best fit bankruptcy models in Czech conditions (Machek 2014).

Altman Z´-Score model could by described as follow (Altman 1983):

$$Z' = 0.717.X_1 + 0.847.X_2 + 3.107.X_3 + 0.420.X_4 + 0.998.X_5. \quad (1)$$

Where X_1 is working capital/total assets, X_2 denotes retained earnings/total assets, X_3 is earnings before interest and taxes/total assets, X_4 represents book value of equity/book value of total liabilities, X_5 is sales/total assets, and Z´ is overall index.

According to value of Z´-Score, we can identify financial distressed and non-distressed entities. If Z' is smaller than 1.23, the firm is threatened by bankruptcy (Distress zone); if Z' is higher than 2.90, the

firm is in good financial condition and there is not financial distress (Safe zone) and the values between 1.23 and 2.90 denotes Grey zone, where the conclusion is ambiguous.

According to Altman et al. (2017) this model is suitable mostly for private manufacturing firms. To fit the model better for both manufacturing and non-manufacturing firms and publicly listed and privately held firms, Altman (1983) modified it and removed the variable X_5 from the model to decrease the industry effect which is more likely to play a role if the assets turnover is taken into account. New version of model is known as Z´´-Score model and is as follow (Altman 1983):

$$Z'' = 3.25 + 6.56.X_1 + 3.26.X_2 + 6.72.X_3 + 1.05.X_4. \quad (2)$$

Variables X_1-X_4 are the same as in Z´-Score model. Also here the firms are classified into three zones based on the value of Z´´-Score: $Z \leq 1.1$ is Distress zone; $1.1 < Z \leq 2.6$ is Grey zone and $Z'' > 2.6$ denotes Safe zone.

Finally, index IN05 has followed the formula by Neumaierová and Neumaier (2005):

$$IN05 = 0.13.P_1 + 0.04.P_2 + 3.97.P_3 + 0.21.P_4 + 0.09.P_5. \quad (3)$$

Where P_1 denotes assets/liabilities, P_2 is earnings before interest and taxes /interests, P_3 denotes earnings before interest and taxes /assets, P_4 denotes total revenue/assets and P_5 is the ratio of current assets/short-term liabilities. The companies are divided into three zones. If the value of IN05 is lower than 0.90, the company is probably not prospering. The value higher than 1.60 places the firm into a prosperity zone. Values between 1.60 and 0.90 put the company into the grey zone (Neumaierová & Neumaier 2005).

	X_1	X_2	X_3	X_4	X_5	P_1	P_2	P_3	P_4	P_5
			2009					**2009**		
N	11	11	11	11	11	11	11	11	11	11
mean	-0.141	-0.331	0.066	0.137	6.598	1.410	2.300	0.066	7.041	0.898
sd	0.233	0.749	0.564	0.262	3.184	0.936	13.397	0.564	3.211	0.267
min	-0.467	-2.359	-0.841	0.004	1.737	0.336	-35.460	-0.841	1.753	0.572
max	0.228	0.506	1.505	0.897	12.007	3.528	9.000	1.505	12.045	1.468
			2010					**2010**		
N	11	11	11	11	11	11	11	11	11	11
mean	-0.091	-0.612	0.001	0.131	7.158	1.384	7.043	0.001	7.793	1.015
sd	0.419	1.427	0.417	0.245	3.854	0.903	4.419	0.417	4.348	0.341
min	-1.174	-4.030	-1.110	0.004	1.403	0.234	-3.458	-1.110	1.411	0.434
max	0.314	0.417	0.633	0.839	12.819	3.087	9.000	0.633	13.494	1.539
			2011					**2011**		
N	11	11	11	11	11	11	11	11	11	11
mean	-0.217	-0.540	0.035	0.163	6.885	2.316	-0.736	0.035	7.078	0.824

sd	0.310	1.187	0.176	0.280	4.531	2.681	20.672	0.176	4.549	0.291
min	-0.836	-3.656	-0.318	0.004	1.604	0.252	-61.994	-0.318	1.671	0.406
max	0.215	0.289	0.367	0.936	15.060	8.877	9.000	0.367	15.135	1.330

Table 2. Descriptive statistics: Altman Z´-Score, Z´´-Score and IN05

Source: Database Albertina Gold Edition, author´s computation

3. RESULTS AND DISCUSSION

To assess the reliability of selected bankruptcy models to indicate the possibly financial distress of travel agencies and tour operators, only the firms that went to bankruptcy in 2012 were selected from our dataset. These firms were represented by 11 travel agents.

Than we calculate the Z´- Score, Z´´-Score and index IN05 for these firms using equation (1), (2) and (3) and according the results we divided the firms into financial distress zone, grey zone or safe zone. To assess the predict ability of individual models, we calculated all three the bankruptcy models for year 2009, 2010 and 2011. The number of firms in each group are presented in Table 3, 4 and 5.

	Financial distress	**Grey zone**	**Safe zone**
Z´-Score	1	0	10
Z´´-Score	4	2	5
IN05	3	3	5

Table 3. Results for year 2009: 11 firms in bankruptcy in 2012

Source: Database Albertina Gold Edition. author´s computation

	Financial distress	**Grey zone**	**Safe zone**
Z´-Score	0	1	10
Z´´-Score	3	0	8
IN05	1	1	9

Table 4. Results for year 2010: 11 firms in bankruptcy in 2012

Source: Database Albertina Gold Edition. author´s computation

	Financial distress	**Grey zone**	**Safe zone**
Z´-Score	0	2	9
Z´´-Score	5	1	5
IN05	2	3	6

Table 5. Results for year 2011: 11 firms in bankruptcy in 2012

Source: Database Albertina Gold Edition. author´s computation

The results show that the conclusions of individual models assessing the financial health of selected companies differed significantly and some models are the better indicator of financial distress of firms.

In 2009, the Z´-Score model indicated financial problems only one of the evaluated companies. The remaining 10 companies showed good financial health according to this model. On the other hand, the Z´´-Score model indicated possible financial problems for six companies and the IN05 model for the same number of firms, considering also the gray zone. This results show the relatively decent reliability of these models to estimate potential financial problems of travel agents. The results are shown in Table 3.

In 2010, the reliability of the models was generally weaker compared to year 2009. The results are shown in Table 4. The possible financial problems were indicated by the Z´´-Score model in the case of only three companies and the IN05 model in two companies. Reliability of the Z´-Score model then remains low, when financial problems were again indicated by only one company, which were in the gray zone and not the distress zone. This was mainly due to better average results of companies in the area of working capital to total assets (sub-index X_1 in Z´´-Score) and the ratio of earnings before interest and taxes and interests (sub-index P_2 in the case of IN05 model). These sub-index were on average better compared to 2009 and 2011 as descriptive statistics in Table 2 shows.

In 2011, the examined models showed similar reliability as in year 2009. The results are presented in Table 5. The Z´-Score was the least reliable indicator of financial distress from examined bankruptcy models. It indicated financial problems of only two companies, considering the gray zone. The Z´´-Score model and IN05 model showed similar reliability and indicated financial problems of six firms in the case of Z´´-Score and five companies using IN05 model.

The reliability of examined bankruptcy models using 1, 2 and 3 years lag is shown in Table 6. The values in the table express the proportion of companies (in percent) that actually went to bankruptcy in 2012 the financial problems were indicated by individual models. The criterion for financial problems is based on the distress zone in the first part of the table, in the second part of the table there are also companies that fell into the grey zone.

lag	**3**	**2**	**1**
	Distress zone		
Z´-Score	9.1%	0.0%	0.0%
Z´´-Score	36.4%	27.3%	45.5%
IN05	27.3%	9.1%	18.2%
	Distress zone + grey zone		
Z´-Score	18.2%	18.2%	27.3%
Z´´-Score	54.5%	27.3%	54.5%
IN05	54.5%	18.2%	45.5%

Table 6. Reliability of bankruptcy models: three-years predictive ability

Source: Database Albertina Gold Edition. author´s computation

In the case of predicting serious financial problems of Czech travel agencies, the Z´´-Score is the most reliable model. This shows a reliability estimate of around 50 percent. This result is very good if we realize that the fact that the company is actually shut down is not just a matter of serious financial problems, but may also be different, such as tax or personal. This model proved to be of operational reliability even if we were based on distress zone only when predicting serious financial problems. If we also extend the field for financial problems with a gray zone, the Czech model IN05 also shows similar reliability. In the case of our time series, however, we can see larger fluctuations in the forecast, when in 2010 its reliability was only 20 percent.

The low reliability of the Z´-Score compared to the remaining examined models results from the inclusion of the share of sales in total assets (sub-index X_5) into the model. This sub-index is traditionally high in the case of service enterprises and thus increases significantly the calculated value of the model. The total calculated value is then relatively high and ranks the company in a safe zone despite the unfavorable situation in other important areas like debtness, profitability and solvency.

4. CONCLUSIONS

The bankruptcy models belong to the complex and relative simple and methods for testing the firm financial health of the firms. Thanks to these characteristics, it is one of the most widely used methods of evaluating financial health, not only in the academic environment but also in practice. There are a number of bankruptcy models where the oldest and always the most frequently used is Altman Z-Score model. However, the reliability and results of individual modes may vary. Some may be more suitable for manufacturing companies, others for service businesses. Suitability may also vary depending on the country's particular conditions and practices.

The aim of this study was to test the reliability of selected bankruptcy models as a predictor of financial distress of Czech travel agencies and tour operator. We tested the reliability of three selected bankruptcy models: Altman Z´-Score model, Altman Z´´-Score model and index IN05.

The results show that the predictive ability of the individual bankruptcy models vary significantly for the subsector of Czech travel agencies and tour operators. The Z´´-Score model proved to be the most reliable model for predicting the financial distress of Czech travel agencies and tour operators. Also index IN05 is relative suitable predictor of financial distress where we extended the zone for financial distress with grey zone. On the other hand, the reliability of Altman Z´-Score model is very weak in the case of Czech travel agents.

The findings are useful for selecting a suitable bankruptcy model for testing the financial health of travel agencies in Czech conditions and are useful for both academics and managers. On the other hand, the conclusions need to be taken with some caution. The reliability of the models was tested only at the sample of selected companies for which financial data were available. Using the large sample of firms could lead to more accurate conclusions.

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