European Journal of Economic and Financial Research
ISSN: 2501-9430
ISSN-L: 2501-9430
Available on-line at: http://www.oapub.org/soc

DOI: 10.46827/ejefr.v8i5.1834 Volume 8 | Issue 5 | 2024

BANKRUPTCY RISK AND SHARE PRICES: A CASE STUDY ON ENERGY COMPANIES IN KUWAIT

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Abstract:
This study aims to investigate how investors' perceptions of risk impact the stock prices of energy companies listed on the Kuwait Stock Exchange (KSE) from 2016 to 2023. Investors' belief in the future financial stability of the companies they invest in influences their risk perception. Therefore, if investors hold pessimistic views, they will decrease their investment in these companies, causing share prices to drop, and vice versa. The Zmijewski x-score model is utilized in this study as a measure of risk to assess the financial stability of Kuwaiti energy companies and its impact on their stock prices. The study employs ordinary least square regression (OLS) to analyze the correlation between the x-score and share prices. Results from this research indicated that there was no statistically significant relation between Zmijewski's x-score and stock price and that investors look at other factors when choosing their investments. This is evident because the company with the greatest bankruptcy risk in the following two years also had the second-highest share price.

JEL: G1, G4, M21

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Keywords: Zmijewski x-score model, risk perception, financial distress, financial soundness, bankruptcy risk, energy companies, Kuwait Stock Exchange (KSE)

1. Introduction

Kuwait relies heavily on oil sales, with over 90% of its income coming from oil revenues. Kuwait Oil Company (KOC), state-owned, holds exclusive rights for oil extraction, refining, and sales in Kuwait. KOC employs both foreign and local contractors for certain operations. A few local contractor companies such as Senergy Holding Company (SHC), Independent Petroleum Group (IPG), National Petroleum Services (NPS), Energy House Holding (EHH), and Burgan Company for Well Drilling, Trading and Maintenance (BD) are included in the Kuwait Stock Exchange (KSE) listing. Because oil prices are constantly changing, the amount of contracts given to these companies fluctuates, leading to inconsistent cash flow. This puts them at risk for financial issues and makes them more likely to experience financial difficulty.

Financial distress is the period leading up to bankruptcy. Financial distress occurs in the final phase of a company's deterioration when it experiences a shortage of cash flow. Many researchers have focused on researching financial distress prediction. According to Platt and Platt (2006), financial distress is described as a period of worsening financial situation that occurs prior to liquidation or bankruptcy. Elloumi and Gueyie (2001) characterize a company experiencing negative net income for two consecutive years as being in a state of financial distress. According to Ward *et al.* (2006), a company with an interest coverage ratio of less than one is said to be at risk of financial distress, as their debt-generated revenues are insufficient to cover the interest payments on their debt, signaling challenges in meeting their short-term obligations. Zmijewski (1984) defines the financial distress of firms as the action of submitting a request for bankruptcy.

The financial status of a company can serve as an indicator of its capacity to sustain its activities. Therefore, it is necessary for companies to examine and assess their financial statements. Financial assessments are carried out by evaluating ratios to determine the financial status of companies in the past, present, and future (Uwah *et al.*, 2023). Multiple analytical techniques are available for forecasting bankruptcy. Altman *et al.* (2017) indicated that financial distress prediction models assist credit rating agencies, debt providers, and equity holders in evaluating the financial well-being of companies. Financial distress models act as a warning system for corporate managers to take corrective actions. The Zmijewski x-score model is frequently utilized to assess companies' financial distress. The x-score model was created using data from 40 bankrupt and 800 non-bankrupt industrial firms from 1972 to 1978. According to Zmijewski (1984), the model successfully predicted the bankruptcy of companies with a 99% accuracy rate two years before their actual bankruptcy.

Zmijewski's x-score model relies on financial ratios that are derived from the company's financial statements. Agarwal and Taffler (2008) discovered that accounting-based bankruptcy prediction models are more effective than market-based prediction models when analyzing all non-finance industry companies listed on the London Stock

Exchange (LSE) from 1985 to 2001. Husein and Pambekti (2014) found that financial ratios in a company's financial statement are an effective method for evaluating the financial stability of a company and can help predict potential financial challenges. Subramanyam and Wild (2013) contend that financial ratios are a valuable tool in financial analysis, aiding business decision-making by identifying both the strengths and weaknesses within a company. Nevertheless, despite being commonly utilized by researchers, financial ratios have limits. Three constraints were mentioned by Wadhwa (2019) in the utilization of financial ratios. One issue is the absence of consistent terms or methods for calculating ratios. The absence of common standards for calculating ratios causes ambiguity. The next one is the distributional characteristics of financial ratios. The lack of normality was confirmed during the analysis of the ratio pattern. As a result, numerous parametric methods are rendered ineffective when applied to financial ratios. Another constraint is the inability to compare ratios due to variances in accounting standards across economies. Variations in accounting standards affect the financial statements and subsequently affect the financial ratios. Divergence in accounting policies under the same accounting standards leads to incomparable financials and diminishes the effectiveness of financial ratios. Studies have demonstrated the presence of the effects of this change. Research has demonstrated that changing the accounting framework during a specific reporting period greatly impacts financial ratios (Cinca *et al.*, 2005; Liu *et al.*, 2013; Faello, 2015).

Husein and Pambekti (2014) conducted a study comparing the accuracy rates of Altman, Zmijewski, Springate, and Grover models using data from 132 companies listed on the Daftar Efek Syariah (DES) between 2009 and 2012. They determined that the Zmijewski model was the best choice for forecasting financial distress. Aminian *et al.* (2016) analyzed the accuracy of Altman z-score model, Springate model, Grover model, and Zmijewski x-score model using data from 35 textile, ceramic, and tile companies listed on the Tehran Stock Exchange from 2008 to 2013. They determined that the Zmijewski x-score model had a significant statistical prediction of a company's financial troubles. In a study conducted by Avenhuis (2013), the effectiveness of the Altman, Ohlson, and Zmijewski models in predicting outcomes for Dutch businesses from 2005 to 2012 was analyzed. When employing the initial statistical methods, the validation sample accuracy rates for Altman's, Ohlson's, and Zmijewski's models were 80.6%, 93.8%, and 95.3%, in that order. Fatmawati (2012) compared the accuracy rate of Zmijewski, Altman, and Springate models using data from 30 delisted companies and 30 listed companies on the Indonesia Stock Exchange from 2003 to 2009. The research findings indicated that the Zmijewski x-score model was the most accurate in forecasting company delisting. Suresh *et al.* (2019) utilized the Zmijewski x-score to assess the financial stability of Bhutan Telecom Company (BTC) from 2010 to 2018, finding that the company maintained a strong financial position, with x-scores falling between -2.653 and -3.993 during the research period. In their study, AlAli *et al.* (2018) employed the Zmijewski x-score model to analyze the financial stability of mobile telecommunication firms that are part of the Kuwait stock exchange from 2013 to 2017. They determined that

Viva was the least likely company to go bankrupt when compared to Ooredoo and Zain companies.

The financial soundness of any company is vital for any party that is associated with the company both internal and external. From the internal side, the score of the financial distress model represents a report card on the efficiency of top management performance and also a good financial position sends a comforting message to the employees that they are unlikely to be laid off. On the external side, a positive financial distress score would mean for the creditors that the company is in a good position to repay its loans without delay or default. Investors, on the other hand, see the financial soundness of the company as an indicator of how well their investments in that company are doing, and that will affect the share price of the company. Al Saedi and Al Tamimi (2018) examined the relation between Altman's z-score and the share price of industrial companies listed on the Qatar stock exchange over the period 2008 to 2017 and found a statistically significant relation between them. AlAli (2019) conducted a study on the effect of Altman's Zeta model score on the share price of healthcare companies listed at Kuwait stock exchange over the period spanning from 2013 to 2017 and came up with the same results that there was a statistically significant relation between Altman's Zeta score and the share price. However, AlKulaib and AlAli (2019) utilized the Altman z-score to investigate the correlation between the z-score and the stock price of traditional insurance firms between the periods 2010 and 2017. The research findings indicated that there was no statistically significant correlation between the Altman z-score and the share price of these companies. They determined that the scores of financial distress prediction models could impact share prices in specific market sectors, but they cannot be applied to all sectors universally.

2. Research Methodology

Zmijewski's x-score is one of the most commonly used models by researchers and practitioners in predicting the financial distress of companies (Grice & Dugan, 2003). The model is presented in equation 1;

$$\text{Zmijewski x-score} = -4.336 - 4.513\,X1 + 5.679\,X2 - 0.004\,X3 \quad (1)$$

Where;
X1 = Net Income/Total Assets (Profitability),
X2 = Total Liabilities/Total Assets (Leverage),
X3 = Current Assets/Current Liabilities (Liquidity).

Djamaluddin *et al.* (2017) categorized the Zmijewski x-score into two groups. If the x-score is below zero, the company is considered to be in good shape. If the x-score is above zero, the company is likely to face financial difficulties. The relation between Zmijewski x-score and the share price is measured using ordinary least squared (OLS) regression using equation 2.

$$SP_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (2)$$

Where;
SP_{it} is the share price of company i at time t,
β is the coefficient of the x-score,
X_{it} is the x-score of company i at time t.
ε is the error term.

Equation 2 is set to examine the following hypothesis;

H_0: There is no relation between Zmijewski x-score and the share price of Kuwaiti energy companies.

Using Ohlson's (1980) statistical model, the probability of bankruptcy of an enterprise can be calculated as follows;

$$P = \frac{1}{1+e^{-x\,score}} \quad (3)$$

Where;
P is the probability of bankruptcy,
e is the Euler number, which equals to 2.71828.

3. Data and Empirical Results

This study is based on the data of the five energy sector companies that are listed on the Kuwait Stock Exchange (KSE) over the period expanding from 2016 to 2023. The data used in this research were obtained from the Kuwait Stock Exchange (KSE) website.

The primary objective of any business is to produce returns for its stakeholders. Giving investors consistent upward returns will lead to higher trust in the company and its leadership, thus boosting its stock prices. Examining Table 1 reveals that EHH had the lowest return on assets (ROA) compared to the other companies analyzed, experiencing losses in 6 of the 8 years and an average loss of -18.25%. Conversely, NPS was the most profitable company within the sector, with an annual average return of 18.51%, yet its profitability is declining.

Table 1: Profitability (X1)

X1	SHC	IPG	NPS	EHH	BD	Average
2016	-0.169	0.018	0.238	-0.391	0.013	**-0.058**
2017	0.003	0.021	0.261	-0.104	0.014	**0.039**
2018	-0.026	0.019	0.265	0.002	0.011	**0.054**
2019	-0.304	0.022	0.236	-0.171	0.006	**-0.042**
2020	0.001	0.021	0.130	-0.067	0.011	**0.019**
2021	0.006	0.017	0.102	0.057	0.014	**0.039**
2022	-0.017	0.017	0.128	-0.468	0.015	**-0.065**
2023	-0.052	0.016	0.122	-0.319	0.016	**-0.044**
Average	**-6.98%**	**1.88%**	**18.51%**	**-18.25%**	**1.25%**	**-0.72%**

Financial leverage is a two-sided tool that has the potential to increase profits when used effectively but can also result in amplified losses. If a leverage ratio is under 1, it's typically seen as acceptable due to sufficient assets covering debts, but exceeding 1 can raise red flags for lenders and investors, and a ratio over 2 is worrisome. Table 2 shows that the average leverage ratio of the companies examined is 0.599. IPG stands out as the sole company with a leverage ratio exceeding 1, which is concerning for investors and lenders alike.

Table 2: Leverage (X2)

X2	SHC	IPG	NPS	EHH	BD	Average
2016	0.446	1.430	0.236	0.362	0.673	**0.629**
2017	0.353	1.486	0.212	0.398	0.686	**0.627**
2018	0.264	1.403	0.186	0.303	0.678	**0.567**
2019	0.366	1.489	0.155	0.243	0.707	**0.592**
2020	0.344	1.434	0.168	0.246	0.691	**0.577**
2021	0.303	1.311	0.181	0.254	0.674	**0.545**
2022	0.271	1.295	0.205	0.803	0.648	**0.644**
2023	0.414	1.269	0.410	0.351	0.616	**0.612**
Average	**0.345**	**1.390**	**0.219**	**0.370**	**0.671**	**0.599**

The liquidity ratio is a series of indicators that assess the company's capability to fulfill its immediate financial liabilities. Businesses with a current ratio below 1 are at risk of financial shocks, signaling negativity to investors and lenders. According to Table 3, every company except for BD has a liquidity ratio higher than 1, suggesting increased liquidity risk for BD. NPS had the highest proportion compared to other companies examined, demonstrating resilience to sudden financial setbacks.

Table 3: Liquidity (X3)

X3	SHC	IPG	NPS	EHH	BD	Average
2016	2.831	1.030	3.987	1.133	0.696	**1.935**
2017	3.162	1.088	4.285	0.910	0.837	**2.056**
2018	3.526	1.061	5.373	1.527	0.787	**2.455**
2019	2.615	1.079	7.819	5.018	0.772	**3.461**
2020	2.597	1.059	7.482	4.444	0.592	**3.235**
2021	2.897	1.073	6.871	4.669	0.569	**3.216**
2022	3.750	1.083	5.565	1.079	0.523	**2.400**
2023	1.914	1.047	3.118	1.983	0.538	**1.720**
Average	**2.912**	**1.065**	**5.562**	**2.595**	**0.664**	**2.560**

The x-score is a measure used to assess a company's financial health, where a score of zero or higher suggests financial trouble leading to bankruptcy, and a negative score signifies a strong and stable financial position. Table 4 shows that four of the five companies analyzed are in good financial health, except for IPG, which has a positive x-score, suggesting a high risk of financial trouble and potential bankruptcy. This is due to its high leverage and liquidity ratio of 1.065, which is close to the critical threshold of 1.

On the other hand, NPS displayed the highest negative x-score, showing robust financial health.

Table 4: X-Score

X-Score	SHC	IPG	NPS	EHH	BD	Average
2016	-1.053	3.699	-4.085	-0.521	-0.580	**-0.508**
2017	-2.356	4.001	-4.324	-1.610	-0.508	**-0.960**
2018	-2.731	3.544	-4.497	-2.633	-0.539	**-1.371**
2019	-0.898	4.018	-4.554	-2.209	-0.352	**-0.799**
2020	-2.396	3.710	-3.999	-2.650	-0.467	**-1.160**
2021	-2.655	3.030	-3.793	-3.172	-0.571	**-1.432**
2022	-2.736	2.936	-3.774	2.329	-0.724	**-0.394**
2023	-1.755	2.796	-2.567	-0.910	-0.912	**-0.670**
Average	**-2.072**	**3.467**	**-3.949**	**-1.422**	**-0.582**	**-0.912**

When applying Ohlson's (1980) statistical model to convert the x-score to financial distress probability, table 5 shows that the energy sector had an average probability of 34.64% of experiencing financial distress. Only IPG and BD had probabilities higher than the industry average. IPG was highly likely to face financial distress, with a 96.68% probability, causing investors and lenders to approach the company cautiously.

Table 5: Probability of Financial Distress

Prob	SHC	IPG	NPS	EHH	BD	Average
2016	25.87%	97.59%	1.65%	37.26%	35.88%	**39.65%**
2017	8.66%	98.20%	1.31%	16.65%	37.56%	**32.48%**
2018	6.12%	97.19%	1.10%	6.70%	36.84%	**29.59%**
2019	28.95%	98.23%	1.04%	9.89%	41.28%	**35.88%**
2020	8.35%	97.61%	1.80%	6.60%	38.54%	**30.58%**
2021	6.57%	95.39%	2.20%	4.02%	36.10%	**28.86%**
2022	6.09%	94.96%	2.24%	91.13%	32.65%	**45.41%**
2023	14.74%	94.24%	7.13%	28.70%	28.67%	**34.70%**
Average	**13.17%**	**96.68%**	**2.31%**	**25.12%**	**35.94%**	**34.64%**

An OLS regression was conducted on the data from five energy companies listed on the Kuwait stock exchange from 2016 to 2023 to investigate the impact of bankruptcy risk on stock prices. The results of the regression analysis can be found in Table 6. The model is not considered a good fit as the Sig F value exceeds 0.10. Additionally, the coefficient of the x-score is not statistically significant, indicating that there is no notable relationship between the x-score and share prices. Investors in the Kuwait stock market do not take into account the risk of bankruptcy when making investment choices, focusing instead on other factors.

Table 6: OLS Regression Output

Regression Statistics				
R Square	0.03064			
Adjusted R Square	0.00513			
F	1.20108			
Significance F	0.28000			
Observations	40			
	Coefficients	**Standard Error**	**t Stat**	**P-value**
Intercept	284.4643	56.9172	4.9979	0.0000
X-Score	-22.6067	20.6276	-1.0959	0.2800

4. Conclusion

This research aimed to investigate how bankruptcy risk impacts the stock prices of energy firms listed on the Kuwait Stock Exchange (KSE). Using Zmijewski x-score as an indication of bankruptcy risk for 5 companies from 2016 to 2023, findings revealed that only one company is at risk of financial distress, while the other four are in good financial standing and are not expected to experience financial distress in the next two years. The OLS regression method was utilized to investigate the connection between bankruptcy risk and share prices. The findings showed a lack of significant relationship between share prices and bankruptcy risk, suggesting that investors in the Kuwait stock market prioritize factors other than bankruptcy risk when making investment choices.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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