

MEASURING THE PROBABILITY OF BANKRUPTCY FOR HEALTHCARE COMPANIES LISTED IN KUWAIT STOCK EXCHANGE USING ZETA MODEL

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ABSTRACT

The aim of this study is to examine the validity of the Zeta model in determining the probability of bankruptcy in healthcare companies listed in the Kuwait Stock Exchange market (KSE). Previous studies have shown that the Zeta model is a reliable model that can be used in present time to predict bankruptcy. This study evaluates the performance for the two companies that are listed under the healthcare sector for the period 2013-2017. The results showed that Yiacco is facing serious problems with its financial positions while Advanced Technology is located in the gray area.

KEYWORDS: Altman, Zeta Model, Healthcare Sector, Kuwait Stock Exchange (KSE), Bankruptcy.

INTRODUCTION

Despite not being the largest sector in the Kuwait Stock Exchange market (KSE), the healthcare sector is a very important sector when it comes to the Kuwaiti economy. These companies, Yiacco and Advanced Technology, are the main providers of medical drugs and medical equipments for both the public and private hospitals and clinics in Kuwait. Any fall in these companies would not only impact their shareholders, but would have a devastating effect on Kuwait's healthcare sector. Keeping a close look on the financial soundness of these companies would be crucial for both the shareholders and the healthcare community as whole in the country. The origins of bankruptcy models can be rooted to the 1960's when Beaver (1967) conducted a study on bankruptcy

detection using one single ratio (cash flow on total debt). One year later, Altman (1968) came up with the z-score which uses five financial ratios. He used financial ratios in his bankruptcy prediction model to produce an early warning system for companies. Back et al. (1994) concluded that financial models based on financial ratios would outperform those based on common financial variables. Venkata Ramana et al. (2012) implemented the Altman's z-score model to measure the financial performance and forecast the bankruptcy risk for the Indian cement companies during the 2001-2010 periods. They found that KCP Ltd and Kilogram Industries Ltd. are experiencing financial distress. Yet, Dalmia Bharat Ltd. is on the threshold of bankruptcy.

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This suggests the use of Altman's bankruptcy model for research is still applicable. Bredart (2014) used Altman's z-score to examine 870 firms listed in Amex, Nasdaq, and NYSE for the period 1:2000 to 12:2012. He concluded that the Altman model had a prediction accuracy of 83.82%. In 1977, Altman, Haldeman, and Narayanan constructed a new model that can detect bankruptcy with an accuracy rate reaching 90%, the called their new model the Zeta model. Gupta et al. (2013) used Zeta model to predict bankruptcy for the listed textile companies in Punjab for the period 1999 to 2010. The study concluded that the Zeta model was able to detect 86.67% of the bankruptcies that occurred in that period.

METHODOLOGY

The Zeta model is a modified version of the original Altman's model that was developed in 1968. The model is based on financial ratios, and it is concluded by many such as Husein and Pambekti (2014) to be an efficient way of diagnosing and analyzing the soundness of firms. In addition, it can be used to anticipate any future financial difficulties. The Zeta model is a linear combination of five financial ratios, weighted by coefficients. The coefficients were estimated by identifying a set of firms which had declared bankruptcy and then collecting a matched sample of firms which had survived, with matching by industry and approximate size (assets).

$$\text{Zeta Score (Z)} = 1.2 X1 + 1.4X2 + 3.3 X3 + 0.6 X4 + 1 X5 \quad (\text{Equation 1})$$

Where;

X1 = working capital (current assets (CA) – current liabilities (CL)) / total assets (TA)

X2 = retained earnings (RE) / total assets (TA)

X3 = earnings before interest and tax (EBIT) / total assets (TA)

X4 = total book equity (TE) / total liabilities (TL)

X5 = Sales (S) / Total Assets (TA)

The results obtained from the model is then compared to a benchmark that is set to determine the financial soundness of the company. The criteria used to interpret the Z-score model is;

- Safe Zone if Zeta-score >3 (risk free)
- Gray Zone if $1.8 \leq \text{Zeta-score} \leq 3$ (at risk)
- Distress Zone if Zeta-score < 1.8 (bankruptcy)

Based on Tomasevic (2014) the Zeta score can be converted into bankruptcy probability using:

$$P = 1 - \frac{e^Z}{1+e^Z} \quad (\text{Equation 2})$$

DATE AND EMPIRICAL RESULTS

This paper is based on data collected from the annual reports of the healthcare companies for the period spanning from 2013 to 2017. The annual reports were obtained from the Kuwait Stock Market website. As seen in table 1, Yiacco has shown a decrease in networking capital to total assets ratio. The reason for it is the huge decrease in networking capital especially in the year 2017, where the networking capital went down from KWD 26,963,702 in 2016 to KWD 7,948,942 in the year 2017. When it comes to the retained earnings to total assets ratio, it can also be seen that in the year 2017 the ratio declined due the huge losses the company experienced in 2017. The retained earnings for Yiacco dropped from KWD 3,813,668 in 2016 to KWD -16,155,800 in the year 2017. As a result of the 2017 losses, the EBIT to total assets ratio also went to -0.134 for that year. The poor performance of Yiacco in 2017 was reflected in its share price that decreased from 360 fils (1KWD=1000 fils) to 152 fils, which in turn affected the equity market value to total liabilities ratio. Despite lower sales, KWD 75,644,610 in 2017 compared to KWD 90,550,141 in 2016, Yiacco's sales to total assets ratio increased and that was due to the reduction in total assets from the previous year.

Table 1.Yiaco Financial Ratios Results

	2013	2014	2015	2016	2017
X1	0.184	0.208	0.163	0.281	0.111
X2	0.106	0.098	0.033	0.040	-0.225
X3	0.041	0.020	-0.064	0.004	-0.134
X4	0.938	0.367	0.320	0.973	0.438
X5	1.199	0.986	0.987	0.945	1.054

When it comes to networking capital to total assets ratio for Advanced Technology, it can be noted from table 2 that the ratio fell in 2017 as a result of the huge increase in total assets from the year 2016 and 2017. The total assets for Advanced Technology rose from KWD

185,435,353 in 2016 to KWD 248,624,796 in 2017. For the remaining ratios, Advanced Technology kept them steady over the study period, except for the equity market value to total liabilities ratio, which displayed downward trend due to the increase in total liabilities.

Table 2.Advanced Technology Financial Ratios Results

	2013	2014	2015	2016	2017
X1	0.230	0.285	0.275	0.253	0.179
X2	0.116	0.117	0.104	0.101	0.095
X3	0.059	0.058	0.046	0.048	0.052
X4	2.167	1.908	1.306	1.009	0.850
X5	0.657	0.616	0.641	0.534	0.678

From table 3, it is evident that Yiaco has always been in the danger zone swinging between both high and gray bankruptcy risk areas. Yiaco experienced the worst year in 2017 with a zeta-score of 0.693, the lowest during the study period, mainly due to the huge losses encountered that year. On the other hand, Advanced Technology displayed solid numbers in

the first three years of the study that resulted in positioning the company in the safe zone. In the years 2016 and 2017 Advanced Technology's score declined to the gray area primarily due to the huge increase in both current and total liabilities that had an effect on both the net working capital to total assets ratio and the EBIT to total liabilities ratio.

Table 3.Altman's Zeta-Score

Healthcare Companies Listed in KSE Market				
	Yiaco		Advanced Technology	
2017	0.693	High	1.706	Gray
2016	1.936	Gray	1.744	Gray
2015	1.210	High	2.054	Safe
2014	1.659	High	2.458	Safe
2013	2.265	Gray	2.589	Safe

3< Free, 3≥ Gray≥1.8, 1.8>High bankruptcy risk.

When converting the zeta-score into probability, it can be seen from table 4 that Yiaco started the study period with a 9.41% chance of being bankrupted within the next two years, but this probability increased during the study period

reaching 33.33% in the year 2017. The same thing can be said to Advanced Technology, where the company started the study period with 6.98% chance of being bankrupted within the next two years, and the probability went up to 15.37%.

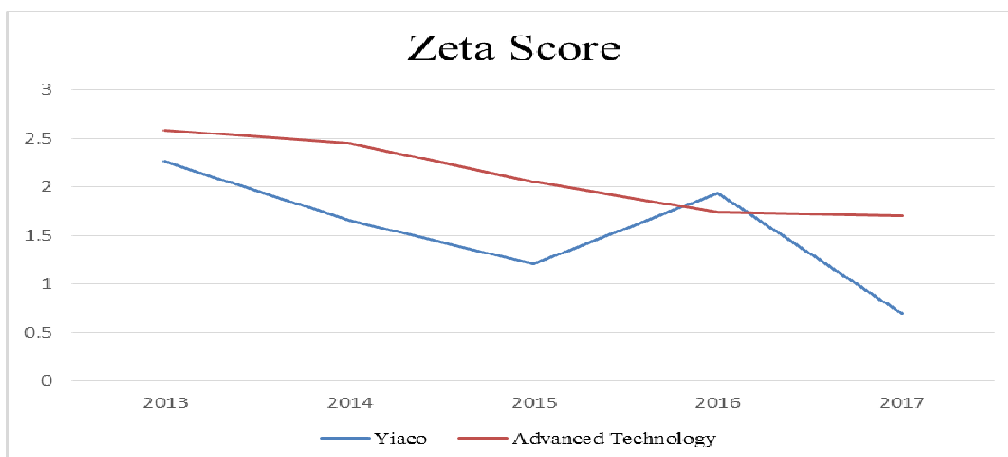


Figure 1.Zeta-Score

It can also be seen that Advanced Technology has exhibited a steady increase in the bankruptcy probability over the study period, while on the other hand, Yiaco showed volatile changes in the bankruptcy chances.

Table 4.Bankruptcy Probability

Healthcare Companies Listed in KSE Market		
	Yiaco	Advanced Technology
2017	33.33%	15.37%
2016	12.61%	14.88%
2015	22.97%	11.36%
2014	16.00%	7.88%
2013	9.41%	6.98%

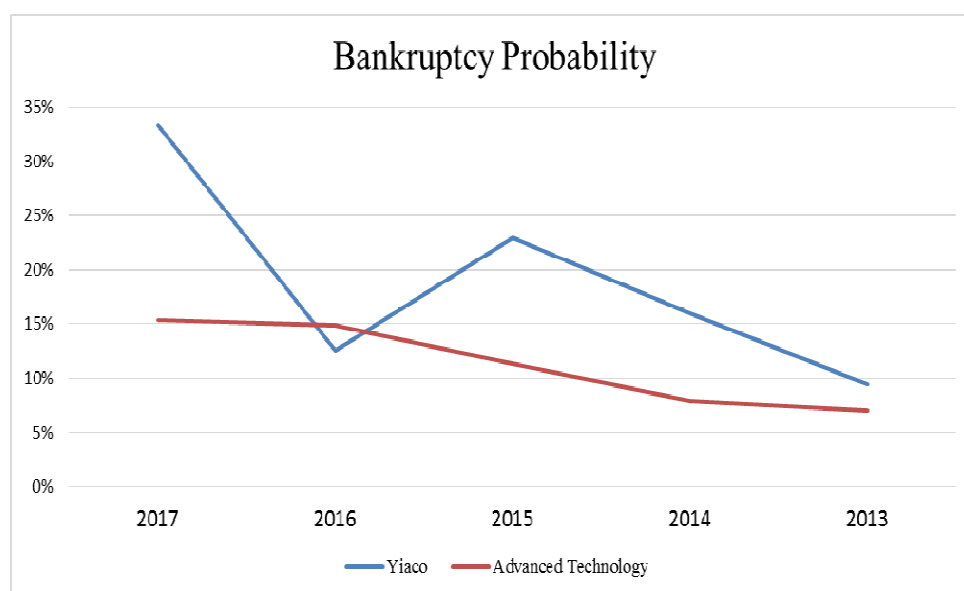


Figure 2.Bankruptcy Probability

Table 4 demonstrates the correlation between the components of the zeta-score. It can be seen that the zeta-score had the highest correlation with EBIT to total assets ratio followed by equity

market value to total liabilities ratio. While the zeta-score showed a positive correlation with the equation components, it exhibited a negative correlation with sales to total assets ratio.

Table 5. Pearson Correlation Matrix

	Zeta Score	X1	X2	X3	X4	X5
Zeta Score	1.000					
X1	0.719	1.000				
X2	0.808	0.660	1.000			
X3	0.877	0.708	0.926	1.000		
X4	0.837	0.625	0.479	0.641	1.000	
X5	-0.399	-0.595	-0.445	-0.571	-0.618	1.000

CONCLUSION

Healthcare companies listed in the Kuwait Stock Exchange play a crucial role in the healthcare industry as whole in Kuwait. Any shortfall in these companies would not only have critical effect on the companies' shareholders but it will also affect the healthcare sector in Kuwait. This study aimed to examine the financial performance and soundness of the healthcare companies listed in Kuwait Stock Market over the period 2013-2017 and their bankruptcy chances within the next two years. The results obtained from this study showed that Yiacor is facing a worrying financial position and the odds of it going bankrupt is high, reaching 33.33% in 2017. The reason for Yiacor's position is the huge losses they encountered in 2017. On the other hand, Advanced Technology have showed fairly good numbers for the first three years of the study, but their numbers began to fall in the last two years of the study. The primary reason for the declining scores of Advanced Technology was due to the large increase in both assets and liabilities in the years 2016 and 2017.

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