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WHAT DETERMINES FINANCIAL SOUNDNESS OF CROATIAN LISTED FIRMS?

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Abstract
After the financial crisis of 2008, the financial soundness of the firms has gained a lot of attention from the regulators, academicians, the public etc. Therefore, the authors wanted to investigate the factors that determine financial soundness of companies. The analysis is conducted on the sample of companies across different sectors, both financial and non-financial, whose shares are listed at the official market of Zagreb Stock Exchange (ZSE). The timeframe of the analysis covers 2014–2018 period. The influence of different company-specific variables on companies' soundness was analysed including size of the company based on total assets, earnings per employee, expense ratio, sales growth and age of the company while the soundness of the firm was measured with Z-score, an accounting based measure of distance to default. The static panel model has been employed. The results of the analysis suggest that age of the company positively affects soundness whereas other variables are not playing significant role in determining soundness of Croatian listed firms.

Keywords: financial stability, Z-score.

Jel Classification: L22; L25; D25; G33

INTRODUCTION

The issue of firm's financial soundness or stability has occupied scientists and practitioners over the years. It can be observed in terms of insolvency or bankruptcy prediction which has resulted in numerous papers covering both financial and non-financial sector (e.g. Thomson 1991; Langford, Iyagba, and Komba 1993; Yong-Duck et al. 1995; Cummins, Harrington and Klein 1995; Cummins, Grace, and Phillips 1999). The research of failure probability can be observed from the opposite angle by examining

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the factors of stability or soundness. For example, Z-score or Z-index which is often employed as a measure of financial soundness is also "an inverse proxy for the firm's probability of failure" (Berger, Klapper, and Turk-Ariss 2009). As a measure of financial soundness it has been widely used primarily in financial sector firms (e.g. Demirguc-Kunt, Detragiache, and Tressel 2006; Berger, Klapper, and Turk-Ariss 2009; Kiyota 2009; Shim 2011; Michalak and Uhde 2012; Pasiouras and Gaganis 2013; Shim 2017; Cummins, Rubio-Misas, and Vencappa 2017).

According to Schinasi (2004), financial stability can be defined in terms of its ability to facilitate and enhance economic processes, manage risks and absorb shocks. Although the term of financial soundness or financial stability is mainly associated with the financial sector, primarily with the banking and insurance industry, the soundness of listed companies is also considered to be important. Although, the reporting of capitalisation in financial statements varies considerably between financial and non-financial firms, assuming that as in financial sector, equity serves as a buffer against unpredicted losses and it is critical to companies' ability to meet its obligations, it is accepted that the Z-score can function as an indicator of the soundness of firms in general. Furthermore, as stated on the web pages of Bank for International Settlements, Restoy (2017) emphasizes that "the financial sector indicators were introduced following the financial crises of the 1990s to provide country indicators relating to the current financial health and soundness of financial institutions, as well as to that of the corporate and household sectors". Moreover, Mizan and Hossain (2014) note that financial soundness is an issue of great importance for the stakeholders of a business firm including owners or shareholders, creditors, suppliers, management and employees. Thus, the importance of financial stability or financial soundness of firms is not only limited to financial institutions such as banks or insurance companies but it should encompass companies from different sectors, both financial and non-financial, since their activities are interrelated and affect each other. The weak soundness of non-financial corporations might as well disrupt or cause significant adverse impact on economic conditions of the country in general. Moreover, Atkeson, Eisfeldt, and Weill (2017) have measured the financial soundness through an extensive cross section of firms, though using distance to insolvency, finding that the financial soundness of financial firms is similar to that of nonfinancial firms.

Therefore, the aim of this paper is to specify and quantify the variables which are effective indicators of corporate soundness. The period of the analysis relates to 2014–2018. However, due to the calculation of standard deviation of return on assets (ROA) by using 3-year rolling periods, data for analysis span the 2014–2018 period to 2011–2018 period.

The paper adds to the literature in a number of ways. Firstly, it adds to the generally scarce empirical research on companies' soundness by providing new evidence on the issue. It provides a view of the causes of potential problems in both financial and non-financial institutions because adverse financial conditions in institutions from different sectors do not just affect them individually. In this way, the paper aims at bridging the gap by exploring the potential sources of companies' vulnerabilities. Moreover, it is first research of its kind exploring soundness of Croatian listed companies.

The rest of the paper is structured as follows. After giving an introduction into the topic concerned including the goals as well as the background of the analysis, sample description follows. Description of variables is given in the fourth section. Model specification as well as the results of the analysis are provided in section five, while the section six concludes and summarizes describing the limitations of the analysis as well as suggesting directions for future research.

1. LITERATURE REVIEW

There is a growing number of research papers investigating financial soundness using Z-score, an accounting based measure of distance to default, as a soundness indicator (e.g. Uhde and Heimeshoff 2009; Cihak and Hesse 2010; Bourkhis and Nabi 2013; Pasiouras and Gaganis 2013; Shim 2017; Cummins, Rubio-Misas, and Vencappa 2017). However, these papers focus solely on financial institutions. On the other hand, there are also studies on financial stability or soundness covering companies across sectors but these, however, use different soundness indicators or methods such as Altman's Z-score, distance to insolvency, CAMELS framework etc. In the rows following below a selection of papers will be presented.

Atkeson, Eisfeldt, and Weill (2017) examined financial soundness of U.S. firms across sectors over a long period of time, i.e. from 1926 to 2012. The authors have used distance to insolvency as a measure of financial soundness that is leverage adjusted for the volatility of innovations to the market valuation of its underlying assets. They have found that the three most disastrous recessions corresponded with insolvency crises. Furthermore, oscillations in asset volatility seemed to cause variation in firms' financial soundness.

Among the papers analysing financial stability of the banks using different approaches besides Z-score it is worth mentioning papers by e.g. Kumar et al. (2012) and Ginevicius and Podviezko (2013). Specifically, Ginevicius and Podviezko (2013) have evaluated financial stability and soundness of Lithuanian banks using several methods including Promethee method on the sample of eight Lithuanian banks in the period 2007–2009. Using ten different criteria describing soundness of banks, the authors find that the level of soundness and stability of commercial banks in the Lithuanian market fluctuates significantly. Kumar et al. (2012) analysed soundness of 12 public and private sector banks over a period of eleven years (2000–2011) using CAMEL approach. The authors have found that private banks outperform public sector banks that displayed low financial soundness.

There is an extensive body of literature analysing financial stability of the banks while using Z-score as a stability measure. Some of these are shown below. Specifically, Cihak and Hesse (2010) analysed financial stability of Islamic banks in 19 banking systems with a significant presence of Islamic banking. The authors used the Z-score as a measure of bank-specific stability finding that larger Islamic banks tend to be riskier than smaller Islamic banks and similar large commercial banks. Moreover, they also found that smaller Islamic banks tend to be more stable than smaller ones. Furthermore, the increasing presence of Islamic banks in a country's financial system doesn't significantly impact the soundness of other banks. Moreover, Fiordelisi and Mare (2014)

examined impact of competition measured with Lerner index of monopoly power on financial stability in European cooperative banks between 1998 and 2009 finding a positive relationship between competition and stability. The authors also controlled for the influence that different factors at the bank level have on the competition-risk relationship including bank size, herding behaviour, macroeconomic variables and the occurrence of the financial crisis. Thus, they provided evidence of the negative impact of the 2007–2009 financial crisis on the individual risk exposure of cooperative banks whereas they showed positive effect of herding behaviour on bank soundness. Demirguc-Kunt, and Detragiache (2011) investigated whether compliance with the Basel Core Principles for effective banking supervision (BCPs) affects bank soundness. The authors used data for over 3000 banks from 86 countries including commercial banks, cooperative banks, real estate and mortgage banks, and savings banks. They also employed set of control variables such as size based on assets, cost efficiency measured as overhead costs as a ratio of total assets, illiquidity proxied by the ratio of bank loans to total assets and variable to control for whether the bank is a commercial or not. Moreover, the authors used another group of variables capturing overall quality of the institutions while various combinations of macroeconomic variables are employed in robustness tests. The main findings reveal that neither the overall index of BCP compliance nor its individual components are robustly associated with bank risk measured by individual bank Z-scores.

Unlike the banking sector, the research on financial stability of insurers is not so extensive although it is growing. Some of these papers include Shim 2011; Pasiouras and Gaganis 2013; Shim 2017; Cummins, Rubio-Misas, and Vencappa 2017. In all of these papers soundness is measures with an accounting based measure of distance to default, i.e. Z-score. While the papers by Shim (2011) and Shim (2017) focus on U.S. property-liability insurers, paper by Pasiouras and Gaganis (2013) covers life and non-life insurance markets from 46 countries whereas Cummins, Rubio-Misas, and Vencappa (2017) examine influence of competition measured with the Boone indicator on soundness of insurance companies from 10 European life insurance markets.

2. SAMPLE DESCRIPTION

The sample consists of companies listed at the official market of the Zagreb Stock Exchange (herein after referred to as: ZSE). Official market is a segment of regulated market in which it is possible to trade listed instruments. Besides submitting a minimum of information specified by the *Capital Market Act* (2018), issuers at the official market must also submit additional requirements stipulated by the ZSE Rules and regulations. Moreover, when listing instruments on the regulated market, it is generally necessary to prepare a Prospectus, aimed at providing the information which may be required for the purpose of instrument evaluation by investors.

In 2018, there were currently 22 companies whose regular shares are traded at the official market of the ZSE. However, only those companies that were listed for eight consecutive years entered the sample. Due to this fact the sample was reduced after adjusting for incomplete data, i.e. after adjusting for companies that were not listed in

the entire period necessary for calculation of all variables. Furthermore, the companies that reported negative equity capital were also omitted from the analysis. Therefore, the final sample consists of 14 companies per year which makes a total of 70 observations in the five year period covered by the analysis. These companies belong to different sectors including:

- insurance,
- construction of utility projects for electricity and telecommunications,
- monetary intermediation,
- wired telecommunications activities,
- hotels and similar accommodation,
- manufacture of refined petroleum products,
- manufacture of electric motors, generators and transformers,
- cargo handling,
- wholesale of pharmaceutical goods,
- sea and coastal freight water transport,
- manufacture of outerwear and
- manufacture of sugar.

For the purpose of analysis, this study uses financial statements, specifically, balance sheet and profit and loss account, publicly available at the web pages of ZSE. Furthermore, the data on the year of foundation of a particular company are found on their corporate web pages.

3. SPECIFICATION OF VARIABLES

This paper investigates the factors that determine financial soundness of the companies listed at the official market of ZSE where the financial soundness, as dependent variable, is presented with Z-score. It is an accounting based measure of distance to default that is inversely related to the probability of a firm's solvency (Pasiouras and Gaganis 2013). As stated by Lepetit and Strobel (2013) there are various approaches to the construction of time-varying Z-score measures currently in use in the literature. The same authors also state that the question of choosing one particular approach "is an inherently empirical question and will depend on the data under consideration". Different approaches to measuring Z-score were also discussed in Strobel (2011). It is calculated using the following equation:

$$Z - score = \frac{ROA + \frac{E}{A}}{\sigma ROA} \quad (1)$$

where

- ROA stands for profitability and it is calculated as net profit after taxes divided by total assets,
- $\frac{E}{A}$ represents capitalization of a company and is calculated as equity divided by total assets,
- σROA stands for profitability volatility expressed as standard deviation of ROA.

It encompasses profitability measure "since a firm's ultimate existence is based on the earning power of its assets" (Altman 2000) as well as capitalization which is one of the key measures for identifying the company's soundness. According to Schaeck and Cihak (2010), who also used Z-score in this form, though in the banking sector, "the Z-score became rather popular in recent literature". It is worth noting some other authors who used Z-score in their empirical research relating to banking sector such as Demirguc-Kunt, Detragiache, and Tressel (2006), Laeven and Levine (2009), Lepetit and Strobel (2013), while papers relating to insurance industry encompass Shim (2011), Pasiouras and Gaganis (2013) and Shim (2017) to name a few.

Having in mind that the soundness of companies may be determined by various factors, the authors have employed different firm-level variables in order to seize main features of companies and their activities. Specifically, company-specific variables employed in this paper consist of size of a company, earnings per employee, expense ratio, sales growth and age of the company. Specification of each of these variables, including the way of their calculation and probable impact on dependent variable, is given in the following rows.

Size (ln_size) variable is calculated as natural logarithm of total assets. It has been extensively employed in empirical research relating to companies' financial soundness (Schaeck and Cihak 2010; Pasiouras and Gaganis 2013; Cummins, Rubio-Misas, and Vencappa 2017) and firm profitability (Gedajlovic and Shapiro 2002; Joh 2003; Cuervo-Cazurra and Dau 2009). The empirical research shows that the influence of this variable is ambiguous. For example, Cummins and Nini (2002) say that "larger firms have lower insolvency risk and/or are able to earn higher revenues because size conveys market power." Moreover, while investing determinants of firm profitability, Dogan (2013) has summarised empirical research finding positive, negative as well as no influence of firm size on its profitability. Thus, the expected influence of size on companies' soundness is unclear.

Earnings per employee (earnings_emp) and expense ratio (exp_ratio) variables were introduced as management soundness indicators since sound management is crucial for good performance and, according to Evans et al. (2000) can serve as proxies for the soundness of management. Specifically, as stated by the same authors, declining earnings per employee indicate inefficiencies as a consequence of overstaffing adversely affecting performance. Expense ratio measures the company's total costs as a proportion of its total income. An increase of expenses compared to total revenues might also suggest that the company is not operating efficiently probably because of management deficiencies (Evans et al. 2000). Therefore, negative influence of these variables on financial soundness is expected.

Sales growth variable (sales_growth) is calculated as percentage change in sales of each company in each year, i.e. as:

$$\frac{sales_t - sales_{t-1}}{sales_{t-1}} \quad (2)$$

and it was adjusted for insurance company and a bank from the sample accordingly. Growth in sales revenue can be related to the growth of gross premiums written in insurance companies where this variable is often considered as a potential factor affecting soundness (Yong-Duck et al. 1995; Chen and Wong 2004). E.g. Yong-Duck et al. (1995) confirms that rapid growth of premium volume is one of the causal factors in insolvency. While examining the influence of competition on efficiency and soundness in banking sector, Schaeck and Cihak (2010), have also employed growth variable, though asset growth, expecting negative relation between asset growth and profit efficiency which the authors explained by the fact that an expanding bank may not keep its efficiency under control. Therefore, negative influence of this variable on soundness of listed companies is expected.

Age (ln_age) is calculated as difference of year of the analysis and the foundation year of the company. Following Bandyopadhyay (2006) approach natural log of the number of years of the firm since incorporation was used. When predicting insurers' insolvency, Grace, Harrington, and Klein (1998), as stated in Chen and Wong (2004), found that age was negatively correlated with life insurers' rate of insolvency. Moreover, Yong-Duck et al. (1995) have the similar finding stating that "new organizations suffer a higher failure rate than older organizations". Since the age effect on companies' soundness is investigated, positive sign of this variable is expected.

4. EMPIRICAL ANALYSIS

Descriptive statistics for all variables employed in the research are provided in Table 1. Descriptive statistics are computed based on 84 observations for all variables.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
zscore	84	198.7852	669.4077	-18.70041	4697.745
ln_size	84	21.27434	1.369486	19.5172	23.949
earnings_emp	84	123691.7	493528.4	-586147.7	2727439
exp_ratio	84	97.079	19.18347	41.34901	135.5332
sales_growth	84	-2.448261	18.86915	-83.90045	56.74827
ln_age	84	3.768885	0.7948984	1.791759	4.89784

First step in the research was to test stationarity in a panel dataset. The presence of stationarity was tested in all variables using a Fisher-type unit-root test based on an augmented Dickey Fuller test. The results showed that variables size, earnings per employee and expense ratio were not stationary. After finding the first difference for non-stationary variables, the same unit-root test was conducted again. Result showed that the first differences of variables size (ln_size_d), earnings per employee (earnings_emp_d) and expense ratio (exp_ratio_d) were stationary. After conducting testing for stationarity, differenced variables were used in regression analysis. Table 2 presents results of conducted Fisher-type unit-root test based on an augmented Dickey Fuller test.

Table 2. Fisher-type unit-root test

Variable	Inverse chi-squared p-value	Inverse normal p-value	Inverse logit p-value	Modified inverse chi-squared p-value
zscore	0.0007	0.0142	0.0025	0.0000
ln_size	0.0000	0.9778	0.1875	0.0000
earnings_emp	0.0019	0.8798	0.6554	0.0002
exp_ratio	0.0220	0.6765	0.4238	0.0115
sales_growth	0.0012	0.0126	0.0055	0.0001
ln_age	0.0000	0.0000	0.0000	0.0000

Next step in research was to check the problem of multicollinearity between independent variables. The matrix of Pearson correlation coefficients and Variance inflation factors for independent variables (VIF) was implemented to test this problem. Correlation matrix for independent variables is shown with Table 3 while VIF factors are provided in Table 4. An absolute value of the Pearson coefficient higher than 0.7 indicates a strong correlation between independent variables as well as VIF factors higher than 5. As it can be seen from Tables 3 and 4 there was no problem with multicollinearity between independent variables.

Table 3. Correlation matrix

	ln_size_d	earnings_emp_d	exp_ratio_d	sales_growth	ln_age
ln_size_d	1.0000				
earnings_emp_d	0.2318	1.0000			
exp_ratio_d	-0.3574	-0.6761	1.0000		
sales_growth	0.1616	0.1494	-0.1162	1.0000	
ln_age	0.0561	-0.0493	-0.0414	0.0242	1.0000

Table 4. Variance inflation factors for independent variables (VIF)

Variable	VIF	1/VIF
ln_size_d	2.0100	0.4975
earnings_emp_d	1.8800	0.5319
exp_ratio_d	1.1700	0.8547
sales_growth	1.0400	0.9615
ln_age	1.0200	0.9804

Since serial correlation in linear panel-data models biases the standard errors and causes the results to be less efficient, researchers need to identify serial correlation in the idiosyncratic error term in a panel-data model (Drukker 2003). To test if there are signs of autocorrelation Wooldridge test for autocorrelation was implemented. The results of Wooldridge test showed no signs of autocorrelation. The results of the Wooldridge test are provided in Table 5.

Table 5. Wooldridge test for autocorrelation

F (1, 13)	0.01
Prob>F	0.9214

For the purpose of econometric data analysis, static balanced panel data analysis was employed. Model (3) forms the basis of our estimation.

$$Y_{it} = c + \sum_{k=1}^{K} \beta_k X_{it}^k + \varepsilon_{it} \tag{3}$$

$$\varepsilon_{it} = z_i + u_{it},$$

where:

Y_{it} is the financial soundness of the company i at time t, with i = 1,..., N; t = 1,…, T

X_{it} are k independent variables as discussed above.

ε_{it} is the disturbance with z_i being the unobserved insurance-specific effect and u_{it} being the idiosyncratic error. The presented model is a one-way error component regression model where $z_i \sim IIN(0, \sigma_z^2)$ and independent of $u_{it} \sim IIN(0, \sigma_u^2)$.

Static panel with fixed effects (FE) and static panel with random effects (RE) were used in research. Hausman test showed that most appropriate model was static panel model with random effects. Table 6 shows the results of the analysis.

Table 6. Parameter estimates of static panel model with random effects

Variable	Z-score
ln_size_d	-8.159156
	(129.0845)
earnings_emp_d	0.0001436
	(0.000297)
exp_ratio_d	0.1843548
	(5.692625)
sales_growth	3.41589
	(3.37394)
ln_age	274.3213*
	(162.7359)
cons	-833.9954
	(628.7259)
R2 within	0.0286
R2 between	0.2193
R2 overall	0.1182
Hausman test	chi = 0.30
	p value = 0.9901

* Statistically significant at the; 10% level. Standard errors are between parentheses.

The results of the static panel model provided in Table 6 suggest that among several firm-specific variables employed in the model, only age of the company has statistically significant influence on financial stability of the firm whereas other variables did not prove to be significant determinants of firm's soundness.

Similar is found by Bandyopadhyay (2006) stating that the reason has been found in the fact that "matured firms have established a reputation with credit institutes and private investors that alleviates the asymmetric information problems because an extended period of scrutiny would permit a better understanding of the economic viability of the firm", adding that "an older firm could rely on such a relationship to

obtain additional lines of credit or favourable grace periods and can avoid a corporate default event". Furthermore, Altman (2000) states that a relatively young firm might show low retained earnings to total assets ratio because it hasn't had time to create its cumulative profits and, therefore, "its chance of being classified as bankrupt is relatively higher than that of another older firm". Moreover, Coad, Segarra, and Teruel (2010) emphasize that "ageing firms experience rising levels of productivity, profits, larger size, lower debt ratios, and higher equity ratios." Glancey (1998) notes that "a positive relationship between firm age and profitability or growth may be expected if older firms benefit from dynamic economies of scale by learning from experience" adding that "older firms may also benefit from reputation effects, which allow them to earn a higher margin on sales."

There are also studies that have examined the age effect of profitability of firms. Since profitability is an integral part of measuring financial stability it is worth noting that statistically significant and positive effect on performance was found by Pavic Kramaric, Miletic, and Pavic (2017) when performance is measured with both ROA and ROE. Furthermore, Pavic Kramaric et al. (2018) found the strongest positive correlation between age of the insurer and insurance companies' performance. Moreover, when predicting insurers' insolvency, Yong-Duck et al. (1995) find that new organizations "suffer a higher failure rate than older organizations".

CONCLUSION

The soundness or stability of both financial and non-financial institutions is of significant importance because their activities are interconnected and unfavourable movements of one of them can spill over to other market participants. E. g. the financial crisis of the 2008 has caused a series of failures among not only banks or insurance companies but among non-financial institutions as well. Therefore, the authors examine the potential factors that might affect firm soundness on the sample of Croatian companies listed on the ZSE in the period 2014–2018.

By performing static panel analysis using different company-specific variables, the results provide evidence that the soundness of Croatian listed companies is significantly affected by the age of the company suggesting that more mature companies operating in the market for a longer period of time are more sound and stable. Other variables such as size of the company, earnings per employee, expense ratio and sales growth do not play statistically significant role in determining firm soundness.

In this way, policy makers can enforce different rules and principles in order to strengthen the soundness of the companies in general with the aim of ensuring that sound companies contribute to preserving health and stable economy.

Still, the authors are aware of the limitations of this study. First of all, a set of factors that might potentially impact soundness used in the research should be extended. Therefore, as a result of future research needed on this issue, specific features of different sectors covered by the analysis should be taken into account. Such indicators should be comparable across countries, i.e. suitable for comparative analysis in order to conduct cross-country study with the aim of providing more evidence on the issue. Moreover, since the sample consists of both financial and non-financial firms that have different reporting requirements

regarding financial statements, it might be useful to extend the sample and see whether financial soundness of financial firms is significantly different than for the other firms.

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