EXAMINING THE FINANCIAL DISTRESS IN SELECTED INDIAN PHARMACEUTICAL COMPANIES BY APPLYING THE ALTMAN'S Z SCORE MODEL

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ABSTRACT

Purpose: The necessity for financial analysis is growing as a result of industrialization, trade, and commerce. Predicting financial difficulties has become a key concern for all firms since the financial crisis happened in 2008.

Approach/Methodology/Design: For assessing a company's financial health and the likelihood of insolvency, employ Altman's Z-score model. Early bankruptcy prediction is vital for both the parties involved in the company and society. Based on their sales in the year 2021-2022, the top five pharmaceutical companies listed on the Bombay Stock Exchange were chosen as a sample for this study. The period of the study is five years, from 2017-2018 to 2021-2022.

Findings: For this study, secondary data is employed. The collected data was examined by using Altman's "Z" score model in Microsoft Excel.

Originality/value: The results show that the average Z-score for the pharmaceutical sector over the course of the study was greater than 4.5, which is significantly greater than the threshold value of 1.8 and indicates that the sector's overall financial position is satisfactory.

INTRODUCTION

For businesses, being able to pay their debts is essential to continuing operations and expanding in the future. Liquidity risk refers to the potential for a firm to lack the cash or liquid assets necessary to meet its cash obligations. The Indian pharmaceutical sector has developed over time into a robust industry, rising at a CAGR of 9.43% over the past nine years, and is currently ranked third in pharmaceutical output by volume. India is well-known for its low-cost vaccinations and generic medications and is the world's largest

supplier of generic drugs and medications. Generic drugs, over-the-counter medications, bulk medications, vaccines, contract research, manufacturing, biosimilars, and biologics are a few important areas of the Indian pharmaceutical industry. India is the world's biggest producer of generic drugs contributing 20% of the total volume supply and 60% of the demand for vaccines worldwide. India is the world's 12th-largest exporter of medical products. India has gained the nickname "pharmacy of the world" thanks to its affordable prices and high-quality pharmaceutical products, which are exported to more than 200 other nations.

Key Terms

Corporate Failure

This expression refers to the situation in which a business closes its doors as a result of failing to generate a profit or bring in enough money to pay its bills. This could be brought on by poor managerial skills, an inability to compete, or even poor marketing.

Financial Distress

Financial distress occurs when a company's liabilities exceed its assets, and it typically results from undercapitalization, a lack of sufficient cash on hand, improper resource utilization, ineffective management of all internal and external activities, continuous declining sales, unfavorable market conditions, etc.

Bankruptcy

A person who is unable to pay their debts to creditors and whose entire liabilities exceed their total assets is said to be in bankruptcy.

Liquidity

Liquidity is the capacity of an organization to convert assets into cash or to get cash through a loan or cash in the bank to satisfy its short-term responsibilities or obligations.

Figure 1 How Does Bankruptcy Occur?

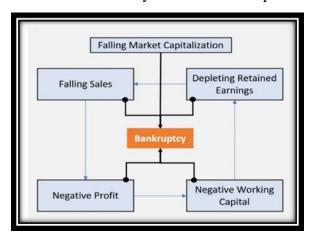(Source: https://getmoneyrich.com)

Although bankruptcy is a common occurrence in the corporate world globally, it remains illegal in India. Promoters would rather present a false image of success than admit that a

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business is in financial trouble. The government felt compelled to enact the Insolvency & Bankruptcy Code. 1. Dewan Housing Finance Ltd. – US$13.93 billion 2. Essar Steel (US$6.9 billion) – Biggest Bankruptcies in India 3. Reliance Communications – US$4.6 billion 4. Jet Airways – US$2 billion.

REVIEW OF LITERATURE

(Abadi & Muhammad Sultan Mubarok, 2023) have examined the accuracy of Altman's model in property companies. Six real estate firms from the 2019–2021 timeframe that were listed on the Indonesia Stock Exchange served as examples. The Altman Z-score analysis approach was employed in this study's hypothesis testing along with the Microsoft Excel spreadsheet tool. The findings reveal that the liquidity ratio, leverage, profitability, market ratio, and activity impact the final value of the Altman z-score prediction. The third finding reveals that six businesses would be in limbo between 2019 and 2021, while the remainder will be experiencing financial difficulties.

(Das, 2023) has researched "Financial Appraisal Through Ratio Analysis". The current study aims to show Tata Steel Ltd.'s financial evaluation through a historically significant association between the balance sheet and profit and loss account feedback. This study, which cannibalizes secondary data, focuses on Tata Steel Ltd.'s financial evaluation for the period from 2017–2018 to 2021–2022. This analysis helps the industry to build better regulations for ensuing development and supports capital appreciation effectively. The study does not include external variables like GDP, or inflation, etc. is limited to a small number of financial appraisal elements.

(Singh, 2022) has given his analysis of the impact of the Amended Patent Act on the Indian Pharmaceutical Industry. This article aims to highlight the changes and deviations the Indian pharmaceutical sector has undergone since 2005. The author noted in the conclusion that it has been demonstrated that the enforcement of patent rules will lead to improved performance, higher exports, and global commercial activities. It is agreed upon that the patent system should be carefully planned to encourage innovation and societal gain. Therefore, it is clear from the literature analysis that TRIPS and the Patent Amendment Act of 2005 have had a significant impact on the Indian pharmaceutical sectors in terms of export, raw material import, profitability, and R&D activities.

(Joshi, 2019) has done a study on the prediction of bankruptcy in Reliance Communication. This study aims to investigate how the Altman Z score model is used to forecast Reliance Communication's chance of bankruptcy. It is discovered that the publicly traded Indian non- manufacturing firm's financial problems and possibly impending insolvency are accurately predicted by the Altman Z-score model. Reliance Communication's financial statements and market data were examined for this study, and it was discovered that the company had been losing money for a while and was in the grey region for bankruptcy risk according to the Altman Z score model. The study indicated that the model was successful in foreseeing Reliance Communication's impending financial trouble.

(Panigrahi, 2019) has examined the pharmaceutical industry by Altman's Z- Score Model, The goal of the study is to use Altman's Model to analyze the financial health or status of sample units of four pharmaceutical industry businesses was chosen. Secondary data provide the foundation of this investigation. The first section of the article discusses how

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the financial crisis has affected a few pharmaceutical companies. The outcome indicates that during the study period i.e. 2012-13 to 2016-17, the pharmaceutical industry's average Z-Score was 5.90. Because Z-Score is significantly higher than the threshold score, or 1.8, it is evident that the pharmaceutical industry is in good financial standing.

METHODOLOGY AND PROCEDURES

Title The title of the present study is as under:

"EXAMINE FINANCIAL DISTRESS IN SELECTED INDIAN PHARMACEUTICAL COMPANIES BY APPLYING THE ALTMAN'S Z-SCORE MODEL"

Research Objective

The goal of the study is to use Altman's Z-sore Model to analyze the financial health or status of selected pharmaceutical companies.

To identify healthy firms for investors among the selected pharmaceutical companies covered in this study.

To determine which company, among the chosen example companies, is operating the best.

Sample Design

All Indian pharmaceutical companies are regarded as the target population for the current study. Based on "total net sales in 2021-2022," the researcher has selected the top five pharmaceutical companies listed on the BSE [Bombay Stock Exchange] as a sample from the population.

Table 1 List of Sample Companies

Company	Net Sales [Rs. In crore]
1. Sun Pharmaceuticals Industries Limited	15,585.98
2. Dr. Reddy's Laboratories Limited	14,405.20
3. Cipla	13,091.79
4. Lupin Pharmaceutical Limited	11,771.67
5. Aurobindo Pharma Limited	11,287.14

(Source: https://www.moneycontrol.com)

Data Collection

This study is purely based on secondary data, which was gathered from the annual reports of the sample companies and the website.

Period Of Study

The period covered in this study is five years, i.e. 2017-2018 to 2021-2022.

Tools & Technique

Z- Score Solvency Test in Microsoft Excel

Mean

Standard Deviation

Review Of Altman's Z-Score Model

Edward I. Altman first published the widely used Z-score function, commonly referred to as multiple discriminant analysis (MDA), in 1968. In Altman's study, from 1946 to 1965, there were 66

corporations in the initial sample, with 33 enterprises in each category. This method is intended for publicly traded manufacturing companies with net worth values greater than $1 million. A numerical statistic, Altman's Z-Score, is used to forecast a company's likelihood of declaring bankruptcy during the next two years. A linear combination of five financial ratios that have been weighted by coefficients makes up this multivariate model. This formula has won the support of different parties, including investors, financial analysts, consultants, bankers, auditors, management accountants, financial institutions, courts, and database systems. Only manufacturing companies were eligible to use the original model. He created a non-manufacturing firm model as a result. Also, he created a model to consider the circumstances of emerging markets, which can have a different environment than industrialized economies (Altman, 1993). The original model's accuracy of prediction of bankruptcy for two years is 72%, with a 6% false positive rate (Type I error).

Table 2: Z-Score Model Formula

Name	Model	Applicable Firms
Z- Score	1.2X1+1.4X2+3.3X3+0.6X4+0.999X5	Public Manufacturing Companies
Z1- Score	0.171X1+0.847X2+3.107X3+0.42X4+0.998X5	Private Manufacturing Company
Z2- Score	6.56X1+3.26X2+6.72X3+1.05X4	None Manufacturing Companies

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

The overall index is "Z," and variables X1 to X5 are calculated as absolute percentage values. Understanding of Ratios used in the formula is as follows:

- **X1- Working Capital/ Total Assets Ratio**

Working capital to total assets as a percentage (WC/TA*100). It is a ratio of a company's net liquid assets to its total capitalization.

- **X2- Retained Earnings/ Total Asset Ratio**

The whole amount of a company's reinvested profits or losses is reported as retained earnings. While total assets comprise both current and fixed assets. It makes logical that new businesses are more prone to break their financial commitments. Additionally, X2 calculates a company's leverage.

- **X3- Earnings Before Interest and Tax / Total Assets Ratio**

[EBIT/TA*100] is the ratio of profits before interest and taxes to total assets. It is a gauge of an enterprise's resource productivity. The fundamental basis for an enterprise's existence is its capacity for profit (profitability).

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- **X4- Market Value of Equity/ Total Liabilities Ratio**

The market value of equity is divided by the book value of debt multiplied by 100. It is the opposite of the well-known debt-to-equity ratio. Debt encompasses both present and long-term

obligations, while equity is determined by the total market value of all shares. This gauges how far an organization's assets can depreciate before its liabilities outweigh its resources and it becomes bankrupt.

- **X5- Total Sales/ Total Assets Ratio**

Sales to Total Assets Ratio (S/TA*100). The capital turnover ratio is a common financial metric for demonstrating an asset's ability to generate sales.

Table 3: Z-Score Analysis

Zones	Z	Z 1	Z 2	Result
Safe Zone	Z > 2.67	Z > 2.9	Z > 2.6	Will not fail
Grey Zone	1.81 < Z < 2.67	1.23 < Z < 2.9	1.1 < Z < 2.6	May or may not fail
Distress Zone	Z < 1.81	Z < 1.23	Z < 1.1	Failure is certain

(Source: https://shodhganga.inflibnet.ac.in/bitstream/10603/117591/12/12)

Z Score Analysis of sample companies

Table 4: Financial Components of Sun Pharmaceuticals Industries Limited

Components / Years	March-2018	March-2019	March-2020	March-2021	March-2022	AVG
X1. Working capital/Total Assets	-0.081	-0.056	0.019	0.095	-0.009	-0.01
X2. Retained Earnings/ Total Assets	0.327	0.328	0.365	0.409	0.334	0.35
X3. EBIT/ Total Assets	0.018	0.033	0.095	0.066	0.017	0.05
X4. Market Value of Equity/ Total Liabilities	1.543	1.537	1.741	1.794	1.520	1.63
X5. Total Sales / Total Assets	0.24	0.26	0.31	0.32	0.38	0.30

Z Score	1.585	1.684	2.202	2.275	1.804	**1.91**
Zone	Distress	Distress	Grey	Grey	Grey	Grey

(Source: Computed from the Balance sheet)

Table 5: Financial Components of Dr. Reddy's Laboratories Limited

Components/ Years	March-2018	March-2019	March-2020	March-2021	March-2022	AVG
X1. Working capital/Total Assets	0.253	0.360	0.304	0.295	0.304	0.30
X2. Retained Earnings/ Total Assets	0.531	0.612	0.641	0.654	0.629	0.61
X3. EBIT/ Total Assets	0.044	0.108	0.145	0.143	0.092	0.11
X4. Market Value of Equity/ Total Liabilities	2.231	3.560	3.546	3.656	2.977	3.19
X5. Total Sales / Total Assets	0.544	0.651	0.606	0.614	0.584	0.60
Z-Score	3.074	4.433	4.475	4.549	3.919	**4.09**
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the Balance sheet)

Table 6: Financial Components of Cipla

Components/ Years	March-2018	March-2019	March-2020	March-2021	March-2022	AVG

Components/Years						
X1. Working capital/Total Assets	0.305	0.401	0.314	0.327	0.365	0.34
X2. Retained Earnings/ Total Assets	0.539	0.588	0.612	0.652	0.689	0.62
X3. EBIT/ Total Assets	0.113	0.136	0.147	0.1478	0.140	0.14
X4. Market Value of Equity/ Total Liabilities	4.733	5.985	5.796	6.563	7.669	6.15
X5. Total Sales / Total Assets	0.641	0.650	0.599	0.593	0.504	0.60
Z-Score	4.971	5.993	5.794	6.322	6.971	6.01
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the Balance sheet)

Table 7: Financial Components of Lupin Pharmaceuticals Limited

Components/ Years	March-2018	March-2019	March-2020	March-2021	March-2022	AVG
X1. Working capital/Total Assets	0.341	0.380	0.401	0.322	0.220	0.333
X2. Retained Earnings/ Total Assets	0.694	0.723	0.706	0.713	0.673	0.702

X3. EBIT/ Total Assets	0.648	0.679	0.767	0.645	0.435	0.635
X4. Market Value of Equity/ Total Liabilities	5.450	6.652	5.448	5.638	4.360	5.510
X5. Total Sales / Total Assets	0.527	0.560	0.523	0.499	0.505	0.522
Z-Score	7.317	8.259	7.789	7.393	5.763	7.304
Zone	Safe	Safe	Safe	Safe	Safe	Safe

(Source: Computed from the Balance sheet)

Table 8: Financial Components of Aurobindo Pharmaceuticals Limited

Components/ Years	March-2018	March-2019	March-2020	March-2021	March-2022	AVG
X1. Working capital/Total Assets	0.149	0.158	0.250	0.310	0.358	0.245
X2. Retained Earnings/ Total Assets	0.407	0.438	0.604	0.808	1.004	0.652
X3. EBIT/ Total Assets	0.111	0.095	0.134	0.232	0.105	0.135
X4. Market Value of Equity/ Total Liabilities	1.717	1.672	2.001	2.192	3.818	2.280
X5. Total Sales / Total Assets	0.463	0.515	0.662	0.861	0.712	0.642
Z-Score	2.609	2.633	3.450	4.448	5.183	**3.665**
Zone	Grey	Grey	Safe	Safe	Safe	Safe

(Source: Computed from the Balance sheet)

Table 9: Financial Components of Altman's Z-Score Test For Solvency Analysis

Name of the Company	X1. Working capital/ Total Assets	X2. Retained Earnings/ Total Assets	X3. EBIT/ Total Assets	X4. Market Value of Equity/ Total Liabilities	X5. Total Sales / Total Assets
Sun Pharma	-0.01	0.35	0.05	1.63	0.3
Dr. Reddy's Lab.	0.3	0.61	0.11	3.19	0.6
Cipla	0.34	0.62	0.14	6.15	0.6
Lupin	0.33	0.7	0.63	5.51	0.52
Aurobindo Pharma	0.25	0.65	0.14	2.28	0.64
Mean	0.242	0.586	0.214	3.752	0.532
Std. Deviation	0.145	0.137	0.235	1.99	0.137

(Source: Computed in the Excel)

For that, the researcher took the 5-year average of each company's all solvency ratios. The working capital ratio reveals that the average working capital to total assets for the sector is 0.242 i.e. 24.2%. Dr. Reddy's Laboratories and Sun Pharma are below it, While every other company is much above the industry average. It suggests that on an average, Indian pharmaceutical companies retain working capital at about 24% of their total assets. Cipla reported the greatest ratio, while Sun Pharma reported the lowest. Researchers may conclude that Lupin and Cipla utilized their resources more efficiently than the other sample units in this study. The ratio of retained earnings to total assets shows how much of the retained earnings are included in the assets. An industry's average asset retention is 58% of its total assets. Sun Pharma's retention rate is below the industry standard.

Earnings before interest and taxes (EBIT) as a percentage of total assets is 21% in this sector. Sun Pharma had the lowest EBIT to total assets ratio when compared to the industry & other companies, and Lupin has a high EBIT to total assets ratio. The market value of equity as compared to the book value of all of the industry's debt is almost 3 times higher, which shows that the overall sector is in a secure position. Cipla is in the best position, followed by Lupin, Aurobindo, Sun Pharma, and Dr. Reddy's Laboratories. The industry's average sales-to-total assets ratio is 0.532. Sun Pharma performs below average for its sector. The other businesses are either at or above the sector average, showing a secure position. Aurobindo Pharma has reported the highest ratio (0.64).

RESULTS AND DISCUSSION

Measurement of Financial Health of Public Manufacturing Companies as the concern of this study, A company is said to be in the **bankruptcy zone** if its Z-Score is less than 1.8. It will fail, and it might do so within the next two years. A company's financial viability is **deemed to be** healthy if its Z-Score falls between 1.8 and

2.99Failure in this circumstance is difficult to forecast. A Z-Score above 2.99 indicates that the company is **too healthy**. Its financial situation is highly stable, and the business will succeed.

Table 10: Altman's Z-Score Test Result

Company/ Year	Mar-18	Mar-19	Mar-20	Mar-21	Mar-22	Mean	Zone
Sun Pharma	1.58	1.68	2.2	2.29	1.8	1.91	Grey
Dr. Reddy's Lab	3.07	4.43	4.47	4.55	3.92	4.09	Safe
Cipla	4.97	5.99	5.79	6.32	6.97	6.01	Safe
Lupin	7.32	8.26	7.79	7.39	5.76	7.30	Safe
Aurobindo Pharma	2.61	2.63	3.45	4.45	5.18	3.66	Safe
Mean	3.91	4.598	4.74	5	4.726	4.59	Safe
Zone	Safe	Safe	Safe	Safe	Safe		
Std. Deviation	2.268	2.635	2.156	1.956	1.970		

(Source: Computed in the Excel)

Throughout the study period, the pharmaceutical sector's average Z-score was 4.59. Z-score is significantly higher than the threshold score, which is 1.8, proving that the pharmaceutical

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industry is in a sound financial situation. Cipla and Lupin both reported average ratios that were higher than the average ratio of the Industry. Compare to other companies Aurobindo and Sun Pharma scored lower.

Sun Pharma's Z-score for the years 2018, and 2019 is less than 1.8, placing it in the bankruptcy zone. All other businesses have solid financial standing and are far above the healthy zone.

The mean, as we all know, is the average of a range of outcomes.

A high standard deviation indicates that the data are dispersed widely (less dependable), while a low standard deviation indicates that the data are firmly grouped around the mean (more reliable & less fluctuation).

Limitations of the Study

The use of Z-score models as the sole tool for analysis is perhaps the paper's most significant flaw.

Constraint in the research was restricted to five companies from the Indian pharmaceutical industry over a five-year period, which may mean that the findings do not accurately reflect the state of the industry as a whole.

Application of Study & Scope for Further Study

By examining a company's financial ratios before determining which shares to buy and which to sell, this research will help investors make educated selections.

Investors will be able to forecast the financial health of companies before investing by using the Z-score methodology.

To obtain a comprehensive understanding of the pharmaceutical industry, researchers can extend their study's time frame and collect a larger sample of the sector.

CONCLUSION AND SUGGESTION

Genuine business failures during downturns in business cycles are a common occurrence, but defaults brought on by malicious intent are very disturbing. Bankruptcy arises out of significant instability of financial resources and or improper management skills. Other than Sun Pharma, all the firms fall into the healthy zone, having a z-score above 2.67, making March 2021 potentially a successful year for the pharmaceutical industry. It can be said that the financial health of companies in the pharmaceutical sector is fairly good, and there is minimal chance of bankruptcy in the coming two years as none of them falls in the distress zone as per the calculation of Z-Score. Investments made by investors in this industry are secure. A company's aggressive working capital management strategy, which implies modest investment in current assets to generate a greater rate of return, is also indicated by low or negative working capital in some situations.

REFERENCES

Abadi, M. T., & Muhammad Sultan Mubarok. (2023). Accuracy Of The Altman Method In Predicting Bankruptcy Of Property Companies. *International Journal Of Economics, Business And Innovation Research*, 235-246.

Das, P. K. (2023). Financial Appraisal Through Ratio Analysis. *Social Science, Humanities And Sustainability Research*, 1-17.

Joshi, P. D. (2019). A Study On The Application Of Altman's Z Score Model In Predicting The Bankruptcy Of Reliance Communication. *International Journal Of 360 Management Review*, 35-47.

Panigrahi, A. (2019). Validity Of Altman's "Z" Score Model In Predicting Financial Distress Of Pharmaceutical Companies. *NMIMS JOURNAL OF ECONOMICS AND PUBLIC POLICY*, 65-73.

Singh, K. (2022). Impact Of Patent (Amendment) Act, 2005 On Indian Pharmaceutical Industry. *Journal Of Intellectual Property Rights*, 397-414. https://www.ibef.org/industry/pharmaceutical-india https://www.moneycontrol.com/financials/sunpharmaceuticalindustries/balance-sheetVI/SPI https://www.moneycontrol.com/financials/drreddyslaboratories/balance-sheetVI/DRL https://www.moneycontrol.com/financials/cipla/balance-sheetVI/C https://www.moneycontrol.com/financials/lupin/balance-sheetVI/L https://www.moneycontrol.com/financials/aurobindopharma/balance-sheetVI/AP https://corporatefinanceinstitute.com/resources/commercial-lending/altmans-z-score-model/ https://www.wallstreetmojo.com/altman-z-score/ https://www.investopedia.com/terms/a/altman.asp