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Association of Financial Distress and Predicted Bankruptcy: The Case of Pakistani Banking Sector*

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Abstract

The banking sector is one of the most important sectors in Pakistan's struggling economy. Recent studies have recommended that suitable methods can be applied to predict bankruptcy. In this context, this work analyzes Pakistan's banking sector's financial status through the five-factor Altman Z-score model, which determines the probability of bankruptcy for an organization. Banking data has been collected through the Pakistan Stock Exchange (PSX) in the period 2013-2017. The Z-score assessment criteria is defined as: $Z > 2.99$ - "safe" zone; $Z > 1.8$ $Z < 2.98$ - "grey" zone; and $Z < 1.8$ - "distress" zone. Results show good predictions for the local banking industry, while most foreign Pakistani banks were found bankrupt with the Z-score below 1.1. One of the financial risks investors face when investing in any company is the risk of bankruptcy. One of the most used models for predicting financial distress for any company is Altman's Z-score model. On the other hand, the Z-score analysis suggests that all banking establishments are not bankrupt because they have sufficient ability to control bankruptcy. At the same time, foreign banks failed financially and would not be able to be sustained in the future because they do not have the ability to pay the short-term and long-term debt.

Keywords: Altman Z –Score Application, Five-Factors Analysis, Financial Distress, Bankruptcy, Banking Industry

JEL Classification Code: G30, G32, G39

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1. Introduction

For rational decision-making, investors and stakeholders in different sectors analyze the financial status of an organization. Instability in the modern economy affects the individual economy of an organization. In this context, financial ratios are used to determine the financial status of the organization. Still, stockholders' equity position and creditors' claims are not compatible with the results obtained from these ratios (Jackson et al., 2000). In the present market, every business has a risk of bankruptcy, and the firm's existence is, therefore, under scrutiny at all times. Therefore, a stable and

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robust banking system is essential to keep a country's economy stable. The banking industry is one of the largest contributors to a country's economy. It is an example of a well-developed association of many extended organizations, including general state banks, private banks, and foreign banks. Therefore, the disclosure and transparency of evidence on the banking sector's business activities are of great importance to all stakeholders (Wang et al., 2020). The banking sector comprises of local and foreign banks, including private banks, public banks, and specialized banks. The financial position and scope of the banking industry have grown over the last few decades.

The 8% increase in the banking sector's total assets in 2016-2017 amounted to PKR20.08 trillion. Total debt and total capital increased by 9% and 5% for local banks, respectively. The banking sector's growth rate increased by 9% in the local banks' balance sheet's financial condition. Foreign banks, which account for 3.2% of the banking sector's total assets, recorded a 10% increase in 2017. Before and after-tax, the banking sector's profit increased by PKR6 billion or 2.33% and PKR8.91 billion or 5.84%, respectively, during the period 2013 to 2017 (Zafar et al., 2019). The banking sector in Pakistan relies on simple financial analysis methods based on the demonstration of theoretical economic indicators that give a false representation of the situation. The financial analysis leads to a misrepresentation of most of these banks (Chandio et al., 2012).

Mubushar (2020) corporate bankruptcy is a limiting factor in the growth of a company and the economy. Pakistan's evaluated debt strategies from 2000 to 2018 have resulted in a substantial financial crisis. A similar approach has affected banking industries in several developing countries and undervaluing countries, making it a global problem. Pakistan is considered an underdeveloped country due to financial instability and low economic growth, and the government does not have appropriate investment opportunities and resources. As a result, the country's economy is at high financial risk. Therefore, it is necessary to borrow debt from outside to survive and meet basic needs. Due to high-interest rates, all sectors in these countries face financial risk and bankruptcy or insolvency (Chadha, 2016; Bharath & Shumway, 2008).

Banks' scale and value at national and international levels are more important, as banks provide short- and long-term debt obligations to investors and other interested parties. Banks in Pakistan play an essential role for all stakeholders in the economy. Therefore, it is crucial to continuously evaluate and monitor banks' financial status using reliable bankruptcy forecasting models. Due to the country's low budget, Pakistan's national banks do not have enough resources or funds, and high amounts of loans are taken from the IMF or the World Bank and Asian development banks every year. Consequently, these banks have high chances of bankruptcy and failure (Abbas & Ahmad, 2018).

Heaton (2020) examined the effectiveness and accuracy of the Altman Z-score model. The efficacy of the Altman Z-score

model's unique formula is studied to apply emerging markets and the banking sector. The Altman Z-score was developed based on a five-factor ratio for financial sectors and a four-factor ratio for the non-financial sectors. In this study, a five-factor ratio is used to measure the bankruptcy results. This study aims to test the ability of these models to predict future financial difficulties or setbacks. This work will assist Pakistan's banking sector in timely monitoring and improving the financial situation of companies. Previous studies have also shown that financial indicators cannot work when used individually to predict financial collapse (Barboza et al., 2017). It became clear that financial analysis using separate financial indicators has deceptive consequences that would not be consistent enough to predict the future of a company, especially when the number of unprofitable firms increases, which leads to investment erosion (Siddique, 2012). Thus, these failures will affect the national economy, so this study attempts to study the Altman Z-score model's reliability in predicting the likelihood of a financial collapse of Pakistan's banking sector. This study also adopted Altman's five-factor model that is valid and desirable for bankruptcy (Slawsky & Zafar, 2015).

2. Literature Review

An organization faces different risks through time (Chen, 2018; EBA, 2017; Wojcik-Mazur & Szajt, 2015; Rashid & Shah, 2019). Financial institutions are characterized as service sector organizations. Their effectiveness and influence in a country's socio-economic activities are significant and diverse. These sectors develop in various financial operations, such as debt management, cash flow management, and other services, which means that they are not exposed to various risk types (i.e., potential financial risk, credit risk marketing, and liquidity risk). Banks' financial status reflects the economic condition of a country (Othman & Asutay, 2017).

The problem of predicting an organization's failure has become a crucial area of research in the field of accounting and finance over the last 70 years. Researchers worldwide are engaged in developing corporate forecasting models (Altman, 1968; Deakin, 1972; Kida, 1980; Ohlson, 1980; Taffler, 1983; Mohammed, 2016). In this context, several financial failure prediction models were proposed in the late 1960s. Several studies have investigated these models' performance for corporate failure prediction (Beaver, 1966; Altman, 1968; Deakin, 1972; Kida, 1980; Ohlson, 1980 Taffler, 1983; Mohammed et al., 2012).

Listed companies are underperforming and are at high risk, which makes them financially unstable. Bankruptcy is defined as a situation where a company cannot meet its obligations. The possibility of bankruptcy increases when a company has high fixed costs or a negative current ratio Sofat, (2015); Metcalfe (1995) reported that the models developed for bankruptcy prediction are not immune to this fact. In this context, recent research has industrialized and revealed

new methods for predicting bankruptcy. Barniv (1999); MacDonald (2007) developed several surrogate methods for testing logit models and company failure forecasting models.

Similarly, Hwang, Zhao, and Gay (2013) used semi-parametric methods to predict bankruptcy. Other such studies are by Serrano-Cinca and Gutierrez-Nieto (2013), where square discriminatory partial rent analysis was applied to predict bankruptcy. Future research would help determine which of these predicting bankruptcy methods will be subject to the time test.

The Edward Altman Z-Score model (Altman, 1968), also used to measure credit (Edelman, 2015), is a multidimensional method to determine financial circumstances. It has been acknowledged as one of the essential tools for financial assessment since 1985. It has been widely recognized by various stakeholders (i.e., depositors, financial analysts, consultants, bankers, auditors, management accountants, courts, and database systems) (Kuruppu et al., 2003). It measures relative liquidity, longevity, operating profitability, leverage, solvency, and efficiency – virtually all aspects of corporate operations, allowing for more definitive conclusions and avoiding prejudice and credibility (Shahzad et al., 2020; Pang 2013).

Al-Rawi et al. (2011), using the Altman performance evaluation model's analysis, predicted the company's insolvency and found that the company has consequently improved its efficiency ratio. Pathan and Faff (2013) applied the Z-score model to a sample of American banking holding companies in 1997–2004 and observed that the financial manager did not cope with the additional risk. Pettit (2012) showed that the Z-score model includes an accurate method for predicting corporate failures; moreover, the study showed the Z indicator's ability. The model of predicting a financial collapse in the first year was 66%, but this percentage fell to 52% in the second year, to 39% in the third year, and finally to 20% in the fourth year before bankruptcy. Another such study by Thakor (2018); Anser et al. (2020) analyzed the Z-score model's construction by applying it to a sample of 200 Chinese retail companies. The study indicated that the model correctly predicts bankruptcy with an accuracy of 94%.

Stundzienė and Boguslauskas (2006), Dakovic et al. (2010), and Fijorek and Grotowski (2012) all predicted the bankruptcy of companies from European countries. They suggested that European countries have provided suitable resources and innovative technology for the companies, so their performance is better than that of South Asian countries. Many studies indicate that companies in South Asian countries are facing financial problems. For instance, Curcio & Gallo (2017); Lin & Wang (2011) were frustrated by companies' financial assessment results in Taiwan. Similarly, Alifiah and Tahir (2018); Kwak (2014) predicted Korean companies' bankruptcy.

On the other hand, Choi et al. (2016), Hult et al. (2011), Nam & Jinn (2000) predicted bankruptcy in various Middle-East countries. They found that these countries should provide adequate resources for these companies. It has been

proven that a company needs a professional and competent financial manager to deal with financial debts (Edelman, 2015). In this context, researchers have suggested that these companies should use the Altman Z-score analysis to manage and control financial stability. If the Z-score value does not appear positively, it may be that these companies' performance is at risk (Malizia et al., 2012).

Mizan and Hossein (2014) used the Altman Z-score model to assess the ICT industry's financial stability in South Asia. The study revealed that two out of five countries were economically stable as their Z-value was higher than the reference (2.99). In contrast, the rest of the states were not financially sound and were categorized in the Grey zone. They further suggested that the World Bank administration needs special attention to improve South Asian developing countries' financial situation. Alkhatib & Al Bzour (2011) conducted a similar study. The impact of economic indicators on bankruptcy forecasts in companies listed on the Jordan Stock Exchange was examined through the Altman and Kida models. It was suggested that the companies listed on the Jordanian Stock Exchange should use at least one of these models to predict the degree to which the business goes bankrupt (Kuo & Cheng, 2018). Altman developed the bankruptcy prediction model in 1968.

Corporate bankruptcy was first proposed and predicted in 1966 by Beaver (Beaver, 1966). Beaver called the disaster area bankruptcy, insolvency, liquidation in favor of the creditor. This company did not fulfill its obligations on debts, or firms could not pay dividends. His study discussed the average cost of 30 ratios of 80 insolvent firms in 38 industries and analyzed the projected debt of individual ratios in classifying bankrupt and insolvent companies. He independently examined the relationships of five factors and four factors and concluded that five and four factors are successful key indicators on the Altman bankruptcy scale (Van de Bunt & Muller 2020). Recently, Gruszczyński (2020) and Hantono (2019) argued that, in reality, there is no clear border between the failed and non-failed firms, but rather an overlap or a grey area between the two classification groups.

3. Research Methodology

3.1. Altman Prediction Application

Bankruptcy is a significant issue for business, administration, and the economy. Corporate bankruptcy was first predicted in 1968 through the well-known Altman model based on multivariate analysis. Over time, several researchers and social scientists have shown the importance of corporate bankruptcy prediction for different companies, using various statistical and theoretical models Campello et al. (2018); Agarwal & Taffler (2007). In this context, Edward Altman's model was the first of its kind to predict the insolvency probability of a company (White, 2007).

Table 1: Two types of Altman application error for final analysis, presented in table (1)

Type error I	Type Error II
An error occurs when the bankrupt company has a Z-score that classifies it as non-bankrupt	Exactly opposite error II, when a non-bankrupt company is below 1.81

Source: Altman and Hotchkiss, (1993); Garrido et al., (2012)

Altman showed that bankruptcy could be expected at a probability of 0.95 a year before it occurred, 0.70 two years before, 0.45 three years before, 0.29 four years before, and 0.35 five years before (Altman 1993). Altman revised his model to include a four- and five-variable Z-score for improved anticipation and prediction capabilities (Altman, 2002). Despite critical arguments (Keener 2013; Li et al., 2020), accounting researchers and economic researchers still consider the Altman Z-score as an excellent and operational indicator for measuring a company’s bankruptcy. The reason for its effectiveness is that it considers various factors to measure financial stability and instability. Since the model is an open system, academics, analysts, and other users can easily understand the formula’s variables (Marini, 2013).

3.1.2. Z-Score Formula

The method uses multiple discrimination analysis. Altman’s model predicts the evasions by practicing the following five accounting ratios (Hayes et al., 2010).

$$\begin{aligned}
 X1: & \frac{\sum WC}{TA}; X2: \sum \left(\frac{RE}{TA} \right); X3: \sum \left(\frac{EBIT}{TA} \right); \\
 X4: & \sum \left(\frac{MVE}{TL} \right); X5: \sum \left(\frac{TS}{TA} \right)
 \end{aligned}
 \tag{1}$$

The fluctuation in Altman Z-score’s calculated depends on the business activities’ nature (Altman 1968; Altman, 1977; Altman, 1993; Altman, 2000; Neumaier, 2009). In the case of the financial sector (general formula), the Z-score formula is:

$$Z = 1.2 * X1 + 1.4 + 3.3 * X3 + 0.6 * X4 + 1.0 * X5 \tag{2}$$

On the other hand, the following four-factor formula is used for manufacturing industries (not applicable to banks and other financial sectors) (Altman, Kant, & Rattanaruengyot, 2009).

$$Z = 6.56 * X1 + 3.26 * X2 + 6.72 * X3 + 1.05 * X4 \tag{3}$$

Economists and financial experts updated the Z-score model for non-productive and start-up businesses in 1995 (Baginski & Wahlen, 2003); (Atman, 1983; Graham, 2000).

$$\begin{aligned}
 Z = & 0.717 * X1 + 0.847 * X2 + 3.107 * X3 \\
 & + 0.420 * X4 + 0.998 * X5
 \end{aligned}
 \tag{4}$$

Consequently, for emerging market companies (banks), the Z-score formula is given as:

$$Z = 1.2 * X1 + 1.4 + 3.3 * X3 + 0.6 * X4 + 1.0 * X5 \tag{5}$$

3.1.3. Explanation of Altman’s Five-Factor model

Table 3 shows the classification of Z-score evaluations proposed by Altman for different applications. There are three zones where a company can be classified as safe, grey, or distressed, and the lower and upper limits vary depending on the version of the applied model.

3.2. Results and Findings

The sample size, methodology, and results of the empirical study are presented in this section. The present research focuses on Pakistan’s financial sectors, and it will be helpful for researchers and analysts to access the accuracy and performance of the Altman Z-score test. However, the method is questionable in companies with high debt and low capital efficiency. As mentioned above, this application was considered by many researchers as an active and appropriate tool to analyze financial difficulties. Mahmoudi et al. (2019) presented a model to predict Italian companies’ corporate failure under extraordinary management. The results of their evaluation of the Z-score showed a high prediction failure rate (95%) for the considered companies. The high prediction accuracy rate suggests the effectiveness and reliability of this application efficiency likely if until now (80% - 95%) (Altman et al., 1995; Altman et al., 2013). Therefore, it is proposed to the multidimensional users for the analysis of bankruptcy. Researchers have applied the Z-score model to analyze the banking sector’s status (Culp et al., 2015; Basu et al., 2007).

On a similar note, the present study uses Pakistan’s banking industry compiled by the Pakistan stock exchange and Pakistan’s state bank. This study provides valuable information on the banking sector’s financial situation in the period 2013-2017. This study can help sensitize business owners to their financial situation and hence help them develop and implement safer strategies to improve financial stability based on a specific factor. The Altman Z-score model is based on financial ratios. In this context, Hussein & Pambekti (2014) determined that the financial ratios included in a company’s financial statements are an effective way to analyze the company’s reliability and can be used to predict future financial difficulties (Hoang -Tien et al., 2019).

Table 2: Definition of the variables and key indicators

Proxies	Abbreviation	key indicators	Descriptions
X1	WC/TA	Working capital/ Total Assets (WC/TA)	This indicator measures a company's liquid position as a percentage of its current assets, such as its net current assets or working capital. Working capital, which is "current assets minus current liabilities," helps analyze the amount of assets required to run a company's daily operations and the size of assets related to working capital. This relationship indicates the extent of the company's liquidity. It has proved to be the most valuable indicator of critical disruption (Altman, 1968).
X2	RE/TA	Retained Earnings)/Total Assets (RE/TA)	This ratio measures the company's ability to generate profits through its assets. Most analysts and investors prefer a higher retained earnings-ratio than total assets, reflecting the company's higher earnings (Altman 1968).
X3	EBIT/TA	Earnings Before Interest and Taxes (EBIT / TA)	This indicator is very similar to net profit-based ROA (Return on Assets). However, in this case of X3 is based on EBIT (Earnings Before Interest and Taxes). These indicators primarily measure the company's operating performance (all tax returns before interest and income). Operating profit is assumed to be one of the key parameters of a company's long-term profitability. This indicator appears to be predominantly fit for studies assigned to corporate failure (Altman 1968).
X4	MVE/TL	Market Value of Equity / Total Liabilities (MVE/ TL)	This indicator measures the company's long-term solvency (i.e., how much the company's market value would fall before the assets of the liabilities are exceeded). The book value of total liabilities is the sum of all current and long-term liabilities on the company's balance sheet. In contrast, the market value of capital is the total current market value of all common and preferred shares. It also appears to be a more effective and efficient predictor of bankruptcy equity to total debt (Altman, 1968).
X5	S/TA	Sales/Total assets (S/TA)	This ratio measures a company's efficiency based on its assets, and it is also considered an asset turnover index. Higher values of this ratio indicate that the business runs smoothly, and assets are well managed (Altman, 1983).

Table 3: Discrimination zones of Altman Z- score Application

Z-Model	Safe	Grey	Distress	Source
Original	Z>2.99	1.8 Z< 2.99	Z>1.8	Altman (1965,1983) & Neumaier (2009)
Emerging	Z>2.9	Z>1.2Z<2.8	Z< 1.2	Atman (1983)
Revised	Z>2.6	Z>1.1Z<2.6	Z<1.1	Altman, Hartzell & Peck (1998); Altman, Donovi & Falini (2013)

3.3. Empirical Results of Altman Z- Score Application

In Table (4), the Altman Z-score > 3 suggests that public and private banks do not have financial problems, whereas foreign banks do not have the capacity to meet the Z-score criteria. Furthermore, the average value of Z score < 1 in the period 2013-17. All of the Pakistani foreign banks operating outside Pakistan have a debt ratio higher than the capital ratio.

Results in Table 5: The five-factor Altman Z-score model has been applied to bankruptcy in Pakistan's banking sector. The weighted formula (2) is used on the data in 2013-17, where companies are divided into three categories based on the computed Z-score. Note in Table 5 that the public banking industry was in the Safe Zone (Z> 2.99) in 2014-17, while it was in the Grey Zone in the year (Z> 1.8 Z<2.98). Public banks generally have the ability to pay off long-term and short-term debts. The WC/TA of public banks improved from 2013 to 2017.

In 2013, the working capital ratio was 9%, but it decreased to 6% in 2014. Similarly, it was 8% in 2015-2016 and 7% in 2017. The RE/TA, EBIT/TA, and TR/TA performance ratios gradually increased from 2013 to 2017. The value of the Z-score reached the highest score of 8.28 (80%). The increasing value of the Z-score shows an improving trend within the safe zone. The overall private banking industry was in the Safe Zone ($Z > 2.98$) from 2013 to 2017, as shown in Table 6. From 2014 to 2017, the WA/TA ratio had a minimum of 6% and a maximum of 8%, indicating a positive value of capital work. The key performance indicators of private banks gradually increased from 2013 to 2017. These indices rose from 50% to 60%, and the Z-score reached the highest at 5.93 (56%). These banks did not face difficulties and were in the Grey zone between 2013 and 2017. These significant changes show positive aspects of private banks.

On the other hand, foreign banks were found in the distress zone, as shown in Table 8. The WA/TA ratio was not as positive as the ratio of current liabilities was higher than the ratio of current assets. These banks were unable to pay short-term debt. In this case, the five key indicators were not positive between 2013 and 2017. Average ratios were less than 30%, and the Z-score reached the lowest score of 30% (.30). Therefore, these banks were included in the distress zone with negative Z-scores. In this case, the long-term debt ratio improved from 2013 to 2017, and it was higher than the equity ratio. According to Altman Z-score criteria, the considered foreign banks do not have the ability for long-term business. Here, Z-score values do not meet the benchmark for the Grey zone or the Safe zone. The analysis shows that foreign banks have more financial problems due to organizational performance and incompatible financial policies.

Table 4: Failed and Non-Failed Banks

Banking industry	Branches	2013	2014	2015	2016	2017	Failed	Non failed
Public (specialized and commercial)	2360	Grey	Safe	Safe	Safe	Safe	Not	yes
Private banks	10043	Safe	Safe	Safe	Safe	Safe	Not	yes
Foreign banks	10	Distress	Distress	Distress	Distress	Distress	Yes	Not

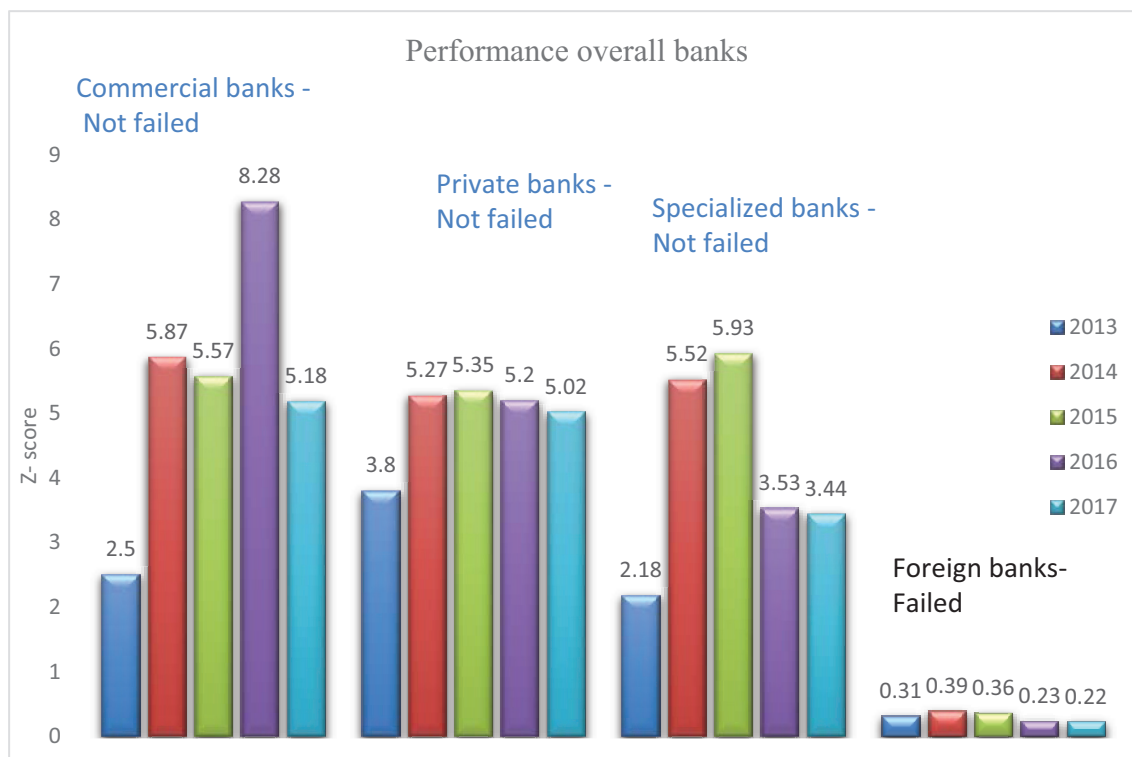


Figure 1: Failed and non-failed banks

Foreign banks do not have the ability to repay their creditors as their capital is less than the loans. Therefore, these banks do not have sufficient resources to run efficiently. It is concluded that the present state of the Pakistani banks operating in other countries is causing bankruptcy. Hence, bad reputation and improvement in policy selection and organizational performance are therefore recommended.

Figure 3 represents the key performance ratios of all the considered public banks. In 2013, the key performance ratio was in the Grey zone as the Z-score value is less than 2.5.

Based on the Altman Z-score analysis, it is found that public banks generally have the ability to meet both short-term and long-term obligations.

Figure 4 represents the key performance ratios of the considered private banks. It is mentioned below that the key performance ratios of overall private banks show a positive trend between 2013 to 2017.

Figure 5 represents the key performance ratios of the considered specialized banks. It is statistically approved that these banks are not bankrupt because the Z-score value is more significant than 1.8.

Table 5: Analysis of financial distress

	YEAR	WC/TA (X1)	RE/TA (X2)	EBIT/TA X3	BVE/TL X4	TR/TA X5	Z VALUE	ZONE	WEIGHT FACTOR
	Overall Commercial (Public) banks	2013	0.1	1.66	0.01	0.08	0.07	2.5	Grey
2014		0.06	3.51	0.23	0.08	0.07	5.87	Safe	Z> 2.99
2015		0.08	4.67	0.25	0.07	0.07	5.57	Safe	Z> 2.99
2016		0.08	5.21	0.24	0.07	0.06	8.28	Safe	Z> 2.99
2017		0.07	3.19	0.16	0.06	0.05	5.18	Safe	Z> 2.99
	YEAR	WC/TA X1	RE/TA X2	EBIT/TA X3	BVE/TL X4	TR/TA X5	Z VALUE	ZONE	WEIGHT FACTOR
	Overall Private Banks	2013	0.08	2.57	0.02	0.08	0.07	3.8	Safe
2014		0.06	3.57	0.02	0.08	0.08	5.27	Safe	Z> 2.99
2015		0.07	3.62	0.02	0.08	0.07	5.35	Safe	Z> 2.99
2016		0.08	3.52	0.02	0.08	0.06	5.2	Safe	Z> 2.99
2017		0.07	3.42	0.01	0.07	0.05	5.02	Safe	Z> 2.99
	YEAR	WC/TA X1	RE/TA X2	EBIT/TA X3	BVE/TL X4	TR/TA X5	Z VALUE	ZONE	WEIGHT FACTOR
	Overall Specialized Banks	2013	0.08	1.31	0.03	0.1	0.09	2.18	Grey
2014		0.06	3.65	0.04	0.15	0.09	5.52	Safe	Z> 2.99
2015		0.1	3.93	0.04	0.12	0.09	5.93	Safe	Z> 2.99
2016		0.1	2.29	0.03	0.12	0.08	3.53	Safe	Z> 2.99
2017		0.1	2.19	0.03	0.11	0.09	3.44	Safe	Z> 2.99
	YEAR	WC/TA (X1)	RE/TA (X2)	EBIT/TA (X3)	BVE/TL (X4)	TR/TA X5	Z VALUE	ZONE	WEIGHT FACTOR
	Overall Foreign Banks	2013	0.09	0.01	0.01	0.15	0.07	0.31	Distress
2014		0.1	0.02	0.03	0.13	0.07	0.39	Distress	Z< 1.8
2015		0.07	0.02	0.04	0.1	0.06	0.36	Distress	Z< 1.8
2016		0.04	0.01	0.02	0.07	0.04	0.23	Distress	Z< 1.8
2017		0.04	0.01	0.02	0.07	0.05	0.22	Distress	Z< 1.8

Figure 6 shows the performance of the considered foreign banks, and it shall be noted that these banks' key performance ratios are not favorable. The working capital and other key performance ratios show negative trends from 2013 to 2017, and the Z-score value is less than 1.8. Therefore, the failure of these banks is statistically verified. On the other hand, foreign banks' financial stability is not as significant as $Z\text{-score} < 1.8$. As mentioned above, the analysis shows that the foreign banking sectors are not booming and are bankrupt.

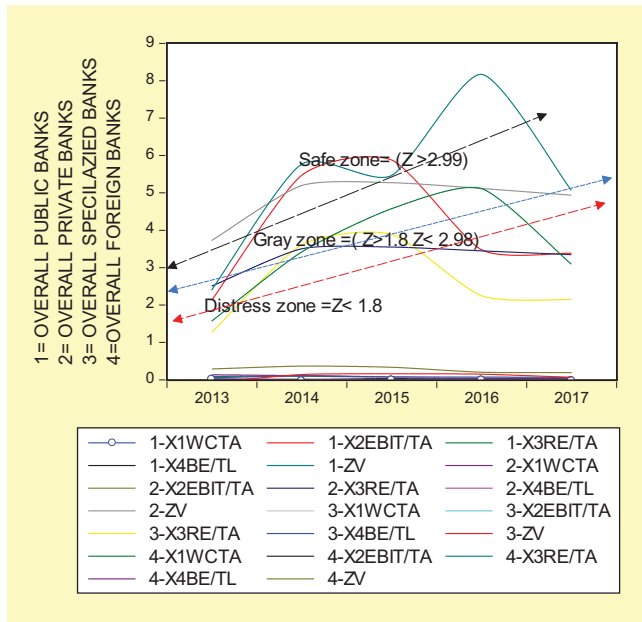


Figure 2: Key indicator performance of all the considered banks.

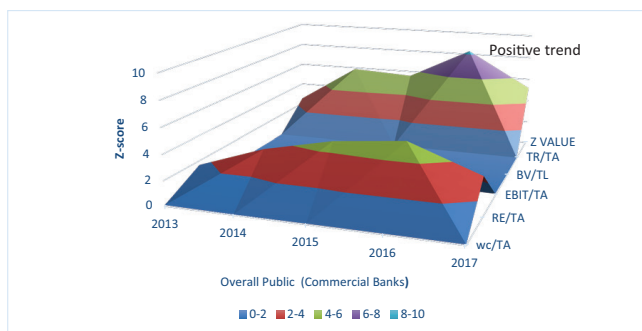


Figure 3: Key performance ratios of all the considered public banks

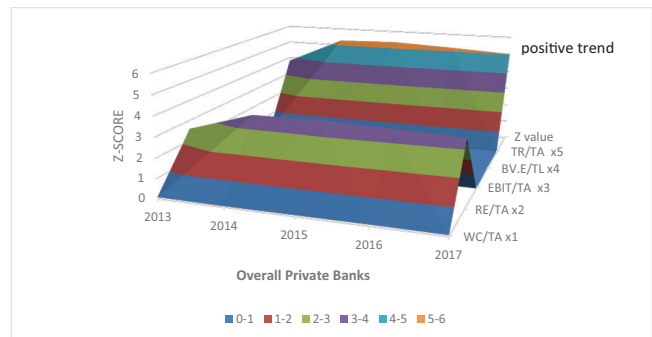


Figure 4: Key performance ratios of the considered private banks

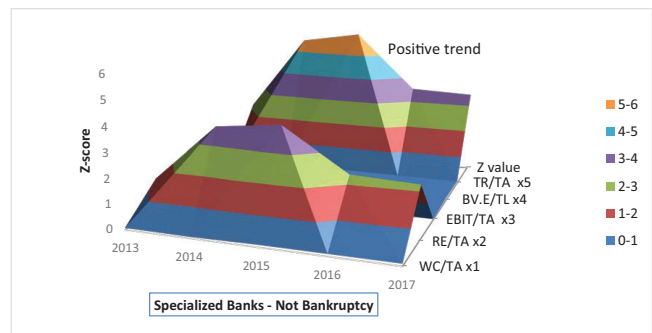


Figure 5: Key performance ratios of the considered specialized banks

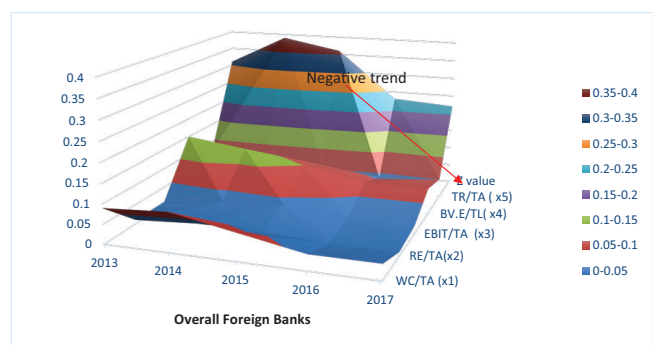


Figure 6: Key performance of the considered foreign banks

4. Discussion

In this study, we found that the banking sector had been going through a “financial risk revolution” in its control and administration that necessitates efficiency in the internal and external control system (Verguet et al., 2015). The study by Altman (2000) deeply explained and proved the term financial risk as to the probability of a potential event that may instigate losses to the organization. It is significant for the institutions to devise the financial risk (debt) strategies to meet the regulations and rules and the firm’s internal needs. An organization’s capital structure combines equity, financial resource, and debt other than can be used to fund long-term assets (Lin & Dong, 2018). The central division within the firm’s capital structure is amid equity alongside debt, where the percentage of the debt is estimated with the help of leverages or gearing (Das, Oliva, & Tsuda, 2012).

According to Tien et al. (2019), controlling working capital and reducing the reduced bankruptcy is a responsibility that needs to be assigned to the team members to review the vendor’s performance and ensure that the contractual terms and compliance with the standard terms. Haq et al. (2016) argued that poor governance is the basis for corruption activities; it corrupts economic growth, violating legal rules and ethical values within a country. Poor control gives birth to political instability, which causes the withdrawal of foreign and direct investments, diminishing economic stability, and worldwide competitiveness (Behn, Berge, & Langford, 2017).

It ultimately targets growth, leading to increasing altitudes of income instability and poverty. In cases like these, the banking sector is also ruthlessly troubled as worldwide organizations can decrease ratings because of the factors such as an excellent level of corruption (H.A. & Nguyen 2020). Foreign investors may decide not to carry out business with such firms. Such nations are frequently considered risky by other countries (Choi, Wallace, & Wang, 2016). One of the main reasons for the Z-Score’s durability and relevance is that it incorporates in a single measure four measures that represent Profitability, Liquidity, Efficiency, Productivity, and Leverage or Coverage of the business. Each measure, individually and collectively, provides information on business performance and expectations for sustainable growth and, indeed, survival over time. The Altman Z-score puts everything under a measure that predicts a possible bankruptcy (Farn, 2016).

5. Conclusion and Policy Implications

This work assesses the financial condition of the banking sector in Pakistan. The study is based on data collected from the Pakistan Stock Exchange, which is analyzed through the

five-factor Altman Z-score test (i.e., $\sum Z = 1.2 X1 WC / TA + 1.4 X2 RE / TA + 3.3 X3 EBIT / TA + 0.6 X4 BE / TL + 1.0 X5 TS / TA$). The Z-score assessment criteria is defined as: $Z > 2.99$ - “safe” zone; $Z > 1.8$ $Z > 2.98$ - “grey” zone; and $Z < 1.8$ - “distress” zone. The banks are divided into three categories (i.e., private, public, and foreign). Results show that 20% of the considered banks failed, while the rest had a stable economy. All of the local banks (private or public) were in the safe zone, and the foreign banks were found in the distress zone (i.e., $Z < 1.8$).

The Altman Z-score model performs with high accuracy and is suitable for predicting the banking sectors’ financial stability. In Pakistan’s banking sector, local public and local private banks had a stable economy, while foreign banks were bankrupt. The study also showed that most bankrupt foreign industries had shown signs of financial distress from 2013 to 2017. This study will help researchers and analysts assess the Altman Z-score test’s accuracy and performance, and it will help policymakers and government officials design better policies.

The banking industry’s Altman forecasting model provides innovative methods and ideas for forecasting analysis, planning, and decision-making. The calculation is simple, the required sample is small, and the result is objective and reasonable. The banking industry application and its efficiency are consistent with the grey forecasting model analysis, which has high precision and efficiency of prediction, decision-making, good value, and practical application effect. The present research is unique as no previous study has linked various variables and looked at their interdependent impacts Altman and Grey forecasting model. Pakistan should cooperate to resolve the financial issue. The government of Pakistan has already taken some significant steps to increase the banking industry’s efficiency and performance. It is crucial for companies to fully understand their sustainability risk to take useful measures to improve business sustainability. Conducting a thorough materiality examination will allow the company to identify social or environmental risks linked to the company’s products and services. This knowledge will help companies in enhancing their business performance. Hence, strategies and good policies should be formulated to encourage internal investors and external investors to invest in the banking industry concerning banking adoption.

This study is limited to determining the best prediction model based on accurate results, although no new models are proposed. There has not been much research investigating the causes and analyzing the trends for this region’s failures. This study is, therefore, an initial step towards raising awareness of the market situation. However, the sample size and considered time-period from 2013-2017 can be improved in future works.

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