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## **Roots and Causes of Financial Distress: An Empirical Investigation for Three Industries in Albania**

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### **Abstract**

This study aims to conduct an in-depth analysis on the drivers of the financial performance of pharmaceutical, energy and construction sectors in Albania. The authors use the components of Z' score as drivers of distress, specifically Working Capital/Total Assets, Retained Earnings/Total Assets, EBIT/Total Assets, Book Value of Equity/Book value of Total Debt, Sales/Total Assets. The years covered in the analysis are 2015-2018. The sample size is 200 companies. The results are compared with the original research of Dhamo and Kume (2016). According to the empirical findings of this research, X4 drives the energy sector to be in a better position in terms of credit risk as compared with the two other industries. Both energy and construction show lower credit risk, mainly due to X1 and X4, as compared with the same industries in the original research of Dhamo and Kume (2016). Financial ratio stability, which directly impacts the stability of Z' score, is an issue in the latter sample period, however.

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**Keywords:** Financial distress, industry performance, default risk

**Jel codes:** G32, G33

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## 1. Introduction

This research further investigates the financial distress performance of three specific industries in Albania, following the original work of Dhamo and Kume (2016). The study aims to identify the main sources of distress for pharmaceutical, construction and energy sector in Albania.

The pioneer research of factors contributing to distress and default for non-financial firms is the seminal work of Altman (1968). The author introduced multi-discriminant analysis technique, aiming to assess the influence of firm-specific financial drivers on probability of default. The newly introduced method enabled the categorization of firms to expect default and non-default. Enhancements of Altman's model was proposed by Altman et al. (1977), where was introduced a version of the model tailored for retail business, which achieved 70% accuracy in prediction for a horizon forecast of 5 years. Altman and Heine (2000) refined the model by considering two new versions of it, namely  $Z'$  and  $Z''$ , for private companies. Furthermore, Altman (2005) adopted the model for applications in emerging markets, non-manufacturing sectors, and private firms, incorporating a constant that represents the median score of bankrupt entities in the US, and adjusting for additional factors such as currency risk and market competitiveness.

Alternative methodologies to the multi-discriminant analysis were explored by Balkaen & Ooghe (2004) and Anjum (2012). These studies investigated logit and probit regressions, recursive partitioning, algorithms, and neural networks. They emphasized the limitations of relying only on annual financial statements. Altman et al. (2017) enhanced  $Z''$  model using Logistic Regression and adding new variables such as firm size, age, industry, and country. The study enabled the application of the model internationally. The authors promote country specific models, suggesting that small modifications can impactfully improve prediction accuracy. More recent studies (Muñoz et al. (2020) and Daryanto & Rizki (2021)) have confirmed the relevance of Altman's  $Z''$ -Score model in discriminating between distressed and non-distressed firms, highlighting the efficacy across financial ratios and using it to assess the impact of global pandemics in sector-specific default likelihood.

This research analyzes the source of distress performance for construction, pharmaceutical and energy sectors in Albania over the period 2015-18, using a mean & range analysis of the five variables of  $Z'$  scores of businesses in these industries. The study further compares the financial health performance of energy and construction with the original research of Dhamo and Kume (2016). This paper continues with a detailed explanation of the methodology, followed by a description of the source of data. The next section analysis the performance of financial ratios driving default across industries and in time, followed by a comparative analysis between the two studies. The last section of the research is the concluding remarks.

## 2. Data & Methodology

The methodology of this paper is based on the use of Altman's Z-Score model inputs to assess the financial distress drivers of construction, pharmaceutical and energy industry in Albania. The original variables of Altman's Z Score are unfeasible for Albania, because of the absence of publicly traded companies in security exchanges. This means that the original variable, market value of equity/book value of debt, cannot be calculated.

The  $Z'$  formulae involve the following variables:

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

Where:

- $X_1$  represents Working Capital/Total Assets,
- $X_2$  represents Retained Earnings/Total Assets,
- $X_3$  represents EBIT/Total Assets,
- $X_4$  represents Book Value of Equity/Book Value of Total Debt,
- $X_5$  represents Sales/Total Assets

In this study, the author investigates the drivers of distress, analyzing the mean and variability of the inputs of the  $Z'$  score formulae, which constitute key indicators of business performance that affect solvency, namely  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  and  $X_5$  described above.

The primary dataset used in this research is the 200 biggest companies in Albania, as measured by revenue magnitude, according to a list published by the prestigious local magazine, Monitor, in 2019. The financial statements of these businesses are publicly accessible in the National Business Center website<sup>1</sup>. The authors have

<sup>1</sup> [www.qkb.gov.al](http://www.qkb.gov.al)

computed the financial ratios, Working Capital/Total Assets, Retained Earnings/Total Assets, EBIT/Total Assets, Book Value of Equity/Book Value of Total Debt, Sales/Total Assets using data from the official financial statements of these companies for the period 2015 through 2018.

The following section provides an empirical analysis of the bankruptcy risk drivers for the construction, energy, and pharmaceutical industry in Albania.

### 3. Analysis of the Empirical Results

*Variable analysis for the period 2015-2018:* This section, it provides an empirical analysis on the drivers of default for the period 2015-2018. The author shows how Working Capital/Total Assets (X1), Retained Earnings/Total Assets (X2), EBIT/Total Assets (X3), Book Value of Equity/Book value of Total Debt (X4), Sales/Total Assets (X5) have evolved in time for each industry, what has been the range of financial ratios on each year, and how they have performed across industries. The analysis is based on the results presented in Table 2 below.

#### 1. Construction Industry

- a. Book Value of Equity/Book value of Total Debt (X4), Sales/Total Assets (X5) have continuously increased in the period under consideration, impacting positively on the financial health of the industry. EBIT/Total Asset has been relatively stable in 2015-18, with minor changes, while WC/TA and RE/TA changes have been nonstable upwards or downwards.
- b. The highest ranges (difference between minimum and maximum value within the sample companies) has been observed in X4 in most of the years (except 2015, where the highest range is observed in X1), meaning that X4 as a financial ratio is quite unstable for the construction industry. The most stable ratio, as measured by range, is EBIT/Total Assets during the observation period. The variability of X1 has been decreasing in time, and the variability of Sales/TA has been increasing.

#### 2. Energy Industry

- a. The average financial ratios in the energy industry sample have been alternating during the period under observation, with WC/TA, RE/TA and EBIT/TA being the most stable averages.
- b. The narrowest range has been observed in X3, with Book Value of Equity/Book Value of Total Debt experiencing the widest difference between minimum and maximum ratios within the industry sample companies. Sales/TA have experienced an impactful widening in the range in the last two years of observation.

#### 3. Pharmaceutical Industry

- a. The average ratios of X2 and X3 have been quite stable in the observation years. The rest of the financial ratios have experienced an alternating evolution over 2015-18 in terms of averages.
- b. It is observed that there is a decreasing trend in the variability of RE/TA over time, as measured by the difference of maximum and minimum ratios within the sample companies of pharmaceutical industry.

#### 4. Comparative analysis between industries

- a. Energy shows the best performance in terms of Retained Earnings/Total Assets as compared with the two other industries, independently of the year under consideration.
- b. Energy seems to also experience the best performance in terms of Book Value of Equity/Book value of Total Debt (X4) as compared with construction and pharmaceutical, independently of the fiscal year.
- c. Pharmaceuticals Sales/Total Asset ratio has the highest average value as compared with other industries through 2015-18.
- d. Variable X4 seems the least stable credit risk input across all years through all industries.
- e. Considering energy shows the highest average Retained Earning/Total Assets and Book Value of Equity/Book value of Total Debt through all year, with the latter having an important difference with the averages of the other two industries, this makes energy experience a higher average value of Z' Score as compared with Construction and Pharmaceuticals.

<b>Table 1: Summary Statistics of the financial ratios for the three main industries</b>											
		2015					2016				
		X1	X2	X3	X4	X5	X1	X2	X3	X4	X5
Construction	Avg	1.10	0.04	0.06	0.47	0.61	0.36	0.01	0.08	0.77	0.61
	Min	0.06	(0.08)	(0.14)	(2.69)	0.12	0.03	(0.80)	(0.06)	(0.22)	0.09
	Max	8.86	0.33	0.21	2.42	1.21	0.89	0.42	0.31	2.51	1.26
Energy	Avg	0.42	0.23	0.11	13.16	0.60	0.41	0.18	0.11	13.57	0.40
	Min	0.14	0.00	0.00	0.04	0.05	0.19	(0.00)	0.02	0.23	0.03
	Max	0.89	0.74	0.26	59.72	1.10	0.93	0.81	0.23	45.44	0.83
Pharmaceutical	Avg	0.35	0.07	0.11	1.06	1.49	0.30	0.05	0.09	0.78	1.37
	Min	0.08	0.00	0.06	0.08	0.68	0.03	(0.01)	0.01	0.04	0.26
	Max	0.53	0.31	0.29	3.42	1.85	0.67	0.26	0.26	1.70	2.11
		2017					2018				
		X1	X2	X3	X4	X5	X1	X2	X3	X4	X5
Construction	Avg	0.35	0.05	0.10	0.94	0.73	0.33	0.06	0.10	2.48	0.88
	Min	(0.03)	(0.42)	0.03	(0.22)	0.11	(0.05)	(0.49)	0.02	(0.14)	0.09
	Max	0.88	0.41	0.31	2.83	1.72	0.82	0.51	0.31	30.20	6.03
Energy	Avg	0.41	0.30	0.08	17.01	0.77	0.40	0.20	0.17	7.95	1.45
	Min	0.04	(0.00)	(0.01)	0.26	0.18	0.19	(0.12)	0.00	0.37	0.22
	Max	0.93	0.94	0.24	77.11	1.38	0.82	0.61	0.38	31.83	2.56
Pharmaceutical	Avg	0.43	0.03	0.11	1.40	1.49	0.41	0.04	0.12	1.05	1.45
	Min	0.11	0.00	0.05	0.87	1.01	0.03	0.00	0.04	0.19	1.05
	Max	0.83	0.12	0.30	2.28	2.01	0.59	0.11	0.28	1.79	2.01

**Source:** National Business Center, Albania; Authors' computations

#### 4. Performance comparison with the original paper of Dhamo and Kume (2016)

It is important to note in this study that the research presented here and the initial investigation by Dhamo and Kume (2016) have relied on distinct sets of sample companies to construct industry credit risk indicators. Construction X1, X3 and X4 ratios show a higher average value over the period 2015-2018 as compared with the period (2011-2013) considered in the original paper of Dhamo and Kume (2016). Variables X2 and X5, however, decreased on average in the latter period. Considering the increases of X1, X3 and X4 have been more impactful in aggregate than the decreases of X2 and X5, the Z' score has increased on average on the latter

period showing a slight improvement in the credit risk profile of the construction industry, as compared with the period 2011-2013. It is important to note, however, that input variability has increased through all the five financial ratios in the latter period, as compared with the range (maximum-minimum) presented in the original research of Dhamo and Kume (2016).

Energy sector variables have increased in the latter period as compared with the original study, except Sales/Total Assets. For this reason, Z' score of 2015-18 period is impactfully higher than the one in the original study of Dhamo and Kume. The variability of all inputs except Sales/Total Assets is higher in the latter period, however, indicating less stable Z' scores.

Next section summarizes the concluding remarks of this research.

## 5. Concluding Remarks

This research studies the roots and causes of financial distress for the construction, pharmaceutical and energy sector in Albania over the period 2015-2018. The data used are the five variables that build Altman's Z' Score. The author assesses the average and range of these variables within each sample industry group for every fiscal year. This paper observes that the energy industry is in a better financial position, mainly due to its higher X4 value, while the construction and pharmaceutical industry shows a mixed picture of financial stability with few improvements on key ratios and regress on others.

Both construction and energy industries have improved in most of the variables, as compared with the original study of Dhamo and Kume (2016). Such improvement enabled a better average Z' Score for both industries in the latter period. Variability increase (maximum-minimum values of each ratio within the sample companies of the industry) is observed across all inputs of both sectors in the latter period, except Sales/TA for the energy sector. This indicates less stable Z' Scores in the latter period.

The research offers practical implication to policymakers, financial institutions, and industry practitioners in Albania. By identifying the key drivers of financial distress through well-known financial ratios, the study enables stakeholders in driving regulatory framework, intervention strategies and developing effective monitoring aiming to mitigate/foresee financial risks and improve economic stability.

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