

Validity of Altman Z-Score Model to Predict Financial Failure: Evidence From Jordan

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Abstract

This paper aims to investigate the Validity of Altman z-score model to predict financial failure in insurance companies listed on Amman Stock Exchange (ASE) over the period 2011-2016. To achieve the goal of the study, the study depended on the different statistics analytical method and Multiple Linear Regression through doing the statistical analysis of the independent variables on the dependent variable related to the subject of the study through the (E-views) program in order to cover the analytical part of the study, in addition to the descriptive method through relying on books, periodicals, previous studies and financial reports of the insurance companies of the study' sample, whether the direct or the indirect ones, to cover the theoretical part. The result of the study finds a high predictive power for Z-score model. Moreover, the findings reveal that Z-Score model could be valuable instrumental indicators for many users of financial statement such as financial managers, auditors, lenders, investors, to make right decisions in the face of financial failure.

Keywords: Altman, Z-score, insurance companies, financial failure, working capital, retained earnings, earnings before interest and taxes, total assets, market capitalization, book value of total liabilities

1. Introduction

Different results of financial crises, that occurred in many countries of the world and had an impact, whether on the short or long term, on the economies of developed and developing countries, have shown that the weak disposition of investment and financial tools in the financial and investment institutions, leads to inconsistency in achieving balance of liquidity, profitability and safety on one hand, and achieving growth and continuity of the financial sector in a shape that benefits all of stakeholders (Aziz & Dar, 2006). If financial distress is not detected in time and turnaround measures taken then bankruptcy is likely. The costs of bankruptcy are enormous and affect all stakeholders of the company (Altman, 1984; Andrade & Kaplan, 1998; Altman & Hotchkiss, 2006; Natalia, 2007; Opler & Titman, 1994).

Therefore, the academic researchers propose several approach to predict failure such as financial statement analysis which is the easiest and best tool to evaluate companies performance, ratio analysis, z-score model, but the problem still which model is the best to take the appropriate action (Aziz & Dar, 2006).

Levratto (2013) reveals that the circumstances of the business (internal and external) have a significant impact upon business failure. Financial failure it happens when companies fall to pay its obligations or the fair assessment of assets fall shorter than obligations (Ijaz et al., 2013).

Altman (1968) developed model for bankruptcy prediction called Altman Z-score model, also called multiple discriminant analysis model (MDA), Altman defined Z-score model as a statistical measure to predict company financial failure, Altman also defined the Z-score model as a linear combination of four or five common financial ratios, weighted by coefficients, Altman was the first one uses Multiple Discriminant Analysis (MDA) to develop a prediction model with a high degree of accuracy, the MDA technique and in particular the z- score model has been applied in several financial distress and bankruptcy studies with satisfactory results (Aziz & Dar, 2006; Bellovary, Giacomino, & Akers, 2007; Platt & Platt, 2006; Zmijewski, 1984). Later, in 1983 Altman developed the original model and finally established two models: Model A Z-score for manufacturing companies closed, and Model B Z-score for non-manufacturing companies (Altman, 2000).

Many authors have pointed out that the failure of a set of definitions: the inability of the company to pay their

obligations, and some went to the cessation of trade and loss of creditors. (Ismail, 2014; Ashour & El-farra, 2002) indicated that financial failure that the company is unable to meet the financial obligations it has incurred and is therefore in the process of bankruptcy. Although, (John, 1993) said that a firm is in financial distress when the liquid assets are not sufficient to meet the current requirements of its hard contracts.

The study derives its value from being the first study Applied Z-score model on Jordanian insurance companies sector according to the researcher Knowledge. In addition, the fact that the insurance sector is considered one of the important components in the economies of developing and developed countries, which contributes to important percentages in GDP and employment. This sector has become an important sector for study after the huge losses it has suffered, which in the past decade have exceeded 120 million Jordanian dinars (Mahmoud, 2013). The importance of the study in trying to identify the importance of the issue of financial failure of the stakeholders and the mechanism they adopt to monitor the performance of companies on the one hand, and on the other to recognize the importance of using financial models to predict the financial failure of companies a year ago to be used as an early warning before the failure in the future.

The problem of the study lies in two dimensions: the first dimension involves the lack of conceptual and analytical awareness among individuals regarding the analysis and forecasting of financial failure, and the second dimension of the problem lies in the lack of financial ratios on which companies rely on predicting the future to give misleading results that cannot be relied upon in decision making. This study aims to determine the effectiveness of the Altman Z-score model to predict the financial failure of the Jordanian insurance companies for the period 2011-2016. The main objective of this research was to verify the accuracy of the revised Altman Z'-score model (1983) in order to determine whether it is an optimal model for predicting corporate failure using recent data of Jordanian Insurance companies in the period 2011-2016.

The paper is organized as follows. Section 2 is the review of the literature which will discuss financial failure. Section 3 introduce and discuss the research design and methodology employed in this study, the data collection and sample of the study. Section 4 present the result of finding. Section 5 will summarize the conclusion of this study.

2. Literature Review

In the late 1960s, several studies were developed a several models for failure prediction. Researchers have examined some of these models in order to identify their ability to predict corporate failure. (e.g. Beaver, 1966; Altman, 1968; Deakin, 1972; Kida, 1980; Ohlson, 1980; Taffler, 1983; Shirata, 1998; Mohammed et al., 2012).

Al-Rawi, Kiani, and Vedd (2008), by using the Altman z-score model analysis to predict a firm's insolvency, they have remarked that the firm has increased its debt consequently. facing bankruptcy in the near future. Similarly, Pathan (2009) applied the z-score model for a sample of US bank holding companies over the period 1997-2004, he finds that small boards size and boards that are not controlled by the CEO lead to additional bank risk. Also, Gerantonis et al. (2009) examined the ability of Altman's Z-score model to predict failure before it occurs, results of the study have proved that the Altman Z-score consider an accuracy way to predict corporate failure, also the study show the ability of Z-score model to predict financial failure, at the first year was 66%, and this percentage decreased to 52% at the second year, while, 39% at third year and down to the 20% at fourth year prior bankruptcy. But, Hayes, Hodge, and Hughes (2010) had analyzed the construction of Z- score model by applying it to a sample of 17 US firms from retail industry, the study revealed that, the model correctly predicts bankruptcy at a level of 94%. However, Mamo (2011) applying Altman model (1968) for predicting financial distress on 43 banks, the result was an accurate predictor on 8 out of 10 failed firms, 80% validity for the model. However, by using a sample of non-failed firms majority of them proved the Edward Altman's financial prediction model to be 90% valid. Also, Li and Naiping (2011), find z-score for public companies is higher than the registered companies, This means that the financial risk of private companies is significantly higher than that of publicly listed companies, and the Z-score for individual companies is significantly lower than of public companies. This means that the financial risks of individual companies are significantly higher than public companies. And, Al-Khatib and Al-Bzour (2011) studied the effect of financial ratios on forecasting corporate bankruptcy through the Altman and Kaida models for the period 1990-2006 and a sample of companies in the services and industry sector. The results of the two models to find out which is more appropriate to give early warning about bankruptcy, where the average model Altman 93.8% and Keda 69% and found that Jordanian companies do not use these models in their financial analysis. Also, Alareeni and Branson (2012) investigated the failure prediction for Jordanian industrial companies in order to define the accuracy of Altman Z-score model before it occurs. The rate of identification accuracy of the Z-score was 73.40% at first year, at the second year 74.46% and at the third year 70.21%. Furthermore, Mohamed (2013), used Altman

Z-score multi discriminant analysis (MDA) model for prediction of bankruptcy of firms listed in the NSE adopted. The result confirm that Altman Z-score (1993) was not sufficient to differentiate between failed firms and non-failed firms as compared to that of Altman's Z score of 1968. Because, Altman (1993) Z-score was intended for manufacturing and retailing firms, Mohamed (2013) suggested that investors should pay attention to liquidity and activity ratios. But Kariuki (2013) study the impact of financial distress on commercial banks performance, he analyzed data by using regression model. The results reveals that most banks under study had financial distress, non-listed banks suffered more. Financial distress had major impact on financial performance, and there is a negative relationship between financial distress and financial performance. Finally, Gunathilaka (2014) examined the financial distress of 82 companies listed on the Colombo Stock Exchange (CSE) from several industries by using the Z-Score models of Altman and Springate. Samples were collected from 2008 to 2012 and analyzed by incorporating Multivariate Discriminant Analysis (MDA). The results of the study were identical, though Altman's Z-Score demonstrated a higher degree of accuracy in predicting the financial distress of the selected Sri Lankan companies at least a year before the distress.

3. Methodology

The study depended on the analytical method through doing the statistical analysis of the independent variables on the dependent variable related to the subject of the study in order to cover the analytical part of the study, in addition to the descriptive method through relying on books, periodicals, previous studies and financial reports of the companies of the study' sample, whether the direct or the indirect ones, to cover the theoretical part.

3.1 Data Collection

Data have been collected from the company's annual financial reports published in Amman Stock Exchange. The sample consists of all insurance companies listed on Amman Stock Exchange (ASE) over the period 2011-2016. In addition, companies with missing data have been removed from the initial sample. Thus, the final sample consists of 21 ASE insurance listed companies.

3.2 The Model

The analytical model used in the study is Altman revised Z-score model (1983). It is a linear equation in the form:

$$Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$$

Where;

Z=overall index;

X1=Working Capital/Total Assets(WC/TA);

X2=Retained earnings /Total Assets (RE/TA);

X3=Earnings before Interest and Taxes/Total Assets (EBIT/TA);

X4=Market Value of Equity/Book Value of Total Liabilities (MC/TL).

Discrimination zones:

$Z > 2.60$, "Safe" zone, exemplifies that a firm will less likely go bankrupt.

$1.10 < Z < 2.60$, "Grey" zone, indicates that the firm is at the risk of financial distress (grey zone).

$Z < 1.10$, "Distress" zone, implies that the firm will very likely go bankrupt in the near future.

3.2.1 Dependent Variable

Z is the discriminant variable whose value will allocate a firm as either financially distressed or healthy.

3.2.2 Independent Variable

X1 = Working Capital/Total Assets (WC/TA)

Working Capital (WC): is simply defined as the difference between current assets and current liabilities and it can either be positive or negative.

X2 = Retained Earnings/Total Assets (RE/TA)

Retained Earnings (RE): are earnings not distributed to shareholders, instead reinvested in the firm. The RE to TA ratio measures the degree of financing of total assets via surplus profits. It also measures the degree of leverage of a company. The ratio measures cumulative profitability of a firm and indicates the firm's earning power as well as age (Altman, 2000).

$X3 = \text{Earnings Before Interest and Taxes/Total Assets (EBIT/TA)}$

Earnings Before Interest and Taxes (EBIT): refer to the earnings generated from the operating activities of the firm. The ratio EBIT/TA measures the efficiency of assets in generating profits. Low EBIT/TA ratio indicates that the firm is not using the assets efficiently in generating profits. This ratio estimates the cash supply available for allocation to the creditors, government and shareholders. This ratio is believed to be extremely appropriate for investigating firm bankruptcy because the ultimate existence of the company depends on earning power (Altman, 1968).

$X4 = \text{Market Capitalization/Book Value of Total Liabilities (MC/TL)}$

Liabilities is the measuring of both the long and current term, while equity is found to be the market value of all the shares of common, preferred and stock. This measure demonstrates how much the firm's assets might decline in value before the assets become lower than liabilities and the company becomes bankrupt (Altman, 2000).

4. Results and Discussions

4.1 Descriptive Analysis

The descriptive variables of the study's variables were calculated as in table (1), where the arithmetic mean and the standard deviation of each of the ($X1$, $X2$, $X3$, $X4$) were calculated.

Table 1. Descriptive analysis of the study's variables

| | $X1$ | $X2$ | $X3$ | $X4$ | Z |
|-------------|-----------|-----------|-----------|----------|-----------|
| Maximum | 1.298485 | 0.107281 | 0.123711 | 2.228598 | 10.34633 |
| Minimum | -0.948374 | -0.983549 | -0.501184 | 0.170101 | -11.66851 |
| Median | 0.351214 | -0.018408 | 0.027206 | 0.567957 | 2.961056 |
| Std. Dev. | 0.445768 | 0.200577 | 0.077743 | 0.388055 | 3.858047 |
| Skewness | -0.121171 | -2.295403 | -3.182951 | 1.631977 | -0.533187 |
| Kurtosis | 3.097175 | 8.354581 | 17.76714 | 6.189481 | 3.988109 |
| Jarque-Bera | 0.357909 | 261.1720 | 1357.613 | 109.3375 | 11.09595 |

$X1$:WC/TA; $X2$:RE/TA; $X3$:EBIT/TA; $X4$:MC/TL.

Through the Table 1, you can see that the arithmetic mean of the independent variables of the study, represented in Working Capital/Total Assets, Retained Earnings/Total Assets, Earnings Before Interest and Taxes/Total Assets, Market Capitalization/Book Value of Total Liabilities, amounted respectively (0.351214, -0.018408, 0.027206, 0.567957) respectively, and with a standard deviation that amounted respectively (0.445768, 0.200577, 0.077743, 0.388055) respectively. The dependent variable of the study, represented in the Z of the study's sample, has amounted on the arithmetic mean (2.961056) and on the standard deviation it reached (3.858047). This indicates that there are differences in the profitability of the insurance companies due to the performance of these companies from one year to another on one hand, and the differences between the size and the structure of the company on the other hand.

Table 2. Pearson correlation matrix

| | $X1$ | $X2$ | $X3$ | $X4$ | Z |
|------|----------|----------|----------|----------|-----|
| $X1$ | 1 | | | | |
| $X2$ | 0.653464 | 1 | | | |
| $X3$ | 0.365882 | 0.566192 | 1 | | |
| $X4$ | 0.529037 | 0.268929 | 0.152477 | 1 | |
| Z | 0.973963 | 0.769602 | 0.524657 | 0.572759 | 1 |

$X1$:WC/TA; $X2$:RE/TA; $X3$:EBIT/TA; $X4$:MC/TL.

The correlations of the variables of the model were calculated and the results are as shown in table (1) above. The findings in table (1) indicates that there is a strong positive correlation between Z values and Working capital/Total asset ($r=0.97$). And there is a strong positive correlation between Z values and Retained Earnings/Total Assets ($r=0.76$). And there is a strong positive correlation between Z values and Earnings Before Interest and Taxes/Total Assets ($r=0.52$). And there is a strong positive correlation between Z values and Market Capitalization/Book Value of Total Liabilities ($r=0.57$).

4.2 Discussion Result

Table 3. Financial ratio analysis

| Middle East Insurance (MEIN) | | | | | | |
|---------------------------------|----------|----------|----------|----------|-----------|------|
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 1.292386 | 0.068597 | 0.002195 | 0.934641 | 9.6977998 | Safe |
| 2012 | 1.162655 | 0.054891 | 0.021655 | 0.713865 | 8.7010432 | Safe |
| 2013 | 1.0909 | 0.051389 | 0.041161 | 0.55593 | 8.1841605 | Safe |
| 2014 | 1.025769 | 0.059067 | 0.031472 | 0.667425 | 7.8338919 | Safe |
| 2015 | 0.962107 | 0.068936 | 0.029283 | 0.658438 | 7.4242926 | Safe |
| 2016 | 0.935837 | 0.107281 | 0.068041 | 0.775897 | 7.7607532 | Safe |
| Al-Nisr Al-Arabi Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.832232 | 0.018689 | 0.02575 | 1.227289 | 6.9820547 | Safe |
| 2012 | 0.69171 | 0.015922 | 0.037268 | 1.171594 | 6.0701403 | Safe |
| 2013 | 0.539919 | 0.009628 | 0.037964 | 0.972702 | 4.8497168 | Safe |
| 2014 | 0.473238 | 0.017666 | 0.04678 | 1.000292 | 4.5266961 | Safe |
| 2015 | 0.422858 | 0.018414 | 0.047706 | 0.842876 | 4.039579 | Safe |
| 2016 | 0.354595 | 0.011189 | 0.041949 | 0.778419 | 3.4618546 | Safe |
| Jordan Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.959164 | 0.023268 | 0.039614 | 2.01784 | 8.752909 | Safe |
| 2012 | 1.020655 | 0.043419 | 0.057272 | 1.926394 | 9.2446251 | Safe |
| 2013 | 0.931684 | 0.025661 | 0.008446 | 1.737974 | 8.0771342 | Safe |
| 2014 | 0.822395 | 0.044766 | 0.056881 | 1.599698 | 7.6027675 | Safe |
| 2015 | 0.591725 | 0.048744 | 0.013104 | 1.49037 | 5.6935703 | Safe |
| 2016 | 0.559976 | 0.038226 | 0.030655 | 1.273635 | 5.3413733 | Safe |
| Arabia Insurance Company-Jordan | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.525599 | 0.034835 | 0.001162 | 0.477334 | 4.0705006 | Safe |
| 2012 | 0.400872 | 0.033038 | 0.026595 | 0.294043 | 3.2248882 | Safe |
| 2013 | 0.388551 | 0.032425 | 0.024488 | 0.27409 | 3.1069558 | Safe |
| 2014 | 0.364829 | 0.033775 | 0.036033 | 0.408859 | 3.1748259 | Safe |
| 2015 | 0.326689 | 0.037214 | 0.003765 | 0.37021 | 2.6784186 | Safe |
| 2016 | 0.347833 | 0.030396 | 0.027817 | 0.355126 | 2.9406887 | Safe |
| Delta Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.94172 | 0.021459 | 0.003794 | 2.228598 | 8.6131674 | Safe |
| 2012 | 0.923736 | 0.029002 | 0.066096 | 0.792084 | 7.4301083 | Safe |
| 2013 | 0.70694 | 0.017414 | 0.052777 | 0.630062 | 5.7105202 | Safe |
| 2014 | 0.6619 | 0.014155 | 0.057363 | 0.516377 | 5.315888 | Safe |
| 2015 | 0.572988 | 0.018195 | 0.030957 | 0.478299 | 4.5283645 | Safe |
| 2016 | 0.555776 | 0.018419 | 0.035702 | 0.594907 | 4.5705092 | Safe |
| Jerusalem Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.843862 | 0.016628 | 0.052407 | 1.336156 | 7.3450792 | Safe |
| 2012 | 0.793055 | 0.021953 | 0.067423 | 1.175113 | 6.9609578 | Safe |
| 2013 | 0.684793 | 0.025884 | 0.063 | 0.964418 | 6.0126202 | Safe |
| 2014 | 0.682944 | 0.033618 | 0.071174 | 0.874199 | 5.9859097 | Safe |
| 2015 | 0.675297 | 0.037287 | 0.042801 | 0.838782 | 5.7198479 | Safe |
| 2016 | 0.593267 | 0.030169 | 0.018717 | 0.640639 | 4.7886308 | Safe |
| National Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.591483 | -0.14155 | -0.04534 | 0.965968 | 4.1282701 | Safe |
| 2012 | 0.521744 | -0.11988 | 0.012431 | 0.970482 | 4.1343635 | Safe |
| 2013 | 0.384585 | -0.06916 | 0.024241 | 0.695341 | 3.1904236 | Safe |
| 2014 | 0.464515 | -0.0143 | 0.063833 | 0.553456 | 4.0106973 | Safe |
| 2015 | 0.534508 | 0.006741 | 0.068029 | 0.588127 | 4.6030376 | Safe |
| 2016 | 0.585722 | 0.024456 | 0.073072 | 0.618718 | 5.0627617 | Safe |

| Jordan International Insurance | | | | | | |
|--------------------------------|----------|----------|----------|----------|------------|----------|
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 1.115113 | -0.01136 | -0.02974 | 0.748442 | 7.8641148 | Safe |
| 2012 | 1.053183 | -0.0308 | -0.00721 | 0.581214 | 7.3702948 | Safe |
| 2013 | 1.224277 | -0.00786 | 0.019898 | 0.635606 | 8.8067415 | Safe |
| 2014 | 1.298485 | 0.024084 | 0.036382 | 1.206427 | 10.107813 | Safe |
| 2015 | 1.284944 | 0.032777 | 0.046764 | 1.424749 | 10.346327 | Safe |
| 2016 | 1.118745 | 0.024704 | 0.025396 | 0.927739 | 8.56429 | Safe |
| Arab Orient Insurance Company | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.228533 | 0.019493 | 0.069824 | 0.81329 | 2.8858935 | Safe |
| 2012 | 0.211264 | 0.020391 | 0.062998 | 0.597935 | 2.5035461 | Safe |
| 2013 | 0.237229 | 0.026137 | 0.064654 | 0.565643 | 2.6698259 | Safe |
| 2014 | 0.296774 | 0.047094 | 0.068105 | 0.621857 | 3.2109761 | Safe |
| 2015 | 0.282523 | 0.064266 | 0.055311 | 0.550389 | 3.0124595 | Safe |
| 2016 | 0.270063 | 0.069579 | 0.013404 | 0.517072 | 2.6314423 | Safe |
| The United Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.836295 | 0.039045 | 0.016735 | 0.713756 | 6.4752825 | Safe |
| 2012 | 0.441116 | 0.018798 | 0.031028 | 0.464411 | 3.6511377 | Safe |
| 2013 | 0.175184 | 0.013554 | 0.046119 | 0.902781 | 2.4512314 | Grey |
| 2014 | 0.049944 | 0.046231 | 0.053136 | 0.483117 | 1.3426938 | Grey |
| 2015 | 0.277096 | 0.042011 | 0.050887 | 0.494414 | 2.8158002 | Safe |
| 2016 | 0.254201 | 0.059622 | 0.061184 | 0.604321 | 2.9076208 | Safe |
| Arab Life & Accident Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.54107 | -0.01277 | -0.00917 | 0.442096 | 3.9103385 | Safe |
| 2012 | 0.508188 | -0.02252 | -0.00785 | 0.361101 | 3.586725 | Safe |
| 2013 | 0.380599 | -0.04163 | -0.01553 | 0.278871 | 2.5494957 | Grey |
| 2014 | 0.375197 | -0.00819 | 0.038665 | 0.27333 | 2.9814236 | Safe |
| 2015 | 0.408389 | -0.00926 | 0.028207 | 0.348538 | 3.2043566 | Safe |
| 2016 | 0.358394 | 0.009084 | 0.034931 | 0.666843 | 3.3155991 | Safe |
| Philadelphia Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.660645 | -0.04069 | -0.01459 | 0.681725 | 4.8189757 | Safe |
| 2012 | 0.498599 | -0.08087 | -0.04485 | 0.550911 | 3.2842531 | Safe |
| 2013 | 0.376165 | -0.12722 | -0.0431 | 0.446756 | 2.2323462 | Grey |
| 2014 | 0.555989 | -0.07079 | 0.078901 | 0.516451 | 4.4890201 | Safe |
| 2015 | 0.622625 | -0.05045 | 0.038274 | 0.598723 | 4.8058045 | Safe |
| 2016 | 0.74922 | -0.03428 | 0.035243 | 0.655389 | 5.728114 | Safe |
| Jordan French Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | -0.02248 | -0.26263 | -0.05024 | 0.268809 | -1.0589612 | Distress |
| 2012 | -0.05057 | -0.27393 | -0.02162 | 0.193617 | -1.1667265 | Distress |
| 2013 | 0.013885 | -0.2167 | -0.00492 | 0.170101 | -0.4697963 | Distress |
| 2014 | 0.014809 | -0.1477 | 0.048717 | 0.182474 | 0.1346336 | Distress |
| 2015 | 0.083953 | -0.09098 | 0.069221 | 0.215696 | 0.9457768 | Distress |
| 2016 | 0.137561 | -0.03723 | 0.068683 | 0.308134 | 1.5661097 | Grey |
| The Holy Land Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.341049 | -0.27229 | -0.03794 | 0.948806 | 2.0909277 | Grey |
| 2012 | -0.94837 | -0.73256 | -0.50118 | 0.294207 | -11.66851 | Distress |
| 2013 | -0.6866 | -0.67908 | 0.068335 | 0.255178 | -5.9907396 | Distress |
| 2014 | -0.72142 | -0.72906 | 0.015001 | 0.349386 | -6.6415596 | Distress |
| 2015 | -0.76556 | -0.98355 | -0.18354 | 0.546556 | -8.8879799 | Distress |
| 2016 | -0.35408 | -0.71294 | 0.123711 | 0.922475 | -2.8469717 | Distress |

| Al-Manara Insurance PLC.CO. | | | | | | |
|---|----------|----------|----------|----------|------------|----------|
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.555962 | -0.48796 | -0.16438 | 0.806827 | 1.7989068 | Grey |
| 2012 | 0.193261 | -0.71591 | -0.23757 | 0.433265 | -2.207618 | Distress |
| 2013 | 0.151112 | -0.78096 | -0.01653 | 0.18574 | -1.4706751 | Distress |
| 2014 | 0.099031 | -0.02707 | -0.0253 | 0.21677 | 0.6189934 | Distress |
| 2015 | 0.162772 | -0.04457 | -0.01215 | 0.221236 | 1.0731058 | Distress |
| 2016 | 0.233813 | -0.05131 | 0.013852 | 0.207924 | 1.6779624 | Grey |
| Jordan Emirates Insurance Company P.S.C | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | -0.13768 | -0.21998 | -0.27153 | 0.451887 | -2.970564 | Distress |
| 2012 | -0.11064 | -0.16639 | 0.02388 | 0.305942 | -0.7865152 | Distress |
| 2013 | -0.11883 | -0.19341 | -0.02015 | 0.418137 | -1.1064193 | Distress |
| 2014 | 0.363598 | -0.16552 | 0.058516 | 0.473354 | 2.735864 | Safe |
| 2015 | 0.103511 | -0.33767 | -0.14525 | 0.397862 | -0.9800829 | Distress |
| 2016 | -0.04939 | -0.22845 | -0.05767 | 0.321429 | -1.1188109 | Distress |
| Arab Union International Insurance | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.273956 | -0.12589 | -0.13785 | 0.921198 | 1.4276835 | Grey |
| 2012 | 0.098771 | -0.21625 | -0.1141 | 0.401784 | -0.4019154 | Distress |
| 2013 | 0.029421 | -0.31533 | -0.08362 | 0.521689 | -0.8491446 | Distress |
| 2014 | 0.086759 | -0.28642 | 0.007741 | 0.759231 | 0.4846076 | Distress |
| 2015 | 0.007479 | -0.30762 | -0.04154 | 0.643239 | -0.5575085 | Distress |
| 2016 | 0.052984 | -0.10282 | -0.03802 | 0.377901 | 0.1537101 | Distress |
| Euro Arab Insurance Group | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | 0.233535 | -0.17278 | -0.16949 | 0.617941 | 0.4785824 | Distress |
| 2012 | 0.111653 | -0.1357 | 0.03075 | 0.412724 | 0.9300558 | Distress |
| 2013 | 0.208032 | -0.06777 | 0.040473 | 0.57027 | 2.0145304 | Grey |
| 2014 | 0.309336 | 0.001332 | 0.087392 | 0.686047 | 3.3412098 | Safe |
| 2015 | 0.347625 | 0.023329 | 0.034367 | 0.59996 | 3.2173737 | Safe |
| 2016 | 0.389647 | 0.025079 | 0.035904 | 0.481527 | 3.3847262 | Safe |
| The Arab Assurers Insurance Company | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | -0.12585 | -0.1583 | 0.060398 | 0.296944 | -0.6239831 | Distress |
| 2012 | 0.068946 | -0.12028 | 0.000601 | 0.220382 | 0.2956032 | Distress |
| 2013 | 0.007356 | -0.11584 | -0.00524 | 0.271179 | -0.079838 | Distress |
| 2014 | 0.055604 | -0.12674 | -0.0034 | 0.25489 | 0.1963559 | Distress |
| 2015 | 0.161637 | -0.08332 | 0.031098 | 0.276578 | 1.2881004 | Grey |
| 2016 | 0.254763 | -0.05051 | 0.038197 | 0.196369 | 1.9694686 | Grey |
| Arab Jordanian Insurance Group | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | -0.25878 | -0.41022 | -0.07717 | 0.37381 | -3.1610052 | Distress |
| 2012 | -0.3651 | -0.47571 | -0.07081 | 0.557494 | -3.8363156 | Distress |
| 2013 | -0.34957 | -0.2299 | -0.0127 | 0.630039 | -2.4664681 | Distress |
| 2014 | -0.11588 | -0.095 | 0.039139 | 0.357218 | -0.4317617 | Distress |
| 2015 | -0.19193 | -0.07264 | 0.028611 | 0.40428 | -0.8791443 | Distress |
| 2016 | -0.11314 | -0.03533 | 0.042566 | 0.430519 | -0.1192963 | Distress |
| The Mediterranean & Gulf Insurance Company-Jordan P.L.C | | | | | | |
| year | X1 | X2 | X3 | X4 | Revised Z | Zone |
| 2011 | -0.06006 | -0.14007 | -0.09692 | 1.274334 | -0.1639093 | Distress |
| 2012 | -0.11978 | -0.11719 | 0.003886 | 1.025987 | -0.0643937 | Distress |
| 2013 | -0.21876 | -0.09766 | 0.008739 | 0.579412 | -1.0863333 | Distress |
| 2014 | -0.32023 | -0.11876 | -0.02637 | 0.400431 | -2.2446137 | Distress |
| 2015 | -0.2736 | -0.11936 | 0.011688 | 0.576791 | -1.4997769 | Distress |
| 2016 | -0.26226 | -0.09408 | 0.022149 | 0.485115 | -1.3688967 | Distress |

Table 3 shows that the percentage of companies with high Z value (Safety zone) reached 57.13%, this indicates the safety of the financial position of these companies, because they develop their activities and good use company funds, which it is noted by rising TA, decreased TL & WC. While the percentage of companies with a low Z value near zero (Gray and Distress zone) reached 38.09%, that companies are exposed to risk of financial failure, may be due to lack of experience in the management of funds and they did not develop their activities and misuse company funds, where it is noted that the rise in assets offset by a rise in liabilities, resulting in a decline in profits. so that gives an indicators the companies will exposed to financial failure if they stay use the same financial polices they currently use. Study results compatible with Al-Rawi, Kiani, and Vedd (2008), Gunathilaka (2014), Gerantonis et al. (2009), Alareeni and Branson (2012).

5. Conclusions

The Z-score model is a very practical tool that can be used to predict the insolvency of companies as well as maintaining and monitoring of companies being risk managed. Company liquidations are a daily occurrence and more often than not, credit granters lose out. The Altman prediction models can effectively be used to breach that gap in the credit industry. Furthermore, this tool could be used by investors when considering investing in a private company to ascertain the state of the company's financial position.

The Z score Altman's model may not be the only model to measure the financial distressed firms and the researcher recommends use of other models to determine the financial distressed firms. This may even expand the number of distressed firms in a given Securities Exchange.

This study highly recommends to the potential investors in companies to use the Altman failure prediction model as an assessment tool. The results could raise certain questions about the state of a company and could ultimately result in an investor investing or purchasing a company that is profitable and well managed since declining Z-score values depicts a failing company.

The study recommends that the Altman failure prediction model should use the prevailing Economic conditions such as changes in the economy, markets and industries in the economy in order to predict a true picture of the company in the economy.

Further research should be undertaken in the field Logit failure prediction models to forecast the success or failure of the company and give a comparison to the Altman failure prediction model used to simply its usage and encourage their use by industry professionals.

Many other factors may have influenced the performance of firms, factors that cannot be measured or quantified e.g staff morale, boardroom wrangles, and occupational health etc. It would be interesting if a similar study was conducted in concomitance with this to ascertain the findings. This would expand the scope of the literature on firm performance.

Further exploration of Altman's Z score, and alternative formulas, is necessary to refine this potentially useful tool in order to develop a collection of tools useful in predicting financial distress.

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