FINANCIAL HEALTH AND THE COST OF CAPITAL OF TRAVEL AGENCIES BEFORE AND AFTER THE CRISIS

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Abstract: *This Article deals with the evaluation of the economic crisis in the area of travel agencies. The evaluation was based on the Altman Z-score of financial health and the weighted average cost of capital (WACC). Data presented in 2007-2010 financial reports compiled by selected companies were also employed. Using the signed-rank test the hypothesis the impact of the financial crisis on the financial health of selected companies was examined. The same test was applied to the weighted average cost of capital. Furthermore, dependencies between financial health and the weighted average cost of capital during individual years in concern were investigated. This dependency was tested by means of Spearman coefficient, determination index a correlation coefficient. According to the tests of statistical hypotheses the companies were not affected by a lower Altman Z-score during the crisis; i.e. Their performance was not worse than before the crisis. The impact of the crisis on the weighted average cost of capital was not proven either. Dependency between both indicators (the Altman Z-score and the weighted average cost of capital) was not established. The aim of this Article was to evaluate the impact of the financial crisis and to find possible dependency between stability (represented by the Altman Z-score) and the weighted average cost of capital. It was ascertained that the financial crisis did not have any significant influence on the financial performance of the selected companies. Dependency between the two indicators discussed above was not proven either.*

Keywords: *Altman Z-score, Weighted average costs of capital, Economic crisis, Signed-rank test, Spearman coefficient, Determination index, Correlation coefficient*

JEL Classification: *M21.*

Introduction

This Article evaluates the impact of the global economic crisis on the financial aspects of Czech companies falling within the branch of travel agencies. Travel agencies are characterized with specific financial issues owing to which they are obliged to take out statutory bankruptcy insurance against. Therefore, these companies were more likely to be susceptible to financial problems due to the economic crisis than entities operating in more stable branches. Their financial difficulties result in a change in funding conditions; specifically in worse accessibility of third parties' funds and thus in the necessity to use the companies' own, more expensive funds. In order to be able to monitor comparable financial sources, the main criterion for selecting companies was their legal form; i.e. joint-stock companies since these companies can be financed by both stocks and external equity capital.

2 Statement of a problem

Two indicators were used to monitor the impact of the crises. These indicators were the Altman Z-score and the weighted average cost of capital (WACC). The Z-score, being a composite financial analysis indicator, offers principal financial characteristics and provides a suitable tool for determining the financial standing of a company. The weighted average cost of capital take into account the capital structure as well as the percentile cost of capital per a unit of capital. The main asset of this indicator is the fact it includes not only the cost of foreign capital, but also the cost of own capital equity capital. This cost, sometimes called opportunity cost, were calculated using a modular method which is based on risk allowances, e.g. the risk of company size, liquidity, indebtedness or profitability. Market methods of determining own cost of capital, which are often presented in technical literature, could not be applied due to the unavailability of information on the beta coefficient. Beta expresses the degree a specific market risk by means of measuring the sensitivity of a stock to changes in a market portfolio [7, p. 324]. Another aim of this article was to verify the dependency of the Altman Z-score and of the weighted average cost of capital.

3 Methods

During the compilation of this article data contained in the administrative registers of the economic entities were used. [12]

Companies that actively carry out business activities and whose business activities are classified as OKEČ 790000; i.e. travel agencies whose legal form is that of a joint-stock company were selected to create a primary group consisting of 374 statistical units. Subsequent systematic selection (of every sixth company) generated a selection set that contained the business identification numbers of the selected companies.

Then, data presented in final accounts published in the Commercial Register were processed. [13] The data used were the data required for the calculation of the Altman Z-score, which works as a financial analysis instrument, and of the weighted average cost of capital (WACC) from the years before and after the crisis period of 2007-2010.

When processed, these data created a file to be evaluated. Regression analysis and correlation analysis were used to investigate the dependencies defined in the hypotheses. Regression analysis monitored dependency using the method of least squares and the index of determination. The correlation coefficient from correlation analysis was used as a test of the size and direction of the dependency. Spearman coefficient was used too.

Furthermore, a non-parametric signed-rank test was performed to identify the impact of the economic crisis on the financial health of a company and on WACC.

4 Problem solving

4.1 Financial analysis based on Altman Z-score

Accounting data covering the years 2007-2010 were adopted from final accounts. Balance sheets provided the following data: current assets, equity, borrowed capital, total capital, retained earnings from previous years, short-term liabilities, long-term

and short-term credits and other long-term liabilities, profit after tax, e.g. liability towards a controlling person. Profit and loss statements provided the following data: revenues, interest paid and profit before tax. Because as many as 70% of selected companies fail to meet their statutory duty to publish final accounts in the Commercial Register only 17 companies' data could be used for calculation; i.e. only 30% of the original selected group had at their disposal complete data regarding the years in concern.

The available data were used to calculate Atman Z-score for every company and every single year (Tab. 2). Altman index of financial health referred to as the Z-score model, or Altman Z-score uses discriminant analysis to draw a line between companies that are highly likely to go into bankruptcy and companies that are not jeopardized by bankruptcy. Altman's model was designed on the basis of data provided by both successful manufacturers and manufacturer who subsequently went into bankruptcy. As a result he created a model based on five ratio indicators and their relevant weights:

$$z = \sum_{i=1}^{5} w_i \, x_i \tag{1}$$

Tab. 1: Altman Z-score applicable to unquoted companies

Parameter	Weight	Indicator
X_1	0,717	Net working capital /assets
X_2	0,847	Accumulated profit /assets
X_3	3,107	EBIT/assets
X_4	0,420	Equity /borrowed capital
X_5	0,998	Revenues /assets
z	z>2.7 financially stable company z<1.2 companies at risk of bankruptcy	

Source: [own data processing]

Table 1 implies that the higher the z-score, the better a company's performance. The global economic crisis that affected companies in the Czech Republic as well and thus could have had negative impact on this indicator. Therefore, it was appropriate to examine this index in the year 2007; i.e. prior to the beginning of the world crisis and to compare it with the same index during and after the crisis. This is why the following hypothesis was formulated:

$H1_0$: Before the world crisis (in 2007) and during the crisis (in 2009) the financial health of the monitored companies showed the same tendencies.

$H2_0$: Before the world crisis (in 2007) and after the crisis (in 2010) the financial health of the monitored companies showed the same tendencies.

The hypothesis was subjected to a matched-pairs signed-rank test. The test was chosen in view of the fact that the standard division of the basic group could not be

considered. The random quantities $D_i = X_i - Z_i$, i = 1,2,…17 (i.e. n = 17) was introduced and the tested hypothesis was defined as follows:

$H_0: X_D = 0$ versus this hypothesis: $H_1: X_D \neq 0$

Were X_D is the median of the random quantity D_i. The calculation of the random quantity is shown in Tab. 2.

Tab. 2: Altman Z-score of the financial health of the monitored companies in the years 2007-2010

Altman Z-score of financial health				$D_i = X_i - Z_i$	
2007 = Z_i	2008	2009 = X_i	2010 = X_i	2010&2007	2009&2007
0.31	0.87	0.65	0.71	0.4	0.34
0.5	0.93	0.21	0.98	0.48	-0.29
0.64	8.34	4.57	1.95	1.31	3.93
0.86	5.99	3.62	6.66	5.8	2.76
0.89	4.56	3.77	1.47	0.58	2.88
1.09	0.74	0.88	1.15	0.06	-0.21
1.14	1.59	3.19	2.76	1.62	2.05
1.47	1.85	1.83	2.38	0.91	0.36
1.58	1.5	1.45	1.88	0.3	-0.13
1.85	2.9	3.29	2.59	0.74	1.44
2.03	2.04	1.32	2.56	0.53	-0.71
2.28	1.56	1.73	2.44	0.16	-0.55
2.34	3.59	4.11	2.81	0.47	1.77
2.35	2.6	2.37	3.07	0.72	0.02
2.87	2.54	2.92	2.56	-0.31	0.05
3.28	3.87	1.72	1.25	-2.03	-1.56
7.18	6.8	4.5	3.2	-3.98	-2.68
Y				14	10

Source: [own data processing]

The number of differences with plus signs is expressed by the random quantity Y for which it holds that the critical area is a set of the values of the random quantity Y: $W = \{Y; Y \leq k_1$ and simultaneously $Y \geq k_2\}$, whereas it holds for n = 17 that $k_1 = 4$, $k_2 = 13$. [8, p. 22]

The hypothesis $H1_0$ ("$H1_0$: Before and during the crisis the financial health of the monitored companies showed the same tendency.") is not rejected because the value of the testing criterion fell into the area of admissible values.

The hypothesis $H2_0$ ("$H2_0$: Before and after the crisis the financial health of the monitored companies showed the same tendency.") is rejected because the value of the testing criterion fell into the area of critical values.

3.2 The effects of the economic crisis on the weighted average cost of capital (WACC)

The weighted average cost of capital indicates how expensive a source of funding is used by a company. In the time of crisis companies might tend to contract debts as they might lack in equity. Subsequently, WACC would be reduced because borrowed capital is generally cheaper than equity. It is in this connection that the two following hypotheses are made:

$H3_0$: Before the crisis (in 2007) and during the crisis (in 2009) the companies had the same cost of capital.

$H4_0$: Before the crisis (in 2007) and after the crisis (in 2010) the companies had the same cost of capital.

The statistical analysis of hypotheses testing was based on the following calculation of weighted cost of capital (WACC):

$$WACC = R_D \times (1 - t) \times {}^{D}/_{C} + R_E \times {}^{E}/_{C} \quad (2)$$

Where:

WACC is the weighted average cost of capital,

R_D is the cost of borrowed capital, t is a corporate income tax rate,D is borrowed capital,C is total capital,R_E is the cost of equity,E is equity.

The interest paid reported in the profit and loss statements of the companies in concern was substituted for the cost of borrowed capital.

While the determination of the cost of borrowed capital is simple and straightforward, the cost of capital can be calculated by means of several methods that differ as to the requirements for input information:

In general, the cost of equity can be determined on the basis of market approaches or by means of methods and models based on accounting data. The primary methods used to estimate the cost of equity are: [2, p. 110]

- Capital Asset Pricing Model (CAPM),
- Arbitrage Pricing Model (APM),
- Dividend Growth Model, and
- Modular Models.

The market models CAPM and APM require the knowledge of the beta coefficient. If a company does not pay for a rating evaluation, it has practically no other way to express this coefficient in a more precise way. The dividend model is more suitable for the needs of future investors. Therefore, the modular data based on available accounting data proves appropriate for the appraisal of one's own cost of capital for the purpose of making decision regarding financial sources.

The modular model comes from the sum of individual risk premiums and of the rate of return of a risk-free asset. This relation can be simply described as follows:

$$WACC_U = R_F + R_{podnikatelské} + R_{finstab} + R_{LA} \text{ [2, p. 112]} \quad (3)$$

Where: $WACC_U$ is the cost of total capital of a debt-free company, R_F is the risk-free rate of interest, $R_{podnikatelské}$ is a risk premium for business risk, $R_{finstab}$ is risk premium for risk ensuing from financial stability, R_{LA} is a risk premium that characterizes the size of a company.

The author of this article followed the methodology based on the modular model that is used by the Czech Ministry of Industry and Trade. [7, p. 325] In principle, this methodology describes the calculation (3) and provides clear instructions on what data from accounting statements are to be used. The results are presented in Tab. 3.

Tab. 3: Weighted average cost of capital (WACC) of the monitored companies in the years 2007-2010

Weighted average cost of capital (WACC)				$D_i = X_i - Z_i$	
2007 = Z_i	2008	2009 = X_i	2010 = X_i	2010&2007	2009&2007
0.093	0.126	0.044	0.088	-0.005	-0.049
0.071	0.095	0.078	0.013	-0.058	0.007
0.011	0.006	0.090	0.050	0.039	0.079
0.089	0.095	0.039	0.072	-0.017	-0.050
0.268	0.101	0.148	0.227	-0.041	-0.120
0.076	0.045	0.089	0.047	-0.029	0.013
0.043	0.177	0.086	0.113	0.070	0.042
0.100	0.165	0.114	0.131	0.031	0.014
0.186	0.051	0.038	0.105	-0.081	-0.148
0.085	0.057	0.114	0.018	-0.067	0.029
0.141	0.136	0.047	0.202	0.061	-0.093
0.079	0.112	0.096	0.134	0.054	0.017
0.074	0.075	0.446	0.125	0.051	0.372
0.036	0.027	0.256	0.041	0.005	0.220
0.071	0.832	0.056	0.045	-0.026	-0.015
0.062	0.150	0.118	0.025	-0.038	0.055
0.107	0.041	0.021	0.061	-0.046	-0.086
Y				7	10

Source: [own data processing]

The hypothesis was subjected to a matched-pairs signed-rank test. The random quantity $D_i = X_i - Z_i$, i = 1,2,…17 (i.e. n = 17) was introduced and the tested hypothesis was defined as follows:

$H_0: X_D = 0$ versus this hypothesis: $H_1: X_D \neq 0$

The number of differences with plus signs is expressed by the random quantity Y for which it holds that the critical area is a set of the values of the random quantity Y: Y: W = {Y; Y≤ k_1 and simultaneously Y ≥k_2}, whereas it holds for n = 17 that $k_1 = 4$, $k_2 = 13$ [8, p.22].

The hypothesis $H3_0$ ("Before and during the crisis the companies had the same cost of capital.") is not rejected because the value of the testing criterion fell into the area of admissible values.

The hypothesis $H4_0$ ("Before and after the crisis the companies had the same cost of capital.") is not rejected because the value of the testing criterion fell into the area of critical values.

3.3 The effect of financial health on WACC

The primary task of every financial manager is [5, p.110]:

a) To secure economically justified budgeted capital for investments forecasted by the company that meet the required rate of return,

b) To achieve the least possible cost of required investments,

c) Not to disturb financial stability (not to substantially increase the company's financial risk) – e.g. by disproportionate use of long-term borrowed capital for the financing of investments.

The above information implies that strategic financing should ensure the required amount of capital provided that the cost of financing sources are kept at a minimum and that the company retains its financially stability (financial health). However, is it possible to fully meet both these criteria; i.e. the minimum cost of capital and the maximum index of financial health? Is there any dependency between these quantities? These questions are addressed by the following hypothesis:

$H5_0$: There is no dependency between financial health and the weighted average cost of capital.

The hypothesis that there is no correlation relation between the random quantities X_i and Y_i (a company's financial health expressed in terms of Altman Z-score and the cost of capital or WACC) was tested. The tested hypothesis is defined as follows:

$H_0: \rho = 0$ versus this hypothesis: $H_1: \rho \neq 0$

This problem will first be solved using Spearman correlation coefficient. The results of Spearman test will be verified by regression analysis and correlation coefficient.

Spearman correlation coefficient was chosen because the assumption of the normality of the division of basic group probability was not met. [Kubanova p. 157] the testing criterion is defined as follows: [9, p.157]

$$R_S - 1 - \frac{6}{n*(n^2-1)} \sum_{i=1}^{n} (R_i - Q_i)^2 \quad (4)$$

Where:n is the number of elements to choose from,R_i is the sequence of the ith element of the random quantity X_i in non-descending order,Q_i is the sequence of the ith element of the random quantity Y_i in non-descending order.

The critical area is defined as a set of the values of the testing criterion R_s for which the following holds: $W = \{ R_S : |R_S| > r_{0.05}\}$, whereas $r_{0.05}$ where n = 17 is 0.4853. [8, p. 22]

The results presented in Tab. 4 clearly show that the value of the testing criterion never fell into the critical area; i.e. the hypothesis $H5_0$ is not rejected; and the random quantities of a company's financial health and the cost of capital are independent of each other.

Tab. 4 also features the results of the determination index and the correlation coefficient.

The correlation coefficient [9, p. 144] assumes small values, which is evidence of the non-correlativity of both random quantities. If the values were approaching 1, it would indicate dependence.

The last indicator used to examine the independence between Altman Z-score and the cost of capital is the determination index. This index represents regression analysis.

The determination index expresses the ratio of the explained part of dispersion to total dispersion. It is calculated as follows:

$$R^2 = \frac{S_t}{S_y} \quad (6)$$

Where: S_t is the part of variability that can be explained by means of a regression model (specifically, by a line),S_y is the sum of squared deviations.

The determination index defines what part of the variability of monitored values can be explained by means of the given model. It assumes values ‹0,1›. The smaller the unexplained part of dispersion, the better the ability of the given function to express dependency and the determination index approaches 1.

The data presented in Tab. 4 suggest that the determination index confirmed the absence of any dependency between Altman Z-score and WACC.

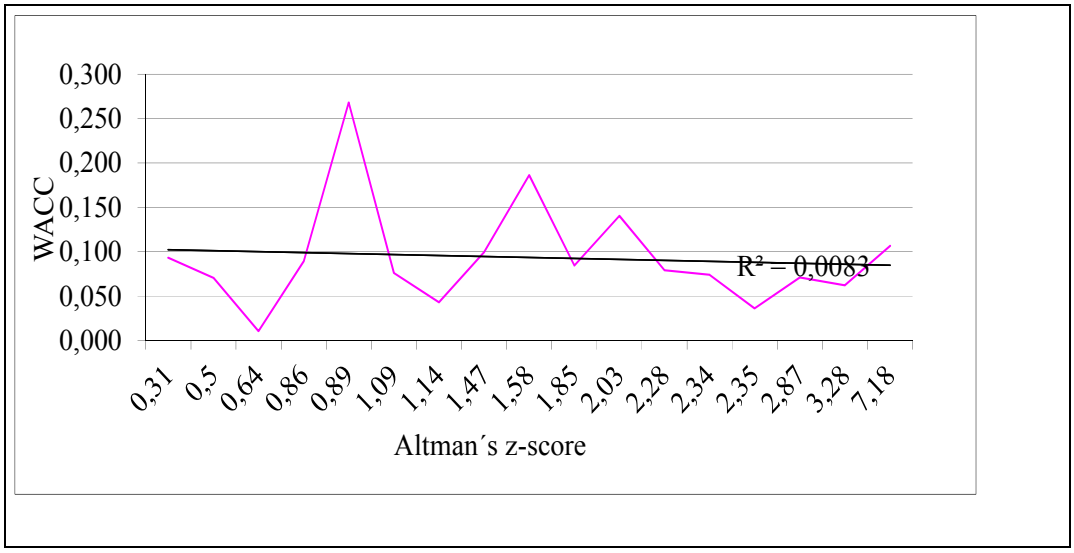
Tab. 4: Indicators of the dependence of Altman Z-score and of the cost of capital in the years 2007-2010

Indicators	2007	2008	2009	2010
Spearman coefficient	-0.0539	0.0564	0.1789	-0.0784
Determination index	0.0003	0.0789	0.0651	0.0067
Correlation coefficient	-0.0270	0.3046	0.2573	-0.1009

Source: [own data processing]

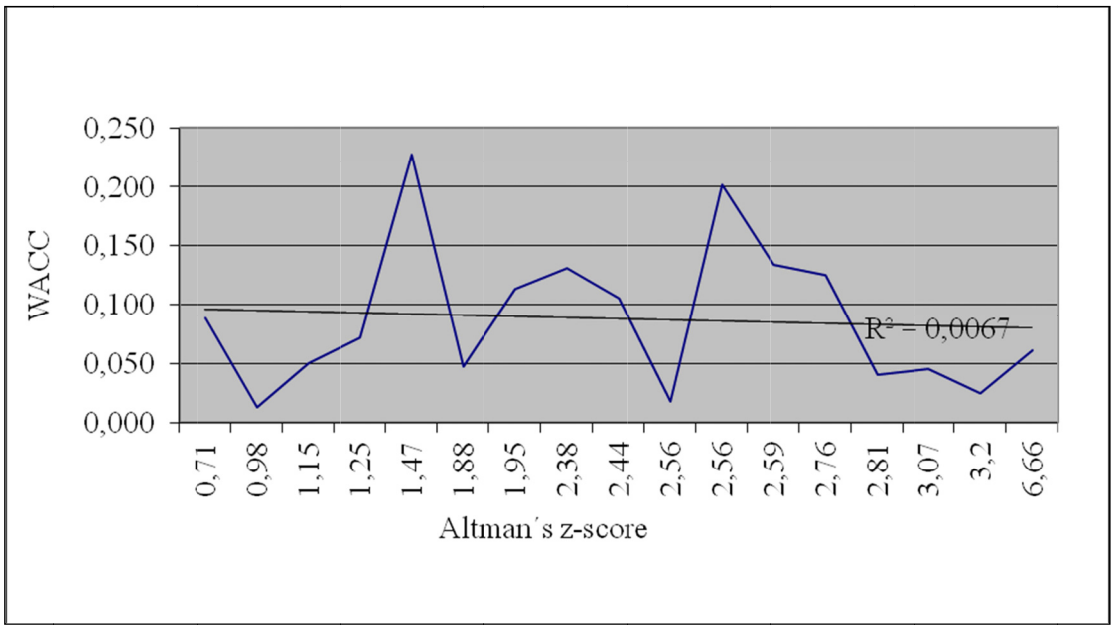
The graphs in figures No. 1 and 2 provide the final representation of proven independence. The interlaid line does not characterize real values. Deviations from the trend are too large.

Fig. 1: The dependence of Altman Z-score and WACC in 2007



Source: [own data processing]

Fig. 2: The dependence of Altman Z-score and WACC in 2010



Source: [own data processing]

5 Discussion

The aim of this article was to assess the degree to which monitored companies were affected by the economic crisis that started in 2008. The indicator used to measure this impact was the Altman index of financial health whose calculation was based on the data presented included in the final accounts of the companies included in the study. The tests of statistical hypotheses showed that the companies were not affected by a lower Z-score during the crisis. Interesting results were revealed by an after-crisis test that identified even higher z-scores after the crisis than before the crisis; i.e. the companies became more financially sound.

Furthermore, this article also dealt with the average cost of capital, or WACC, and with the effects of the financial crisis on WACC. The study did not prove any impact of the crisis on WACC.

Hypotheses recapitulation:

Before the world crisis (in 2007) and during the crisis (in 2009) the financial health of the monitored companies showed the same tendencies.

$H2_0$: Before the world crisis (in 2007) and after the crisis (in 2010) the financial health of the monitored companies did not show the same tendencies.

$H3_0$: Before the crisis (in 2007) and during the crisis (in 2009) the companies had the same cost of capital.

$H4_0$: Before the crisis (in 2007) and after the crisis (in 2010) the companies had the same cost of capital.

$H5_0$: There is no dependence between financial health and the weighted cost of capital.

Tab. 5: Results of hypothesis testing

Hypothesis	Testing results
$H1_0$	Not rejected.
$H2_0$	Rejected.
$H3_0$	Not rejected.
$H4_0$	Not rejected.
$H5_0$	Not rejected.

Source: [own data processing]

The final part of the article paid attention to the possible dependence between a company's financial health and the weighted average cost of capital. Both correlation and regression analysis revealed the non-existence of dependence between financial health and the weighted average cost of capital.

Conclusion

This article was compiled in order to assess the impact of the financial crisis on companies operating in the field of travel agencies. This field already faces financial problems that are likely to be further aggravated by the crisis.

The initial data used in this study were obtained from financial reports of 2007. A summarized financial indicator was computed from those data and then compared with the value of the same indicator applicable to a year falling within the crisis (2009) and to a year after the crisis (2010).

It was confirmed that the crisis did not contribute to the worsening of the companies' financial standing during the crisis. On the contrary, financial results achieved after the crisis were even better than before the crisis.

The same principle was applied to the examination of the weighted average cost of capital that was also expected to change due to the crisis. However, no impact of the crisis was proven.

Considering that the index of financial health and the weighted average cost of capital belong to the most significant financial indicators it is necessary to monitor the relations between the two. The question presents itself whether there is any type of dependence between them; i.e. whether the optimization of either of them affects the other, and if it does, what is the nature of dependence. However, the companies under review did not show any type of dependence.

The original aim of this study was to examine the complete group of the selected companies. However, because a number of the companies did not have their complete final accounts of the period 2007-2010 published on publicly accessible servers the selected group had to be markedly reduced. For instance, it did not include small companies (established after 2008) or companies whose operation was terminated prior to 2010, perhaps due to the aftermath of the crisis.

The calculations presented in this article should offer a more optimistic view of the financial crisis. The generally negative understanding of the impacts of the crisis – which is often even further intensified by the media – cannot be held as dogma. It is always necessary to assess a specific field, a concrete group of companies or a specific company, while simultaneously defining indicators to be researched. Not all results established by this study were as bad as they might have appeared.

Another, no less important aim was to evaluate two significant quantities used in financial management, namely Altman Z-score (that represents the most relevant aspects of financial analysis) and the weighted average cost of capital. It was necessary to prove whether and to what degree these qualities are correlated, because this information could be valuable for financial managers who attempt to secure the best financing possible as well as financial stability. However, our investigation proved that these two indicators are independent. This means that financial managers have to consider each quantity separately.

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