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Financial Distress Prediction of Islamic Banks in Top Sukuk-Issuing Countries: An Application of Altman's Z-Score Model

Siti Nurulhuda Ibrahim[1*], Shafinar Ismail[1] , Nur Hayati Abd Rahman[2], Irfah Najihah Basir Malan[1] & Wan Musyirah Wan Ismail[1]
[1]Faculty of Business & Management, Universiti Teknologi MARA, Cawangan Melaka Kampus Bandaraya Melaka, Jalan Hang Tuah, Melaka, Malaysia
[2]Faculty of Business & Management, Universiti Teknologi MARA, Cawangan Melaka Kampus Alor Gajah, Jalan Lendu, Alor Gajah, Melaka, Malaysia
sitinur304@uitm.edu.my*, shafinar@uitm.edu.my, nurhayati@uitm.edu.my, irfah@uitm.edu.my, musyirah792@uitm.edu.my
*Corresponding Author: Siti Nurulhuda Ibrahim

Abstract: Financial stability and solvency are essential for manufacturing and service businesses driven by profit, especially the banking sector. As a service sector organization, the banking industry is vital to economic growth. Along with the financial market, both achieved significant progression, particularly in the sukuk market. Despite the possibility of complementary interaction between the sukuk market and Islamic banking institutions, there are also concerns about competitive likelihood. Thus, the study of the finance scope of these Islamic banks in top sukuk issuing countries is crucial. This study applies the Altman Z-score model to measure private-sector banks' financial health from 2018 to 2022. The sample comprises of Islamic banks in the top sukuk-issuing countries (i.e. Malaysia, Saudi Arabia, Indonesia, Turkiye, United Arab Emirates, Bahrain, and Pakistan). It concludes that UAE, Indonesia, and Saudi Arabia are experiencing financial distress since these banks fall into the "Distress Zone" according to Z-score criteria. Meanwhile, Turkiye, Bahrain, and Pakistan are categorized under the "Grey Zone" and require further improvement on specific financial ratios. Lastly, Malaysia is the only country under the top sukuk-issuing countries that merely achieved the "Safe Zone" criteria, implying that the Islamic banks in this country have greater financial stability rather than others.

Keywords: *Financial Stability, Islamic Banks, Sukuk, Altman Z-Score, Financial Distress.*

1. Introduction

Islamic banking is a component of the worldwide financial system that serves in compliance with Shariah principles, which are based on Islamic law. The principles encompass restrictions on usury (interest), prohibitions on gambling, speculative activities, and behaviors that contravene Islamic ethical and moral standards (Prima Sakti & Mohamad, 2018). The primary objective of Islamic banking is to offer financial services that align with these principles and assist the Muslim community in attaining their financial objectives while upholding Islamic values. The performance of Islamic banking has seen substantial growth and a rising level of global awareness since its inception. This is the outcome of endeavors to enhance the conception of Islamic banking, heighten public consciousness, as well as offer pertinent products and services to consumers who adhere to Shariah principles. The Islamic financial market is seeing an increased maturity due to the establishment of more Islamic banking institutions and also the expansion of product and service offerings. With the growth of Islamic financial institutions, sukuk (Islamic bonds) have emerged as a widely used financing tool for Shariah-compliant development and business initiatives. Nevertheless, in contrast to Islamic banking, the Islamic capital market sector, which includes Sukuk as a primary element, viewed a deceleration in its growth rates compared to the previous years. Islamic banking maintained its position of dominance, with total assets amounting to USD 2.25 trillion, or 69.3% of the global assets in the Islamic Financial Services Industry (IFSI) as reported by the IFSB Stability Report in 2023.

Sukuk is an Islamic financial instrument generally employed to generate funds for investment activities that hold to Shariah principles or Islamic law. It diverges from customary responsibilities that yield interest (riba), a practice that is forbidden in Islam (Smaoui, 2017). As per Shariah regulation, Sukuk must stick to the Shariah guidelines established by the Islamic regulatory authority or the designated Shariah expert. This entails ensuring that initiatives financed by Sukuk adhere to Islamic principles by abstaining from acts that are forbidden in Islam, such as the consumption of alcohol, participation in gambling, or the practice of usury. In contrast, Sukuk holders are entitled to the portion of the earnings or profits created by the assets or projects

that are funded by the Sukuk. This market urges foreign investors seeking a Shariah-compliant investment option to diversify their portfolios. Hence, Sukuk enables investors to reduce the risk of their investment portfolios while adhering to Islamic rules and provides a return on investments. This instrument has accelerated the growth of the Islamic financial market.

The key features of Sukuk can be seen from its diverse range of structures, with Mudarabah and Ijarah structures being the most predominant. In the Mudarabah structure, Sukuk investors provide capital to the fund management (mudarib) to invest in a specific project. Sukuk, within the framework of Ijarah, indicates the privileges of sukuk holders to tangible assets or services that Sukuk issuers lease. Generally, Sukuk is utilized by corporate and government entities where seeking funding for projects that adhere to Shariah rules. These projects may include investments in the housing sector, infrastructure development, and lawful companies from an Islamic perspective. It can facilitate infrastructure finance and eventually foster economic development without resorting to usury.

Islamic banks contribute to the growth of Sukuk by acting as either a sukuk holder (investor) or being active in the issuance process as the Sukuk issuer. Nevertheless, the involvement of Islamic banks in the Sukuk market remains underdeveloped. There are only a few Islamic banks that opt to act as Sukuk issuers. The majority of participants in the Sukuk market are purchasers rather than issuers. However, it is necessary to note that the Sukuk market is a highly active and favorable sector within Islamic finance. Table 1 indicates that Islamic banks in Turkiye do not demonstrate any tendency towards issuing Sukuk. However, there is a lack of data regarding this activity in Pakistan and Bahrain. This table also reveals that Islamic banks in the leading Sukuk-issuing countries possess a large amount of Sukuk rather than actively engaging in the issuance of Sukuk. Table 1 presents the average value of Sukuk holdings and Sukuk issuance by Islamic banks in leading Sukuk-issuing countries from 2018 to 2022.

Table 1: Total average value of Sukuk holdings and Sukuk issued by Islamic banks in top Sukuk-issuing countries from 2018 to 2022

Country	Saudi Arabia		Indonesia		UAE		Turkiye		Pakistan		Malaysia		Bahrain	
Indicator	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued	*Sukūk* holdings	*Sukūk* issued
Currency	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	USD	USD
Units	M	M	B	B	M	M	M	M	M	M	M	M	M	M
2018	56337.24	4007.75	36452.41	525.00	47000.98	28080.68	12167.99	0.00	200888.08	...	101918.13	2337.40	...	...
2019	69268.22	4008.18	41124.36	1600.00	50951.65	27684.75	31573.16	0.00	315107.79	...	124669.24	3177.28	...	...
2020	81649.37	4020.50	44999.45	1773.08	52194.03	29961.85	76754.66	0.00	459914.61	...	141119.19	4095.35	...	...
2021	112440.61	4032.27	65432.86	2508.92	52687.15	29095.75	96903.61	0.00	711487.24	...	160169.02	4162.46	...	...
2022	147035.91	14035.54	91924.91	4519.77	65431.23	29330.33	188301.27	0.00	1494714.40	...	170026.25	3332.78	...	...

Source: Prudential and Structural Islamic Financial Indicators (PSIFIs)
(….) Indicates the data is not available
M Indicates Millions
B Indicates Billions
NC Indicates National Currency

Islamic banking and Sukuk are primary elements of the Islamic financial environment. Therefore, they both experienced remarkable growth. There is an ongoing debate among scholars over the impact of Sukuk markets on the Islamic banking industry, as evidenced by the interaction between these two entities. This issue remains unclear, as indicated by studies conducted by Mimouni et al. (2019), Smaoui & Ghouma (2020), Smaoui et al. (2020), and Ledhem (2022). Islamic banking offers a means of financing and investing that adheres to Shariah standards. Sukuk, on the other hand, is a financial instrument that enables organizations to raise cash lawfully according to Islamic principles. They complement each other to assist the growth and development of the Islamic economy and also the Islamic financial market as a whole. Furthermore, Sukuk plays a crucial role in Islamic banks by serving as a viable solution to address the challenges of saving mobilization and liquidity management. It is essential for Islamic banks to actively engage in the growth of the Sukuk market to reap their advantages. The study conducted by Ledhem (2022) focused on several countries, namely Malaysia, Saudi Arabia, Indonesia, Turkiye, and Brunei. The study found that the expansion of the Sukuk market has a favorable impact on the financial stability of these institutions. This can be achieved by enhancing the mutual support and cooperation amongst Islamic banks.

Nevertheless, the expansion of Sukuk can potentially undermine the stability of Islamic banking, as both Sukuk and Islamic banking sometimes compete for the same clientele and investors. Given its appeal as a Shariah-compliant investment option, Sukuk has the potential to compete with Islamic banking directly to obtain consumer funds. The study shown by Mimouni et al. (2019), Smaoui and Ghouma (2020), and Smaoui et al. (2020) demonstrate that the growth of the Sukuk market has a detrimental impact on Islamic banks, as it intensifies rivalry among them. According to Mimouni et al. (2019), the Sukuk market development adversely affected Islamic banks' profitability but did not affect conventional banks. Parallelly operating in the financial market, both Sukuk and Islamic banks compete to attract investors and borrowers who are willing to use Sharia-compliant financial instruments. To obtain Islamic financing, a deficit company can issue Sukuk or borrow from an Islamic bank. In the same vein, a surplus company can invest in Sukuk or choose from various Islamic banking products when selecting investment options. As a result, Sukuk expansion deprives profit directly against Islamic banks. Similarly, Smaoui and Ghouma (2020) discovered that the Sukuk market's expansion has negatively impacted Islamic banks' capitalization since its growth encourages competition among market participants and influences them to maintain lower capital ratios. Expanding Sukuk markets has the potential to reduce banks' market share and increase competition among them. On the other hand, Smaoui et al. (2020) found that the expansion of the Sukuk market hurts the stability of Islamic banks, where the growth of the Sukuk market increases the insolvency risk of Islamic banks, while conventional banks are unaffected. As the Sukuk market becomes more competitive, Islamic banks need to assume greater risk and reduce their margins.

Despite diverse impacts discussed in empirical studies on Sukuk market expansion on Islamic banks' performance, Sukuk markets have experienced remarkable development globally. Given the expanding Sukuk market and the rising need for Shariah-compliant financial instruments, a profound comprehension of Sukuk has become imperative. Sukuk plays a pivotal role in the Islamic financial ecology, offering miscellaneous prospects and obstacles. However, as discussed previously, the growth of the Sukuk market may have an impact on the stability of the bank. To assess the stability of banks in the leading countries for issuing Sukuk, this study utilized the Z-score ratio, which was developed by Edward Altman and is known as Altman's Z-score model. This model quantifies and assesses the financial stability, robustness, likelihood of bankruptcy, and ability to meet the financial obligations of the banking sector. Auditors, financial managers, investors, and lenders should utilize this tool to make informed judgments in the event of financial distress or failure of this institution.

Several empirical research has used the Altman Z-score as a tool for forecasting the occurrence of financial distress in banks (Singh & Singla, 2023; Ntawumenyumunsi & Maringa, 2022; Elia et al., 2021; Ullah et al., 2021; Saputri & Krisnawati, 2020; Joshi, 2020). Consequently, banks will steer clear of financial turmoil. This work contributes to the existing body of study by identifying a unique method for assessing a bank's stability in countries where its Sukuk markets are most prominent. The influence of Sukuk in the financial industry is a newly emerging area of study. Hence, analyzing the financial vulnerability of Islamic banks will offer valuable perspectives within the framework of leading Sukuk-issuing countries.

2. Literature Review

Previous debates have demonstrated that numerous studies have provided support for the notion that Altman's model exhibits more classification capability and remains successful in predicting financial difficulty or business failure. According to Singh & Singla (2023), various models have been periodically developed to forecast the likelihood of failure, and among these models, Altman's Z-score model is widely utilized in practical applications. Companies use these models to predict whether they will face financial difficulties and insolvency shortly. Thus, a financial distress prediction model serves the purpose of not only determining the likelihood of a company's failure but also acting as an early indicator to prevent bankruptcy. Several studies have been undertaken to create financial distress prediction models following the development of Altman's model. These studies provide empirical evidence that the Altman Z-score was implemented to assess institutions' financial stability.

Joshi (2020) applied Altman's Z-Score model to forecast financial distress in a sample of twenty public sector banks in India. Upon analyzing the data collected during ten years from 2009-2010 to 2018-2019, it was discovered that all of the chosen banks were deemed to be in a secure financial position. This conclusion was

based on the fact that the average Altman's Z-Score value exceeded the recommended threshold of 2.9, which indicates a safe zone.

Meanwhile, Elia et al. (2021) utilized the Altman Z-score model to demonstrate its effectiveness in forecasting the financial distress of Lebanese Alpha banks from 2009 to 2018. The study used the Altman Z-score to assess the financial health of non-manufacturing enterprises operating in emerging regions. According to the estimated value, most of the ten Alpha Banks had values lower than the threshold of 1.1, demonstrating that they were in a state of distress throughout the specified period.

Moreover, in the context of Islamic banking institutions, a comparative analysis study was conducted by Sabir et al. (2018) to evaluate the stability performance of Islamic banks in Pakistan and Malaysia using Altman's Z-score. The study covered 8 Islamic banks in Pakistan and 12 Islamic banks in Malaysia from 2011 until 2015. The research results propose that Malaysia's Islamic banking industry is classified in a state of distress, while Pakistani Islamic banks are operating in a "safe zone." In comparison to Islamic banks in Pakistan, Malaysian banks exhibit a higher degree of instability during the study period.

On the other hand, in consideration of all banking sectors in Pakistan, Ullah et al. (2021) assessed the financial well-being of Pakistan banks' performance using the Altman Z-score methodology. Banking data was collected through the Pakistan Stock Exchange (PSX) from 2013 to 2017, and it was determined that the local banking industry had positive forecasts. However, it was seen that most of the foreign Pakistani banks faced bankruptcy, as their Z-scores fell below 1.1. According to the Z-score study, all banking facilities are viewed to be financially stable as they acquire adequate bankruptcy control capabilities. Concurrently, foreign banks experienced financial failure and could not sustain themselves in the future due to their inability to meet both short-term and long-term loan obligations.

Furthermore, Ntawumenyumunsi and Maringa (2022) performed a study on the impact of financial distress indicators on the financial performance of commercial banks listed on the Rwanda Stock Exchange between 2015 and 2019. They utilized the Altman Z-score failure prediction model for their analysis. They focused exclusively on three banks within this stock exchange and discovered a strong probability of bankruptcy because all three banks had a Z-Score below 1.8 over five years. They are currently in a state of ambiguity, which is referred to as the 'Grey Zone', and require thorough monitoring and corrective measures in their daily operations to mitigate uncertainty and improve their financial standings in the long term.

3. Methodology

The study is focused on Islamic banks in top-issuing Sukuk countries, including Malaysia, Indonesia, Saudi Arabia, the United Arab Emirates (UAE), Pakistan, Turkiye, and Bahrain. All the banks' data were extracted from the IFSB's Prudential and Structural Islamic Financial Indicators (PSIFIs) database from 2018 to 2022. The database is used as key information for predicting the stability of these Islamic banks.

All the data was analyzed using Altman's Z-score model. This measurement model is considered a reliable method for evaluating a bank's financial health, particularly in times of economic volatility. It assists in the identification of institutions that are very vulnerable to bankruptcy, enabling management to implement several actions to reduce these risks proactively. In this study, Altman's Z-score model 1993 is more practical rather than the original Z-score model (Altman's 1968). The Altman's (1993) Z-score model initially comprised of two versions. The first version was designed for privately owned non-manufacturing enterprises, while the second version was customized to cater to emerging markets. The second version covered an additional constant term of +3.25, in addition to the four variables present in both versions. The original model (Altman's 1968) comprised five variables, which were modified to measure the Z-score model (used for companies in the manufacturing sector). The main model adjustment made from the original model was the fourth variable (X4), namely the book value of equity, while the fifth variable (X5) was eliminated from the model. Thus, the Z_-score model applied in this study is as follows:

$$Z = 3.25 + 6.56\,(X1) + 3.26\,(X2) + 6.72\,(X3) + 1.05\,(X4) \quad (1)$$

Whereby Z stands for the Altman's Z-score of Islamic banks in top Sukuk-issuer countries; X1 denotes the working capital as per total assets; X2 is the retained earnings as per total assets; X3 is the earnings before interest and taxes divided by total assets, and X4 is the book value of equity as per book value of total liabilities.

If the result of the score for private and non-manufacturing companies is interpreted as above 2.6, it is considered that the company is in a 'Safe' Zone. Meanwhile, if the score is less than 2.6 but above 1.1, the company is considered in the 'Grey' Zone. However, if the score is less than 1.1, the company is considered in the 'Distress' Zone based on the financial figures.

For this study, as classified above, the revised Z-score with four variables and a constant term is used to measure the Z-score of financial institutions in emerging markets. This model is a robust method for assessing the distress potential of like-industry firms (Yohannes, 2021).

4. Data Analysis

This study was conducted using the Z-score method to analyze the financial health of Islamic banks in emerging markets about the core issue discussed. Various ratios, including the working capital to total assets ratio, retained profits to total assets ratio, operating income to total assets ratio, and book value of equity to book value of debt ratio, were computed for T1, T2, T3, and T4. This study extracted the data from the Prudential and Structural Islamic Financial Indicators (PSIFIs), respectively, and needed to rearrange them to calculate the ratios.

Working Capital to Total Asset Ratio

The working capital to total asset ratio in Table 2 indicates the liquidity situation relative to the total capitalization of the banks. It assesses the bank's capacity to fulfil its immediate financial responsibilities. According to Table 2, the Islamic banks in the UAE have the most negative average working capital to total assets ratio (-0.64716). Islamic banks in Malaysia posit the highest average ratio of working capital to total assets (0.04803) compared to other banks.

Table 2: T1 is a Working Capital/Total Assets of Islamic Banks (in USD)

Period/Country	Malaysia	UAE	Turkiye	Indonesia	Bahrain	Pakistan	Saudi Arabia
2018	0.0460	-0.6438	-0.2755	-0.6413	-0.1460	-0.2354	-0.5480
2019	0.0568	-0.6442	-0.2302	-0.6269	-0.1375	-0.2331	-0.4778
2020	0.0397	-0.6413	-0.3110	-0.5819	-0.1145	-0.1772	-0.5005
2021	0.0528	-0.6403	-0.1507	-0.5520	-0.1019	-0.1163	-0.5462
2022	0.0450	-0.6663	-0.1807	-0.7041	-0.0951	-0.0292	-0.5071
Average	0.0480	-0.6472	-0.2296	-0.6212	-0.1190	-0.1582	-0.5159

The working capital of a bank generally refers to the amount of liquid assets readily accessible for the bank's day-to-day operations. The presence of negative working capital in the aforementioned Islamic banks (except Malaysia) suggests an inability to fulfil their immediate financial obligations. Furthermore, it is important to note that an extremely raised level of working capital may not necessarily be beneficial for the bank. This is due to the potential drawback of lost investment prospects arising from allocating a significant portion of its cash resources. The primary source of liquidity risk in Islamic banks is inadequate availability of liquid products that adhere to Shari'ah principles. Islamic banks lack the range of funding choices that conventional banks have within the interbank market. In contrast, there is a significant likelihood of the Islamic bank encountering a liquidity deficit if there is a sudden rise in the withdrawal of deposits by borrowers.

Retained Earnings/Total Assets

The ratio of a company's retained earnings to its total assets is presented in Table 2. It indicates the proportion of the total assets that retained earnings have funded. The ratio should be as high as possible because it indicates the degree to which a bank is financially stable, even when the profits are low. It also shows that banks relied on internal financing based on their earnings as a source of funding rather than debt financing due to a

more cost-effective choice. It was found that all of these banks' retained earnings financed an average of two to three percent of their overall assets.

The study's findings indicate that the banks included in the sample have employed a higher proportion of debt rather than retained earnings. The study shows a decrease in the ratio of banks in Turkiye, Bahrain, and Saudi Arabia. At the same time, an increase is observed in the ratio of banks in Malaysia, the UAE, Indonesia, and Pakistan in December 2022, implying a fluctuating trend in using retained earnings throughout the study.

Table 3: T2 is a Retained Earnings over the Total Assets (in USD)

Period	Malaysia	UAE	Turkiye	Indonesia	Bahrain	Pakistan	Saudi Arabia
2018	0.0233	0.0092	0.0221	0.0080	0.0042	0.0076	0.0149
2019	0.0238	0.0212	0.0222	0.0099	0.0062	0.0116	0.0161
2020	0.0276	0.0201	0.0191	0.0085	-0.0002	0.0165	0.0127
2021	0.0278	0.0178	0.0205	0.0102	0.0044	0.0184	0.0147
2022	0.0289	0.0215	0.0164	0.0119	0.0032	0.0214	0.0141
Average	0.0263	0.0179	0.0201	0.0097	0.0036	0.0151	0.0145

Earnings Before Interest and Taxes (EBIT) over Total Assets

This ratio exhibits a bank's operational efficiency, whereby the profits generated after operating expenses are deducted from revenue. Therefore, it also indicates the bank's profitability, which is how the bank successfully generates earnings before interest and taxes from its assets. The greater the bank's earnings from its assets, the more effectively the assets are used to generate income.

Table 4: T3 is an Earnings Before Interest and Taxes as per Total Assets (in USD)

Period	Malaysia	UAE	Turkiye	Indonesia	Bahrain	Pakistan	Saudi Arabia
2018	0.0101	0.0169	0.0148	0.0129	0.0074	0.0069	0.0246
2019	0.0109	0.0126	0.0117	0.0157	0.0055	0.0115	0.0257
2020	0.0068	0.0101	0.0116	0.0143	0.0024	0.0141	0.0210
2021	0.0111	0.0132	0.0102	0.0169	0.0058	0.0125	0.0246
2022	0.0116	0.0174	0.0347	0.0224	0.0068	0.0161	0.0237
Average	0.0101	0.0140	0.0166	0.0164	0.0056	0.0122	0.0239

According to Table 4, the ratios are not too far apart from the others. It can be seen that the average EBIT to Total Assets ratio of Islamic banks in Saudi Arabia is 0.0239, which demonstrates that these banks have made a substantial operating profit in proportion to their assets when compared to the other financial institutions. The average ratios of Islamic banks in Bahrain and Malaysia are just 0.0056 and 0.0101, respectively, which illustrates that these banks have poor profitability in the amount of their assets.

Book Value of Equity to Book Value of Total Liabilities

The book value of equity, or net worth, signifies the total capital invested by ordinary and preferred shareholders. In the financial statement, the share capital, general reserves, retained earnings, and revaluation reserves generally characterize the ownership of the company's shareholders. Furthermore, excessive debt will often lead to insolvency. Debt generally pays a fixed interest rate, while equity pays a variable dividend. If a bank's debt exceeds its equity, it will increase its financial leverage and eventually affect the profitability as well as the company's performance.

Meanwhile, the book value of equity to book value of liability ratio measures a business entity's long-term financial stability without relying on borrowed capital. Having a 1:1 equity-debt mix in banks is considered highly favorable. Therefore, companies with high market capitalizations and low debt levels are often considered to be more stable and less susceptible to risk. A higher ratio indicates that the company has a significant market capitalization compared to its debt, which signals a stronger financial position. Meanwhile,

a low ratio indicates that the company's obligations are significant compared to its equity market value, representing increased financial and insolvency risks.

Table 5 shows the Islamic banks' book value of equity to book value of debt ratios, which provides insight into the degree to which a bank's market value of stock is adequate to meet its whole commitments. Concerning the result above, all the ratios are relatively lower than 1, except for Bahrain. It can be concluded that regarding these ratios, the financial health of all Islamic banks under this study is relatively poor, and instability and the likelihood of bankruptcy are higher since the banks rely more on debt financing. Most Islamic banks under this study must improve these ratios either by increasing the book value of their equity (i.e. asset-backed sukuk issuance) or by retiring some of their book value of debt funds to achieve financial stability, as a ratio of more than 1 is considered less risky. In other words, Islamic banks should ensure that the book value of equity is maximized and total liabilities are minimized so that the component of X4 can have a positive effect on the overall Z-score ratios model.

Table 5: T4 is a Book value of equity as per Book value of debt of Islamic Banks (in USD)

Period	Malaysia	UAE	Turkiye	Indonesia	Bahrain	Pakistan	Saudi Arabia
2018	0.0739	0.1484	0.0885	0.1098	1.8284	0.0618	0.1748
2019	0.0752	0.1565	0.0866	0.1163	1.2863	0.0573	0.1642
2020	0.0769	0.1602	0.0727	0.1170	1.5281	0.0601	0.1522
2021	0.0747	0.1515	0.0644	0.1162	1.5618	0.0560	0.1364
2022	0.0743	0.1551	0.0700	0.1204	1.6964	0.0488	0.1280
Average	0.0750	0.1543	0.0765	0.1160	1.5802	0.0568	0.1511

Z-score value

The computation of the Z-score value of all Islamic banks in top Sukuk issuing countries is done by applying the formula as follows:

$$Z = 3.25 + 6.56\,(X1) + 3.26\,(X2) + 6.72\,(X3) + 1.05\,(X4) \quad (2)$$

This model is used to determine the Z-score in emerging markets, showing the non-manufacturing company's financial stability and probability of bankruptcy. Generally, the lower the Z-score, the higher the possibility that a company will become insolvent and go for bankruptcy. Table 5 shows the result of the Z-score of all Islamic banks in the top Sukuk-issuing countries from 2018 to 2022, which reveals that Malaysia's Z-score value of Islamic banks was 3.7975 within that period. Based on the score, this country falls in the 'Safe' Zone, which implies the probability of financial catastrophe is low.

Meanwhile, there are three countries where their Islamic banks are classified under the 'Grey Zone'. This zone is an unfavorable area of financial health based on Altman's 1993 model since it shows the uncertainty of their financial conditions. It signals the possibility of bankruptcy if the bank does not properly manage its financial activities. As per the table below, from 2018 to 2022, the Z-score values of Islamic banks in Turkiye, Bahrain, and Pakistan are 2.2510, 2.3223, and 2.4023, respectively. They fall in the 'Grey' Zone ($1.1<Z<2.6$), which indicates the probability of financial catastrophe is average and considered as a moderate risk of bankruptcy. In this case, the banks are required to improve their financial performances; otherwise, they may go into a distress zone.

On the other hand, the table below also shows that the Z-score of Islamic banks from 2018 to 2022 in UAE, Indonesia, and Saudi Arabia are -0.4306, -0.5615, and 0.2323, respectively. They suppose comparatively the lowest Z-score amongst all the top Sukuk-issuing countries. Their discriminant zones are placed in the distress zone ($Z<1.1$), the worst of all discriminate zones; at the same time, it can also be considered a danger zone with a high risk of bankruptcy. The Islamic banks in these three countries display a quite low value compared to other top Sukuk issuing countries and probably go for bankruptcy in subsequent years. Thus, these banks should take prompt action to have stable financial conditions.

Table 6: Z-score of Islamic Banks in Top Sukuk-Issuing Countries

Country	Z-score Component	Z-score Multiple	Z-score Value	Total Z-score Value
Malaysia	Constant	3.25	3.25	3.7975
	T1	6.56*0.0480	0.3151	
	T2	3.26*0.0263	0.0857	
	T3	6.72*0.0101	0.0680	
	T4	1.05*0.0750	0.0787	
Turkiye	Constant	3.25	3.25	2.2510
	T1	6.56*-0.2296	-1.5063	
	T2	3.26*0.0201	0.0654	
	T3	6.72*0.0166	0.1116	
	T4	1.05*0.0765	0.0803	
Bahrain	Constant	3.25	3.25	2.3223
	T1	6.56*-0.1190	-0.7807	
	T2	3.26*0.0036	0.0116	
	T3	6.72*0.0056	0.0376	
	T4	1.05*1.5802	1.6592	
Pakistan	Constant	3.25	3.25	2.4023
	T1	6.56*-0.1582	-1.0381	
	T2	3.26*0.0139	0.0452	
	T3	6.72*0.0122	0.0821	
	T4	1.05*0.0600	0.0630	
UAE	Constant	3.25	3.25	-0.4306
	T1	6.56*-0.6472	-4.2454	
	T2	3.26*0.0179	0.0585	
	T3	6.72*0.0140	0.0943	
	T4	1.05*0.1543	0.1621	
Indonesia	Constant	3.25	3.25	-0.5615
	T1	6.56*-0.6212	-4.0754	
	T2	3.26*0.0097	0.0316	
	T3	6.72*0.0164	0.1104	
	T4	1.05*0.1160	0.1218	
Saudi Arabia	Constant	3.25	3.25	0.2323
	T1	6.56*-0.5159	-3.3844	
	T2	3.26*0.0145	0.0473	
	T3	6.72*0.0239	0.1608	
	T4	1.05*0.1511	0.1587	

5. Conclusion and Recommendations

This study aims to predict the Islamic bank's stability in top Sukuk-issuing countries measured using the Z-score ratio of emerging countries, which is commonly referred to as Altman's 1993 Z-score model. The results from the scores can be used by investors, financial managers, and analysts to make financial decisions. Therefore, the study consistently identified the Islamic banks in Malaysia as the top performers. Conversely, the Islamic banks in Indonesia have the weakest financial condition compared to those in other leading countries that issue Sukuk. Hence, most Islamic banks in leading Sukuk-issuing countries must enhance their financial performances to prevent bankruptcy. Even though the Altman Z-score is not the only model for forecasting

banks' financial distress, banks can improve their financial performances (Z-score) by improving working capital, increasing internal capital and EBIT, and also optimizing the debt side.

In addition, although external events can influence the Z-score, they can help to provide a quick analysis of where a company stands compared to competitors and track the risk of insolvency over time. Therefore, this study exhibits that banks need to have significant involvement in the Sukuk markets, particularly in Sukuk issuance on asset-backed Sukuk, which is more likely equity-based financing. Besides enhancing its function as an Islamic intermediation, the Islamic bank's involvement in Sukuk issuance allows it to overcome various problems related to saving mobilization, bank liquidity management, risk-taking, and long-term investment, which can boost stability performance.

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