Further Investigation on Financial Distress: A Comparative Performance Study among three Industries in Albania

This research presents an empirical investigation of the financial health for the energy, construction, and pharmaceutical industries in Albania. The authors use Z' and Z" score as indicators of financial health. The period under investigation is 2015-2018, and companies considered are from the top 200 list in terms of revenue. The findings of this research are compared with the original work of Dhamo and Kume (2016). The findings reveal diverse financial distress conditions and trends among the three industries. Construction and pharmaceutical sector show fluctuating and non-concluding performance in terms of risk of default. The energy sector is classified as non-default, independently of observation period or metric used. Construction and energy seem to have improved in terms of financial health, according to the data and metrics considered in this study, as compared with the performance investigated in the work of Dhamo and Kume (2016).

Keywords: *Financial distress, Altman Z score, industry performance, default risk, empirical analysis.*

Introduction

This research provides further insights on credit risk performance of industries in Albania, following the work of Dhamo and Kume (2016). We focus on the financial characteristics that cause distress for the construction, energy, and pharmaceutical industries in Albania.

The beginning of financial performance research, with special focus on probability of default, is based on the seminal work of Altman (1968). The author introduced multi-discriminant analysis as a method that investigates the impact of firm characteristics, measured by financial ratios. Such analysis serves to categorize companies as either default or non-default. The original work of Altman identified five key financial ratios that were expected to drive the firm default behavior for US manufacturing listed companies, namely Working Capital/Total Assets, Retained Earnings/Total Assets, EBIT/Total Assets, Market Value of Equity/Book Value of Debt, Sales/Total Assets. The original Z model show a high level of accuracy, with 94% correct predictions of bankruptcy cases.

The original study is followed by model upgrades suggested by Altman et al. (1977). The authors proposed a tailored model for retail firms, having an accuracy rate of 70% for five-year horizon forecasts. Altman and Heine (2000) cite further enhancement in the model, proposing private companies' models Z' and Z". Z' model replaces the market vale of equity with book value in X4, while Z" model accounted for industry effects, through excluding Sales/Total Asset ratio. This metric is believed to be heavily influenced by the industry where the company operates.

Altman (2005) adapted the Z model for emerging markets, non-manufacturing firms, and privately held businesses. This version has also a constant representing the median score of bankrupt entities in US and adjusted for factors such as currency risk and competitive position.

Other researchers like Chava and Jarrow in 2004, Smith and Liou in 2007, and Hayes et al. in 2010, contributed significantly by introducing monthly intervals for bankruptcy prediction, incorporating macro variables, and affirming the Z″ model's predictive power in specific sectors like retail.

Balkaen and Ooghe (2004) & Anjum (2012) focus on the limitation of relying solely on annual accounting data. The studies investigate alternative models to the MDA approach, including logit and probit regressions, recursive partitioning, algorithms and neural networks.

Altman et al. (2017) expands the Z" model using a new estimation technique, Logistic Regression instead of Multi-Discriminant Analysis, and adding new variables, such as firm size, age, industry, country & shortening the estimation period. The authors conclude that the Z"-Score Model, enhanced with background variables, provides very good results internationally. A model tailored to individual countries, however, may be more accurate. Adding basic additional variables to a country specific model can impactfully improve the ability to predict accurately bankruptcy.

Muñoz et al. (2020) find that, using Altman's Z"-Score model revealed significant differences between distressed and non-distressed firms across various financial ratios. The analysis confirms that financial ratios significantly varied between the two groups, showing effectiveness in determining the difference between financially distressed and non-distressed firms.

Daryanto and Rizki (2021) study the effect of the pandemics in the construction sector default probability in Indonesia. The authors find that, before pandemics, the scores were within a safe zone. From Q3 2019, the scores fell within the gray area, classifying the sector in a higher risk of default. The scores worsened by a maximum of 0.5 points during the pandemics, suggesting a higher likelihood for defaults in the upcoming 2 years.

In this research, we focus on the bankruptcy characteristics of the construction, energy, and pharmaceutical sector in Albania for the period 2015-2018. The classification is done using the mean and the range of Z' and Z" scores of companies within each of the sectors under study. Furthermore, for two specific industries, energy, and construction, we compare the financial health observed in the latest sample period (2015-2018) with the one studied in the original research of Dhamo and Kume (2016), which covers the 2011-2013 period.

The research continued with a detailed description of the methodology, followed by a section highlighting the sources of data. The fourth section analysis the potential default characteristics of construction, energy, and pharmaceutical industries for the period under consideration. Section 4 expands on making a comparative analysis between the findings of this study and the original work of Dhamo and Kume (2016) specifically for the construction and energy sector. Concluding remarks is the last section, which summarizes the main findings and highlights the possibilities for further research.

Methodology

This paper's methodology is centered around Altman's Z-Score models for assessing distress characteristics of businesses in the construction, energy, and pharmaceutical industries in Albania. It is not feasible to apply of the original Altman (1968) Z-Score model to be implemented in the Albanian context, since, to the best of the authors' knowledge, there is no Albanian company publicly listed in security exchange as equity issuer. This means that it is impossible to calculate the independent variable, X4, as the ratio of market value of equity to book value of debt.

Altman (2005) and Muminovic (2013) advocate for customized distress models using local firm data since the latter tend to capture the specific characteristics of the country. The Albanian context, as explained by Dhamo and Kume (2016), makes it challenging to build such models due to very limited data on bankruptcy filings. The lack of data is mostly attributed to the embryonal corporate culture in Albania, where businesses were state owned until 33 years ago. This implies that solvency and bankruptcy practices, although well covered by law in recent years, have not been properly implemented yet. The focus of this research, however, is to assess the distress tendency of three well known sectors using well established and acknowledged indicators in financial literature.

We implement Altman's Z' and Z" Models to quantify the distress position of the construction, pharmaceutical and industry sectors in Albania. Z' formula includes:

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

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

Each variable represents a unique aspect for the financial health and operational efficiency of the business. Z' score categorizes companies as:

1. Bankrupt, if the score is lower than 1.23,
2. Non-bankrupt, if the score is higher than 2.9
3. Gray area (undefined solvency), if the score is between 1.23 and 2.9

The Z" model omits the Sales/Total assets variable, because of its sensitivity to industry effects. The coefficients accompanying the other four variables (X1, X2, X3, X4) are adjusted to reflect the omission.

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

The Z" model categorizes companies as:

1. Bankrupt, if the score is lower than 1.1,

2. Non-bankrupt, if the score is higher than 2.65
3. Gray area (undefined solvency), if the score is between 1.1 and 2.65

To make the results of the study more feasible, the authors selected three industries that have different levels of sensitivity to economic cycles. Namely, we selected one highly cyclical activity, namely construction, and two activities that are cyclical agnostic, namely energy and pharmaceutical. We apply Z' and Z" models to the financial data of the businesses within each of the three industries for the period 2015-2018. Mean, minimum and maximum scores are calculated for the two models in each industry over 4 years.

Based on an empirical analysis, we categorize the distress position of each industry for the 4 year period. The gray area of each model is included and visually summarized in Figures 1 and 2.

The research continues with the comparison of construction & energy industry performance in the new sample vs. the pervious study (Dhamo & Kume, 2016) in terms of exposure to credit risk, based on Z' and Z" average and range scores.

Next section continues with the description of the data used, providing a comprehensive view on the reasoning of company selection. While innovative, the followed approach is an adjustment to the Albanian context regarding well-structured financial data availability.

Data

As mentioned in the previous section, we focus on the analysis of possible solvency for three industries in Albania, construction, energy and pharmaceutical. The lack of well-functioning financial markets prevents the authors from identifying firms representing each sector using market capitalization.

The database used in the study is the list of 200 biggest companies operating in Albania, published by the local prestigious magazine Monitor. Each of the companies are categorized into specific industries, and relevant metrics are built based on these industry groups. The financial statements are available in the official website of the National Business Center of the Albanian Republic. We draw from these statements the nominal value in Albanian LEK of current assets, current liabilities, total assets, total liabilities, sales, EBIT, retained earnings and book value of Equity. The financial reporting years are 2015, 2016, 2017, 2018.

Next section reports a detailed analysis for the bankruptcy risk of construction, pharmaceutical and energy sector in Albania for the fiscal period considered in this research. We also compare the conclusion of this empirical analysis with the findings of the original research conducted by Dhamo and Kume (2016).

Empirical Analysis of Results

Z' and Z" scores for 2015-2018: Table 1 presents the average, minimum and maximum Z' and Z" scores for the companies in the construction, pharmaceutical and energy industry in Albania. The construction industry is well represented in the sample of the 200 biggest companies operating in Albania, with 21 companies. Energy and pharmaceuticals, however, are represented by 5 companies each in the top 200. Figures 1 and 2 show how the average Z' and Z" score has evolved in time for each of the industries.

1. Construction Industry
    a. With respect to Z' score, the construction industry has always been within the gray area. The average credit risk, as measured by Z' score, has shown an improvement in the last year (2018), but still the industry average does not exceed the 2.95 value, the upper limit of the gray area. The risk of score stability, measured by the range (maximum – minimum within the industry sample) narrows down for the construction industry between 2016-2017, while it widens to 13.84 in the last year of financial observations.
    b. Regarding Z" score, the performance of construction sector is always considered as virtually non-default, because the average score of the industry has always been higher than 2.65, the upper bound of the gray area for Z". The sector has the best performing year in terms of low credit risk in 2015, and the worse one in 2016. The stability risk is higher, however, in the first and last year of observation, with score ranges being more stable in 2016 and 2017.
    c. In summary, the construction sector shows higher credit risk in 2016 and 2017, and lower risk in the first and last observation, as measured by the average score, independently of the metric (Z' or Z") used. The score stability, however, is riskier in 2015 and 2018, as compared with other years.
2. Energy Industry
    a. Z' average score categorizes the energy sector as non-default, independently of the years under consideration. The worst performance is in the last observation year, however, with the best performance being in 2017. In terms of credit risk score stability, last year shows more stable score (less risk for score change) as compared with previous scores.
    b. Z" score for energy sector drive to the same conclusion as the Z' score with regards to default risk of the sector through all the period under observation. Same thing applies to best and worst performing year 2018 showing the highest credit risk and the previous year showing the lowest credit risk. The Z" scores are more stable in the observation year, showing less risk for change and dispersion within the sector, as compared with the period 2015-2017.

c. In conclusion, Z' and Z" drive similar conclusion in terms of average credit risk of the industry, year with higher and lower risk, and industry risk dispersion. The industry is categorized as non-default, independently of the metric used. The year with the highest credit risk is 2018, while the year with the lowest risk is 2017. Industry risk dispersion (difference between minimum and maximum score within the industry) is lower in the last observation year.

3. Pharmaceutical sector
   a. Like the constructions sector, pharmaceuticals Z' average score categorize this industry in the inconclusive area, meaning neither in the tendency to default nor in the tendency to non-default. The year with the lowest credit risk is 2017, while the year with the highest risk of default is 2016. In terms of score stability, last observation year show much lower dispersion as compared with previous years, meaning that companies within the sample of this sector were similar in terms of exposure to default risk.
   b. Z" average score categorizes the pharmaceuticals as nondefault, independently of the observation year, which is like the two other industries. In line with credit risk tendency shown by average Z' score, the best performing year (ie lowest credit risk) is 2017, and worst performing year (ie highest credit risk) is 2016 for this sector, according to Z" average score. Z" score dispersion is lowest in the last observation year, as suggested also by Z' minimum and maximum score observations within the pharmaceutical industry.
   c. As a summary, we may conclude that pharmaceutical sector is inconclusive in terms of default risk, according to Z' score, and non-default, according to Z" score. The year where the lowest credit risk is shown is 2017, and 2016 is the highest risky year. Companies within this industry sample show quite similar credit risk exposure in the last observation year.
4. Comparative analysis between industries
   a. Energy shows the lowest credit risk exposure, independently of the score metrics ore observation year. It is always categorized as non-default in the period under observation. We will deep dive into the Z' and Z" score constituent analysis to understand the reason for the low average credit risk of this sector.
   b. With reference to Z' average score, pharmaceutical industry seems to be in a better position as compared with construction, independently of the observation year. Both sectors, however, are categorized as inconclusive in terms of default or non-default classification. Z" score shows mix results in terms of relative credit risk exposure for construction and pharmaceutical. While 2017 seems a better year for pharmaceutical industry, construction shows lower credit risk, as measured by the average Z" score, in all the other years.

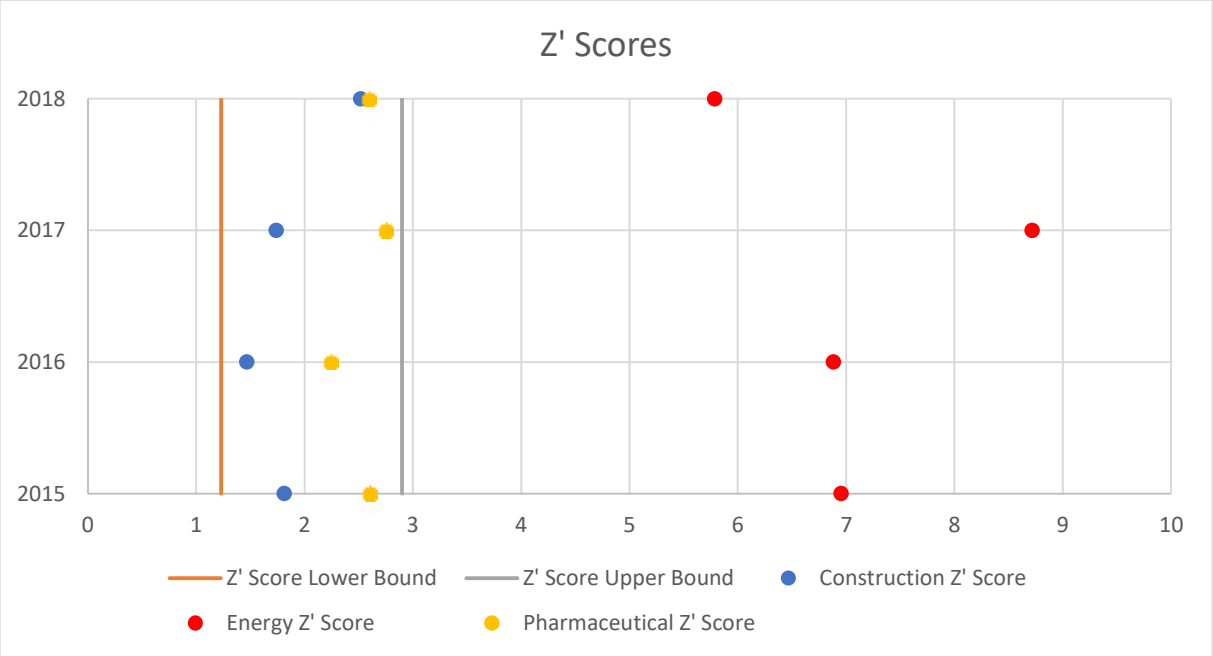
c. Z" score categorizes the three industries as non-default, independently of the observation year. This might indicate that Z" model might not be a feasible credit risk metric for companies operating in Albania. We will validate this observation later, when comparing the Z" average scores of this study with the original study of Dhamo and Kume (2016).
d. While energy shows the lowest credit risk, it also shows the highest in sample score dispersion as compared with the two other industries, independently of the observation year, based on results presented in Table 1. One of the reasons might be the fact that there are generally two categories of businesses operating in this field, those that are well established, have strong governance structure, and apply hedging strategies to maintain the low gross profit margins of the sector strong, and others who have recently joined the industry and do not have, yet, the experience to maintain profitability and leverage in control, although being able to generate a high volume of sales.

Table 1. *Summary Statistics of the Z-Score among Three Models, for the Industries Included in this Study*

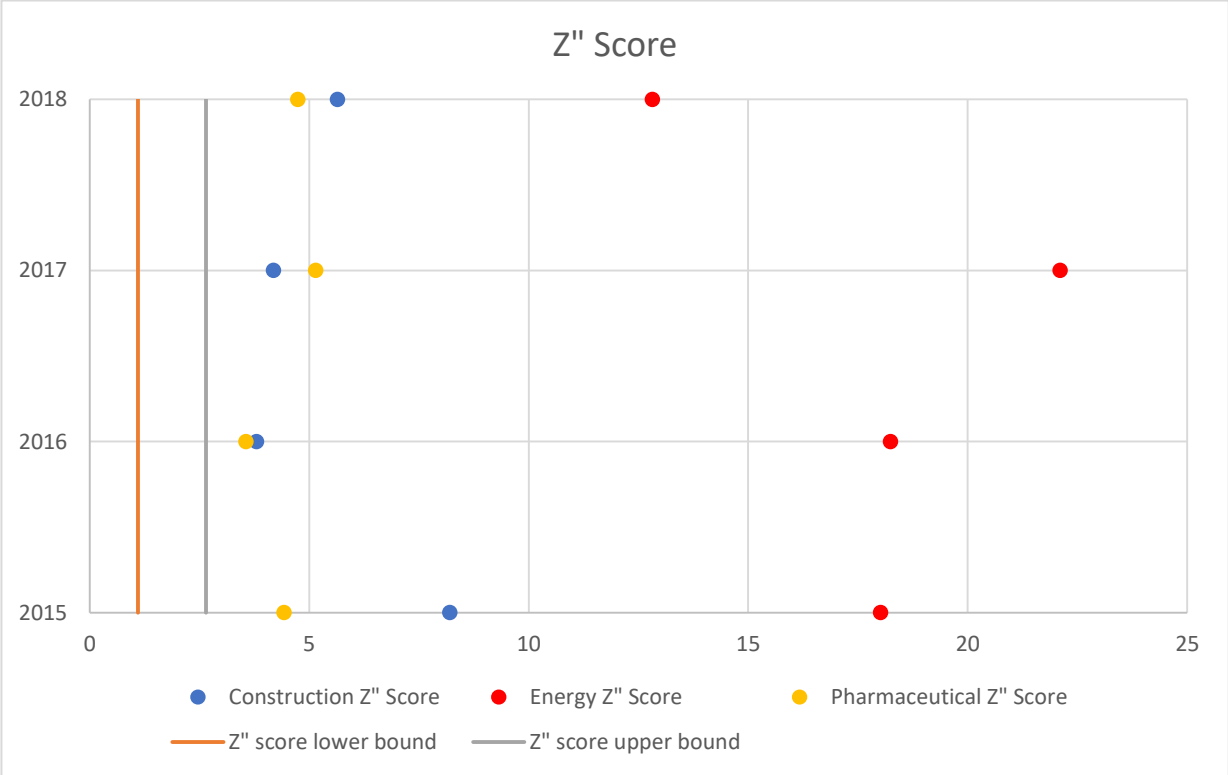
2018			
		Z'	Z"
Construction	Avg	2.519	5.649
	Min	0.318	-0.344
	Max	14.162	37.511
Energy	Avg	5.787	12.820
	Min	1.734	4.429
	Max	17.909	43.383
Pharmaceutical	Avg	2.591	4.741
	Min	2.087	2.276
	Max	2.859	6.385
2017			
		Z'	Z"
Construction	Avg	1.740	4.186
	Min	0.357	0.640
	Max	3.287	9.025
Energy	Avg	8.717	22.110
	Min	1.562	3.008
	Max	34.534	90.396
Pharmaceutical	Avg	2.748	5.150
	Min	2.238	2.611
	Max	3.066	8.324
2016			
		Z'	Z"
Construction	Avg	1.467	3.804
	Min	0.278	0.682

	Max	2.905	8.935
Energy	Avg	6.884	18.247
	Min	0.952	3.162
	Max	19.420	50.034
Pharmaceutical	Avg	2.244	3.562
	Min	0.335	0.329
	Max	3.500	6.836
2015			
		Z'	Z"
Construction	Avg	1.813	8.209
	Min	0.113	0.619
	Max	6.965	58.927
Energy	Avg	6.954	18.020
	Min	1.479	2.743
	Max	27.772	72.764
Pharmaceutical	Avg	2.600	4.427
	Min	1.769	1.066
	Max	4.117	8.291

Graph 1. *Z'Scores trends across industries in the 2015-2018 period*



Graph 2. *Z" Scores trends across industries in the 2015-2018 period*



In terms of comparison among periods, as mentioned earlier in text, this study covers the 2015-2018 period, while the first research of Dhamo and Kume (2016) covers the 2011-2013 period. Comparing the finding of this research with those of Dhamo and Kume (2016), we observe that construction and energy industry are less exposed to the risk of default in the period 2015-2018 (latest period) than in the period 2011-2013 (earlier period).

The construction industry has faced an increase of the average Z' score by 0.14 over the latest period, as compared with the earlier period. Meanwhile, the increase of the average Z" score is 2.08 for the same industry, comparing the two periods. In both studies, however, the construction industry is classified as non-conclusive (gray area) according to Z', and non-default, according to Z". Minimum average Z' (Z") score in the sample has decreased by 0.14 (0.4). The average range (maximum – minimum) increase of the latter as compared with the earlier period, however, can be attributed mostly to increase of the average maximum Z' & Z" over the 2015-2018 period, respectively by 3 and 19.

Regarding the energy sector, we observe that the average increase of the Z' (Z") score of the later period is 4 (15). It is worth highlighting that average value of Z' and Z" scores in the earlier period classify the energy sector in the border between the gray and non-default area, while the latter averages classify the sector in the non-default zone. All the increase in the dispersion, however, is attributed to a higher average maximum over the later period of 18 and 52 respectively for the Z' and Z" score. In other words, the higher dispersion of the Z' and Z" risk metrics

are not a consequence of higher risk rather the presence from the non-default side of the distribution.

In terms of Z' and Z" trends in comparing the latest period with the earlier period, observations are inconclusive. We do not observe the domination of the upward trend (toward lower risk of default) or downward trend (toward higher credit risk) over the 2015-2018 and 2011-2013 period, referring to the Z' and Z" score. One thing to be considered in this study, however, is the fact that this research and the original research of Dhamo and Kume (2016) have utilized different sample companies in building industry credit risk metrics. This is a consequence of the fact that the composition of the top 200 businesses with the highest revenues in Albania has changed in time.

In summary, this section presents a comprehensive analysis of the risk of default for construction, energy and pharmaceuticals over the period 2015-2018, as per Altman's Z' and Z" scores. According to the findings, we observe different trends and risk exposure across sectors. Construction industry performance fluctuates within the inconclusive area, indicating unclear risk of default. The energy sector shows low credit risk across all the period, classifying itself as non-default, independently of the metrics used. Pharmaceuticals risk level is inconclusive, like construction, according to Z' score. The industry, however, is categorized as non-default, according to the Z" credit risk metrics. The variations across industries highlight the dispersion of risk of default across well represented Albanian industries, offering valuable insights future research and possibles investors in the field. We also compare the performance of construction and energy industries in Albania in two different period: 2011-2013 (studied by Dhamo and Kume (2016)) and 2015-2018 (covered in this study). This research observes that construction and energy are less exposed to the risk of default in the later period. Z' improved marginally, while Z" experienced an impactful improvement for the construction industry. Both studies classify the industry in the inconclusive zone, however, according to the average Z' score. The energy industry experienced impactful changes for Z' and Z" in the later period, moving from an almost inconclusive status to a non-default classification. The study results may be influenced by the different sample companies the authors used in each period due to dynamic changes of Albanian businesses generating highest revenues.

Concluding Remarks

This research offers a multifaceted perspective on the financial distress of the construction, energy and pharmaceutical industry in Albania. Our analysis covers the period 2015-2018. It reveals important insights on these industries' risk of default. The risk of default is measured according to Altman's Z' and Z" formulas.

The construction industry shows a nuanced view of financial health in time. The average Z' and Z" scores have experienced an upward trend, according to our data, which means lower financial distress. The industry remained in the inconclusive area, however, according to Z' and Z" classification. The main implication of this finding is that the industry is considered quite uncertain in

terms of credit risk exposure, indicating accurate due diligence from investors and other stakeholders. The energy sector showed a robust financial performance. The industry is classified as non-default, independent of metrics used and period in consideration. Pharmaceutical financial distress exposure shows a more complex scenario. Z' scores were within the gray area, indicating unclear financial health for the industry. Z" scores, however, categorized the industry as non-default, showing a better outlook. In this case, the same suggestion of construction applies, meaning careful due diligence from investors and other stakeholders.

In comparing the finding of this research with the original work of Dhamo and Kume (2016), it is observed a notable positive shift in performance. Both construction and energy seem to face lower credit risk as compared with 2011-2013 period. The reasoning may lie to various macroeconomic factors and industry-specific externalities that may have enabled better financial health.

One of the limitations of this study is, when comparing with the original work of Dhamo and Kume (2016), it must be acknowledged the different samples of companies used for each industry, due to the evolving nature of business environment. The later has provoked a direct consequence of the change in composition in time of top 200 revenue generators in Albania. Another observation is the fact that Z" score categorizes all industries as non-default for the period under observation. Further investigation in the future may shed light whether Z" model is appropriate for assessing the financial health of local companies in Albania.

Future research may focus on deep diving on the major sources of differences in financial performance among the three industries in Albania. This may include external (non-company specific) and internal causality analysis and their implications in financial distress levels.

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