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EXPLORING THE FINANCIAL PERFORMANCE OF LISTED COMPANIES ON THE GHANA STOCK EXCHANGE AND JOHANNESBURG STOCK EXCHANGE USING THE ALTMAN Z-SCORE MODEL

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Abstract

The purpose of this quantitative study was to predict the good financial health and examining the bankruptcy rate of the companies listed on Ghana Stock Exchange and Johannesburg Stock Exchange using the Altman Z-Score Model and Zmijewski Score Model (Altman and Brach, 2015; Sinarti and Sembiring, 2015). The study used a quantitative method to explore 378 listed companies for the selected period from 2009 to 2015. Financial data for the study was extracted from the published annual reports of the respective listed companies. The Z-Score values and the Zmijewski Score values were tallied with the criterion scales for each of the models to predict the financial performance of the listed companies. The results of the Altman Z-Score Model for the listed companies on the Ghana Stock Exchange showed that 25.21% listed companies average were in the safe zone, 21.85% listed companies average were in the grey zone, 46.64% listed companies average were in the distress zone and 6.30% listed companies average had no data. However, the Zmijewski Score Model displayed that 65.13% listed companies average were in the non-bankruptcy zone, 28.57% listed companies average were in the bankruptcy zone and 6.30% listed companies average had no data. The Altman Z-Score Model for the listed companies on the Johannesburg Stock Exchange indicated that 42.03% listed companies average were in the safe zone, 13.91% listed companies average were in the grey zone, 27. 24% listed companies average were in the distress zone and 16.82% listed

companies average had no data. In contrast, the Zmijewski Score Model indicated that 74.04% listed companies average were in the non-bankruptcy zone, 9.14% listed companies average were in the bankruptcy zone and 16.82% listed companies average had no data.

Keywords: Altman Z-Score, Zmijewski Score, bankruptcy, Ghana, South Africa

INTRODUCTION

The repeatedly crashing of some major financial markets such as the stock markets in China and United States is a problem that affects financial markets worldwide (Kyoung Tae and Hanna, 2016). Stock market crashes are driven by the bankruptcy of major listed companies (Wang, Meric, Liu and Meric, 2013). The prediction of stock market crashes by investors is difficult (Diakomihalis, 2012). Therefore, the prediction of the bankruptcy of listed companies by researchers and regulatory agencies to lessen the impact of bankruptcy has been long the object of study of corporate finance literature (Chavali and Karthika, 2012). This study hopes to create awareness on the financial performance of the listed companies on the Ghana Stock Exchange and Johannesburg Stock Exchange using Altman's Z-Score and Zmijewski's Score prediction models since, most studies on corporate bankruptcy prediction in Africa have failed to use both models at the same time in a single study to study bankruptcy rate of companies which can cause stock market crash in Africa.

The purpose of this quantitative study was to predict the good financial health of the companies listed on Ghana Stock Exchange and Johannesburg Stock Exchange using the Altman Z-Score Model and Zmijewski's Score Model (Altman and Brach, 2015). The study also focused on examining the bankruptcy rate of the listed companies on the Ghana Stock Exchange and Johannesburg Stock Exchange in two years' time using the Altman Z-Score Model and Zmijewski Score Model (Sinarti and Sembiring, 2015). The study also sought to find out whether the Altman's Z-Score Model and Zmijewski's Score Model contradict each other in exploring the financial performance of listed companies on Ghana Stock Exchange and Johannesburg Stock Exchange (Avenhuis, 2013).

This study focused on the following research questions, with their respective hypotheses.

R1. Are the listed companies on the Ghana Stock Exchange in good financial health using Altman Z-Score Model?

$H1_o$: Using the Altman Z-Score Model the companies listed on the Ghana Stock Exchange are not in good financial health.

$H1_a$: Using the Altman Z-Score Model the companies listed on the Ghana Stock Exchange are in good financial health.

R2. Is bankruptcy likely to occur in two years' time among the companies listed on the Ghana Stock Exchange using the Altman Z-Score Model?

$H2_o$: Bankruptcy will not occur in two years' time in the listed companies on the Ghana Stock Exchange using the Altman Z-Score Model.

$H2_a$: Bankruptcy will occur in two years' time in the listed companies on the Ghana Stock Exchange using the Altman Z-Score Model.

R3. Are the listed companies on the Ghana Stock Exchange in good financial health using the Zmijewski Score Model?

$H3_o$: Using the Zmijewski Score Model the companies listed on the Ghana Stock Exchange are not in good financial health.

$H3_a$: Using the Zmijewski Score Model the companies listed on the Ghana Stock Exchange are in good financial health.

R4. Is bankruptcy likely to occur in two years' time among the companies listed on the Ghana Stock Exchange using the Zmijewski Score Model?

$H4_o$: Bankruptcy will not occur in twoyears' time in the listed companies on the Ghana Stock Exchange using the Zmijewski Score Model.

$H4_a$: Bankruptcy will occur in twoyears' time in the listed companies on the Ghana Stock Exchange using the Zmijewski Score Model.

R5. Are the listed companies on the Johannesburg Stock Exchange in good financial health using Altman Z-Score Model?

$H5_o$: Using the Altman Z-Score Model the companies listed on the Johannesburg Stock Exchange are not in good financial health.

$H5_a$: Using the Altman Z-Score Model the companies listed on the Johannesburg Stock Exchange are in good financial health.

R6. Is bankruptcy likely to occur in two years' time among the companies listed on the Johannesburg Stock Exchange using the Altman Z-Score Model?

$H6_o$: Bankruptcy will not occur in twoyears' time in the listed companies on the Johannesburg Stock Exchange using the Altman Z-Score Model.

$H6_a$: Bankruptcy will occur in twoyears' time in the listed companies on the Johannesburg Stock Exchange using the Altman Z-Score Model.

R7. Are the listed companies on the Johannesburg Stock Exchange in good financial health using the Zmijewski Score Model?

$H7_o$: Using the Zmijewski Score Model the companies listed on the Johannesburg Stock Exchange are not in good financial health.

$H7_a$: Using the Zmijewski Score Model the companies listed on the Johannesburg Stock Exchange are in good financial health.

R8. Is bankruptcy likely to occur in two years' time among the companies listed on the Johannesburg Stock Exchange using the Zmijewski Score Model?

$H8_o$: Bankruptcy will not occur in twoyears' time in the listed companies on the Johannesburg Stock Exchange using the Zmijewski Score Model.

$H8_a$: Bankruptcy will occur in twoyears' time in the listed companies on the Johannesburg Stock Exchange using the Zmijewski Score Model.

R9. Does the Altman Z-Score Model and Zmijewski Score Model contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Ghana Stock Exchange?

$H9_o$: The Altman Z-Score Model and Zmijewski Score Model do not contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Ghana Stock Exchange.

$H9_a$: The Altman Z-Score Model and Zmijewski Score Model do contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Ghana Stock Exchange.

R10. Does the Altman Z-Score Model and Zmijewski Score Model contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Johannesburg Stock Exchange?

$H10_o$: The Altman Z-Score Model and Zmijewski Score Model do not contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Johannesburg Stock Exchange.

$H10_a$: The Altman Z-Score Model and Zmijewski Score Model do contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Johannesburg Stock Exchange.

The Ghana Stock Exchange has 38 listed companies as at 11thJanuary 2016 (Ghana Stock Exchange, 2016). On 25th August 2016, the market capitalization of the Exchange was GH¢54,070.43 million (Ghana Stock Exchange, n.d.). The Johannesburg Stock Exchange has 385 listed companies as at 31stAugust 2016, with the market capitalization of R 15,365.22 billion as at 26thAugust 2016 (Johannesburg Stock Exchange, n.d.). The large numbers of market capitalization and listed companies on both Exchanges justify the importance of the study. The

study helped to expand the existing studies that have been conducted on African Stock Exchanges by providing new knowledge and understanding of the future of Ghana and South Africa stock markets.

The research findings of the Altman Z-Score showed that greater percentage of the listed companies on the Ghana Stock are in distressed zone whilst the Zmijewski Score showed that greater percentage of the listed companies on the Ghana Stock Exchange are in the non-bankruptcy zone. The results of the two models revealed that greater percentage of the listed companies on the Johannesburg Stock Exchange are in good financial health and cannot go bankrupt. The rest of this paper is organised as follows: the next section of the study provides a literature review of the topic, section 3 of the study shows the research methodology, section 4 is on results and discussion, in section 5, the researchers provide the conclusions of the study and the final part of the study provides the references used for the study.

LITERATURE REVIEW

Altman's Z-Score Model

Two main theories formed the theoretical framework for the study. The first theoretical framework for the study was the Altman's Z-Score Model. The Altman Z-Score Model was developed by Edward I. Altman in 1968 (Kasilingam and Jayabal, 2012). A statistical technique known as the discriminant analysis was used by Altman to predict the bankruptcy of companies from five best-performing accounting ratios (Celli, 2015). The version of the Altman Z-Score in 1993 for manufacturing companies given by a formula in a linear relationship used for the study was as follows:

$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$ (for the manufacturing companies) (Celli, 2015).

Where;

X_1: Working capital / Total assets (Celli, 2015);

X_2: Retain earnings / Total assets (Celli, 2015);

X_3: Earnings before interest and taxes / Total assets (Celli, 2015);

X_4: Market value of equity / Book value of total liabilities (Celli, 2015);

X_5: Sales / Total assets (Celli, 2015);

Z: Overall Z-Score index (Celli, 2015).

The version of the Altman Z-Score Model in 1995 for non-manufacturing and emerging companies, given by a formula in a linear relationship used for the study was as follows:

$Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$ (for the non-manufacturing and emerging companies) (Altman, Danovi and Falini, 2013). Where;

X_1: Working capital / Total assets (Altman, Danovi and Falini, 2013);

X_2: Retain earnings / Total assets (Altman, Danovi and Falini, 2013);

X_3: Earnings before interest and taxes / Total assets (Altman, Danovi and Falini, 2013);

X_4: Book value of equity / Book value of total liabilities (Altman, Danovi and Falini, 2013);

Z: Overall Z-Score index (Altman, Danovi and Falini, 2013).

The dependent variable Z represented the overall Z-Score value of the model. The independent variables (accounting ratios) represented by X_n are (Muthukumar and Sekar, 2014):

X_1: Working capital / Total assets. Working capital measured the difference between current assets and current liabilities (Muthukumar and Sekar, 2014).

X_2: Retain earnings / Total assets. The ratio measured the gains the company can derive from reinvesting the company's retained earnings in the company or new business (Muthukumar and Sekar, 2014).

X_3: Earnings before interest and taxes / Total assets. The ratio indicated the actual return the company generates from assets of the company before deducting interest and taxes (Muthukumar and Sekar, 2014).

X_4: Market value of equity / Book value of total liabilities. The ratio indicated how much the value of the assets of the company can decline before the liabilities of the company exceed the value of assets of the company, which may result in the bankruptcy of the company (Avenhuis, 2013).

X_5: Sales / Total assets. The ratio measured the contribution of total sales of the company (Muthukumar and Sekar, 2014).

Altman later modified the original Z-Score Model which was applicable to only manufacturing companies by updating the parameter and the indices of the original Z-Score (Celli, 2015). The modification of the original Z-Score Model resulted in a version of Z-Score Model applicable to non-manufacturers and private manufacturers (Altman, Danovi and Falini, 2013). Modification of the Model occurred as a result of the limitations of the original Z-Score Model (Altman, Iwanicz-Drozdowska, Laitinen and Suvas, 2014). Two of the ratios used for the original Z-Score Model were not useful for companies that do not publicly trade their shares. The Market value of equity / Book value of total liabilities ratio was one of the two models since, it cannot be applied to companies that do not trade their shares in the equity market on a recognized Stock Exchange (Altman, Danovi and Falini, 2013). Hence, the market value of equity of this ratio was modified to book value of equity in developing the new Z-Score Model for the non-manufacturers and private manufacturers (Altman, et al., 2014). The Sales / Total assets ratio was the second ratio that restricted the usefulness of the original Z-Score Model to non-manufacturers and private manufacturers since assets turnover was different from one industry to another industry (Altman, Danovi and Falini, 2013). To minimize the sensitivity of industry effects, Altman

eliminated this ratio from the original Z-Score Model to develop the new Z-Score for the non-manufacturers and private manufacturers (Altman and Hotchkiss, 2006).

The Z-Score value obtained from the linear equation by multiplying each of the financial ratios by an appropriate coefficient and adding the results together was compared to a cut-off value of 2.68 set by Altman to make a decision on the default risk or the good financial health of companies (Celli, 2015). If the Z-Score was greater than 2.99, the company was unlikely to default. When the Z-Score was between 1.81 and 2.99, then the company was in the grey zone (could go either way or uncertainty area). If the Z-Score was less than 1.81, then the probability of default was very high (Celli, 2015). To sum up, the situation of companies can be classified as:

- Safe Zone (Unlikely to default) / healthy zone = Z > 2.99 (Celli, 2015);
- Grey Zone (Could go either way) = 1.8100 < Z < 2.99 (Celli, 2015);
- Distress Zone (At major default risk that the company will go bankrupt within two years) / unhealthy zone = Z < 1.81(Celli, 2015).

The Altman Z-Score Model for banking institutions in the emerging markets such as Ghana stock market and the South African stock market was given by:

$Z = 3.25 + 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$ (for the banking institutions in the emerging markets) (Aasen, 2011). Where X_1, X_2, X_3 and X_4 remained the same as used for non-manufacturing and emerging companies. The criterion used to interpret this Z-Score Model for banks was (Aasen, 2011):

- Safe Zone / healthy zone = Z > 5.85 (Aasen, 2011);
- Grey Zone = 4.35 < Z < 5.85 (Aasen, 2011);
- Distress Zone / unhealthy zone = Z < 4.35 (Aasen, 2011).

The accuracy and effectiveness of Altman Z-Score Model weretested by Altman using 31 years (1968 - 1999) and the Model was found to be approximately 80% - 90% accurate in predicting bankruptcy one year before the event, with a Type II error of 15% - 20% (Altman, 2000).

Zmijewski's Score Model

The second theory of the study was the Zmijewski Score Model that predicts firm's bankruptcy in two years. In 1984, Zmijewski used three accounting ratios to measure firm performance, leverage, and liquidity in developing his model. The ratios used in estimating the value of Zmijewski Score Model were determined by probit analysis (Avenhuis, 2013). Zmijewski Score Model was developed with the sample of 40 bankrupt and 800 non-bankrupt industrial companies and a hold-out sample of 41 bankrupts and 800 non-bankrupt firms (Sinarti and

Sembiring, 2015). The Zmijewski Score Model given by a formula in a linear relationship used for the study was as follows:

Zmijewski Score (X) = - 4.336 – $4.513X_1$ + 5.679 Z_2 + $.004X_3$ (Avenhuis, 2013),

Where;

X_1: Net income / Total assets (Avenhuis, 2013);

X_2: Total liabilities / Total assets (Avenhuis, 2013);

X_3: Current assets / Current liabilities (Avenhuis, 2013);

X: Overall index (Avenhuis, 2013).

The overall index (X) maps a probability value between 0 and 1(Avenhuis, 2013). A company with a small score less than 0.5 or negative score was seen as a company in the good financial health or non-bankruptcy zone and a company with a score greater than 0.5 or equal to 0.5 was classified as bankruptcy or not in good financial health (Sinarti and Sembiring, 2015). The accuracy rate of Zmijewski Score in 1984 for estimation sample was 99% (Avenhuis, 2013).

RESEARCH METHODOLOGY

The study used a quantitative research methodology. Quantitative study helps researchers to test a given model (Venkatesh, Brown and Bala, 2013). The study explored 378 listed companies comprising 34 listed companies on the Ghana Stock Exchange and 344 listed companies on the Johannesburg Stock Exchange. The study covered the period 2009 – 2015. The rationale behind the time frame for the study was to study the two stock markets after the 2008 financial crisis. Financial data for the study was extracted from the published annual reports of the respective listed companies' websites and Annual Reports Ghana website.

Altman's Z-Score and Zmijewski's Score are quantitative research models that were used for the study since, they are quantitative research methods based on the balance sheet and income statement data for determining a company's financial health (Altman, Danovi and Falini, 2013). Data collected for the study was analyzed using the Altman's Z-Score and Zmijewski's Score models. The relevant accounting data from 2009 to 2015 for the listed companies was extracted and exported to Microsoft Excel for the computation of the Altman Z-Score values and the Zmijewski Score values for the 378 listed companies on both Exchanges. The two models were used to calculate the Z-Score values and the Zmijewski Score values of the listed companies. The Z-Score values and the Zmijewski Score values were tallied with the criterion scales for each of the models to predict the financial performance of the listed companies (Celli, 2015).

RESULTS AND DISCUSSIONS

The results of the study presented some interesting information about the Altman Z-Score Model and Zmijewski Score Model concerning the ten research questions that were used for the study. The first research question (R1) asked: Are the listed companies on the Ghana Stock Exchange in good financial health using Altman Z-Score Model? The second research question (R2) asked: Is bankruptcy likely to occur in two years' time among the companies listed on the Ghana Stock Exchange using the Altman Z-Score Model? The results were surprising as Altman Z-Score of the listed companies in the safe zone increased from 26.47% in 2009 to 32.35% in 2010, decreased to 29.41% in 2011, remains the same at 29.41% in 2012, decreased again to 26.47% in 2013, decreased again to 20.59% in 2014 and decreased again to 11.76 in 2015, the results in the grey zone also decreased from 20.59% in 2009 to 17.65% in 2010, improved in 2011 to 23.53%, improved in 2012 to 26.47%, decreased to 20.59% in 2013 and 2014 and improved to 23.53% in 2015, the results in the distress zone decreased from 50.00% in 2009 to 47.06% in 2010, decreased again to 44.12% and 41.18% for 2011 and 2012 respectively, increased to 50.00% in 2013, increased again to 55.88% in 2014 and decreased to 38.24% in 2015. The results imply that the listed companies were financially secured in 2010 and much distressed in 2014. Comparing the results of the safe zone to the distress zone of the period of 2009 - 2015, the results indicated that the greater percentage of the listed companies are in the distress zone which was similar to the findings of Vasanthaa, Dhanraj and Thiayalnayaki (2013). This implies that greater percentage of the listed companies can go bankrupt because a greater percentage of the listed companies are financially not performing well. However, few percentage of the listed companies are in good financial health meaning those companies cannot go bankrupt as identified by Boakye and Evans (2014).

The third research question (R3) asked: Are the listed companies on the Ghana Stock Exchange in good financial health using the Zmijewski Score Model? The fourth research question (R4) asked: Is bankruptcy likely to occur in two years' time among the companies listed on the Ghana Stock Exchange using the Zmijewski Score Model? The results of the Zmijewski Score Model for this study showed a missed results from 2009 to 2015. The percentage of listed companies in the non-bankruptcy zone increased from 64.71% in 2009 to 73.53% in 2010, improved again to 79.41% in 2011, decreased to 73.53% in 2012, decreased again to 52.94% in 2013, improved to 58.82% in 2014 and decreased to 52.94% in 2015. The percentage of the listed companies in the bankruptcy zone decreased from 32.35% in 2009 to 23.53% in 2010, decreased again to 17.65% in 2011, increased in 2012 to 23.53%, increased again to 44.12% in 2013, decreased to 38.24% in 2014, and decreased again to 20.59% in 2015. Comparison of the results of the non-bankruptcy zone to the results of the bankruptcy

zone of the period of 2009 - 2015 showed that the percentage of the listed companies in the non-bankruptcy zone was greater than the percentage of listed companies in the bankruptcy zone which was similar to the findings of Sinarti and Sembiring (2015). This implies that greater percentage of the listed companies are in good financial health and cannot go bankrupt whereas, less percentage of the companies are not in good financial health and can go bankrupt which supported the findings of Maham (2015).

The ninth research question (R9) asked: Does the Altman Z-Score Model and Zmijewski Score Model contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Ghana Stock Exchange? The results found by R1, R2, R3 and R4 as discussed earlier showed that the results of the Altman Z-Score Model predicted greater amount the of the listed companies to be in the bankruptcy zone and few amount of listed companies to be in the non-bankruptcy zone for the period 2009 - 2015 but, the results of the Zmijewski Score Model predicted greater percentage the of the listed companies to be in the non-bankruptcy zone and few percentage of listed companies to be in the bankruptcy zone for the period 2009 – 2015. The results imply that the two models provide different views on the financial health and bankruptcy rate of the listed companies as the two models move in the opposite direction. The results of the Altman Z-Score Model were significantly influenced by the sales, working capital, retain earnings, the market value of equity and earnings before interest and tax data which resulted in the significant difference between the two models (Sinarti and Sembiring, 2015). Hence, the two models contradict each other in predicting the good financial health and bankruptcy rate of listed companies on the Ghana Stock Exchange which was similar to the findings of Sinarti and Sembiring (2015).

The fifth research question (R5) asked: Are the listed companies on the Johannesburg Stock Exchange in good financial health using Altman Z-Score Model? The sixth research question (R6) asked: Is bankruptcy likely to occur in two years' time among the companies listed on the Johannesburg Stock Exchange using the Altman Z-Score Model? The results of Altman Z-Score of the listed companies in the safe zone displayed an increased from 35.76% in 2009 to 39.54% in 2010, improved to 40.12% in 2011, improved again to 42.73% in 2012, improved again to 44.77% in 2013, decreased to 43.32% in 2014 and increased to 47.96% in 2015. The results for the grey zone indicated an increased from 11.05% in 2009 to 11.92% in 2010, remains at 11.92% in 2011, increased to 15.41% in 2012, decreased to 12.50% in 2013, improved to 17.44% in 2014, and decreased again to 17.16%. The results for the distress zone showed an increased from 19.18% in 2009 to 20.35%in 2010, increased to 24.12% in 2011, increased again to 25.87% in 2012, increased again to 32.85% in 2013, increased again to 34.59% in 2014 and decreased to 33.72% in 2015 which was similar to the findings of

Muthukumar and Sekar (2014). The results imply that greater percentage of the listed companies are in good financial health and cannot go bankrupt but, few percentage of the listed companies are not in good financial health and can go bankrupt which supported the findings of Maham (2015).

The seventh research question (R7) asked: Are the listed companies on the Johannesburg Stock Exchange in good financial health using the Zmijewski Score Model? The eighth research question (R8) asked: Is bankruptcy likely to occur in two years' time among the companies listed on the Johannesburg Stock Exchange using the Zmijewski Score Model? The results of the Zmijewski Score Model for the non-bankruptcy zone showed an increased from 59.88% in 2009 to 64.54% in 2010, increased to 68.60% in 2011, increased again to 74.42% in 2012, increased again to 79.94% in 2013, increased again to 83.72% in 2014 and increased again to 87.21 in 2015. The results for the bankruptcy zone also increased from 6.11% in 2009 to 7.27% in 2010, increased to 7.56% in 2011, increased again to 9.59% in 2012, increased again to 10.18% in 2013, increased again to 11.63% in 2014 and remains the same at 11.63% in 2015. When the researcher compares the results of the non-bankruptcy zone to the results of the bankruptcy zone of the period of 2009 – 2015, the researcher found that the percentage of the listed companies in the non-bankruptcy zone was greater than the percentage of listed companies in the bankruptcy zone which supported the findings of Maham (2015). This means that greater amount of the listed companies are in good financial health and cannot go bankrupt. On the other hand, few amount of the listed are not in good financial health and can go bankrupt which was similar to the findings of Sinarti and Sembiring (2015).

The tenth research question (R10) asked: Does the Altman Z-Score Model and Zmijewski Score Model contradict each other in exploring the good financial health and bankruptcy rate in twoyears' time of the listed companies on the Johannesburg Stock Exchange? The results of this research question found by R5, R6, R7 and R8 as discussed earlier revealed that the results of the Altman Z-Score Model predicted greater percentage the of the listed companies to be in the non-bankruptcy zone and few percentage of listed companies to be in the bankruptcy zone for the period 2009 – 2015 as the results of the Zmijewski Score Model also predicted greater percentage of the listed companies to be in the non-bankruptcy zone and few amount of listed companies to be in the bankruptcy zone for the period 2009 – 2015. The results indicated that the two models were in agreement with each in predicting the financial health and bankruptcy rate of the listed companies as the two models move in the same direction. The differences in percentage of the results of the two models were significantly influenced by the sales, working capital, retain earnings, the market value of equity and earnings before interest and tax data used by the Altman Z-Score Model but were

not used by the Zmijewski Score Model (Sinarti and Sembiring, 2015). Hence, the two models do not contradict each other in predicting the good financial health and bankruptcy rate of listed companies on the Johannesburg Stock Exchange.

CONCLUSIONS AND PRACTICAL RECOMMENDATIONS

The study used a quantitative method to explore the financial performance of the listed companies on the Ghana Stock Exchange and Johannesburg Stock Exchange. The results of the Altman Z-Score Model for the listed companies on the Ghana Stock Exchange showed that 25.21% listed companies average for the period of 2009 – 2015 were in the safe zone, 21.85% listed companies average for the of 2009 – 2015 were in the grey zone (could go either way), 46.64% listed companies average for the period of 2009 – 2015 were in the distress zone and 6.30% listed companies average for the period of 2009 – 2015 had no data. On the other hand, the results of the Zmijewski Score Model displayed 65.13% listed companies average for the period of 2009 – 2015 were in the non-bankruptcy zone, 28.57% listed companies average for the period of 2009 – 2015 were in the bankruptcy zone and 6.30% listed companies average for the period of 2009 – 2015 had no data. The results of the Altman Z-Score Model for the period 2009 – 2015 revealed the greater percentage of the listed companies on the Ghana Stock Exchange to be in bankruptcy zone while the Zmijewski Score Model revealed the greater percentage of the listed companies on the Ghana Stock Exchange to be in the non-bankruptcy zone. The results given by the two bankruptcy models means that the listed companies in Ghana should manage their funds efficiently and adopt good business strategies to ensure that they obtained good financial health to prevent bankruptcy (Vasanthaa, Dhanraj and Thiayalnayaki, 2013). The risk management departments of the listed companies in Ghana should work effectively and introduce new risk management policies to ensure that they do not go into bankruptcy (Boakye and Evans, 2014). Investors should be careful in performing their investment appraisal to assist them to make good investment decisions (Vasanthaa, Dhanraj and Thiayalnayaki, 2013).

The results of the Altman Z-Score Model for the listed companies on the Johannesburg Stock Exchange indicated that 42.03% listed companies average for the period of 2009 – 2015 were in the safe zone, 13.91% listed companies average for the period of 2009 – 2015 were in the grey zone (could go either way), 27. 24% listed companies average for the period of 2009 – 2015 were in the distress zone and 16.82% listed companies average for the period of 2009 – 2015 had no data. In contrast, the Zmijewski Score Model indicated that 74.04% listed companies average for the period of 2009 – 2015 were in the non-bankruptcy zone, 9.14% listed companies average for the period of 2009 – 2015 were in the bankruptcy zone and

16.82% listed companies average for the period of 2009 – 2015 had no data. The Altman Z-Score Model results displayed the greater percentage of the listed companies to be in the non-bankruptcy zone from 2009 - 2015 as the Zmijewski Score Model results also showed a greater percentage of the listed companies to be in the non-bankruptcy from 2009 - 2015. Hence, the results of the Altman Z-Score Model and Zmijewski Score Model imply that the greater percentage of the listed companies on the Johannesburg Stock Exchange are in good financial health and cannot go bankrupt (Mahama, 2015). The results provided by the two bankruptcy models imply that the listed companies on the Johannesburg Stock Exchange need to maintain their current operations well and introduce new sound risk management policies in addition to what they have now to enable the companies to be in their good financial health for the rest of the years they wish to operate. Investors should be careful making their investment decisions as the Altman Z-Score Model revealed some percentage of listed companies to be in the grey zone and distress zone and the Zmijewski Score Model also found some percentage of the listed companies in the bankruptcy zone which means those companies can also go bankrupt (Vasanthaa, Dhanraj and Thiayalnayaki, 2013).

The results of the two bankruptcy models offered different views on the status of the listed companies on both the Ghana Stock Exchange since, the two models revealed different percentages for the bankruptcy and non-bankruptcy zones when results of the two models were compared. Hence, the two models provided contradictory results which may be as a results the Ghanaian economy is a developing economy. In contrast the results indicated that the two models did not contradictory each other in predicting the financial health and bankruptcy rate of the listed companies on the Johannesburg Stock Exchange as the two models move in the same direction. The movement of the two models in the same direction is as a results of the developed economy the listed companies operate in South Africa. The results imply that the statistical technique and economic conditions use in developing a model had an effect on the predictive power of the model hence, researchers and investors in Ghana and South Africa Stock markets should take care of the model they select for future research (Avenhuis, 2013).

Further research with different bankruptcy prediction model such as Ohlson O-Score Model may provide another view on the good financial health and bankruptcy rate on the listed companies on the Ghana Stock Exchange as the results revealed by the Altman Z-Score Model and Zmijewski Score Model are inconclusive. The major limitation is the percentage of the listed companies without data for the period of 2009 – 2015 which reduced the percentage of the listed companies covered for the study in each year.

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