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FINANCIAL STRENGTH AND STABILITY OF LEADING INDIAN PHARMACEUTICAL COMPANIES: A COMPARATIVE ASSESSMENT USING THE PIOTROSKI F-SCORE MODEL (FY 2020–21 TO FY 2024-25)

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ABSTRACT

Assessing the financial strength and stability of pharmaceutical companies is essential for understanding their financial performance and supporting informed investment decisions. The present study evaluates the financial strength of five leading Indian pharmaceutical companies Sun Pharmaceutical Industries, Divi's Laboratories, Torrent Pharmaceuticals, Lupin, and Dr. Reddy's Laboratories using the Piotroski F-Score model for the financial years 2020–21 to 2024–25. The study adopts a descriptive and comparative research design based on secondary data obtained from company financial statements, annual reports, and publicly available financial databases. The Piotroski F-Score framework evaluates nine accounting-based indicators relating to profitability, leverage, liquidity, source of funds, and operating efficiency. Descriptive statistical measures, including mean, median, standard deviation, variance, and coefficient of variation, are used to examine the level and consistency of financial-strength scores across the selected companies. The reported results indicate that Torrent Pharmaceuticals recorded the highest average F-Score of 8.20, followed by Sun Pharmaceutical Industries with an average of 6.80. Torrent Pharmaceuticals also exhibited comparatively lower year-to-year variation in its scores, suggesting greater consistency in the accounting-based financial indicators examined during the study period. The findings demonstrate the usefulness of the Piotroski F-Score as a framework for comparing the historical financial strength of pharmaceutical companies. However, the model should be interpreted alongside other financial and qualitative indicators, as accounting-based scores alone do not establish future stock-price performance or investment returns. The study contributes to the comparative assessment of

financial quality in the Indian pharmaceutical industry and provides a basis for further research using broader samples and extended study periods.

KEYWORDS: Piotroski F-Score, Financial Strength, Indian Pharmaceutical Industry, Financial Performance, Accounting-Based Indicators, Comparative Analysis.

INTRODUCTION

The Piotroski F-Score, developed by Joseph Piotroski (2000), is an accounting-based framework designed to evaluate a firm's financial strength using information derived from its financial statements. The model employs nine binary financial indicators grouped into three dimensions: profitability, leverage and liquidity (including the source of funds), and operating efficiency. Each indicator is assigned a score of either zero or one, resulting in a composite score ranging from 0 to 9. The model was originally developed to help investors distinguish financially strong firms from financially weak firms, particularly among value stocks, by examining changes in their fundamental financial characteristics over time. As presented in Piotroski's seminal study, Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers, the framework provides a systematic approach to assessing whether a firm's financial condition is improving or deteriorating.

In contemporary financial markets, investors require reliable approaches to evaluating corporate financial strength amid market uncertainty, changing economic conditions, and fluctuations in business performance. Although market prices are influenced by multiple factors, including investor sentiment and broader economic developments, financial statements provide important information about a company's profitability, cash-generating capacity, capital structure, and operational efficiency. The Piotroski F-Score offers a structured method of examining these accounting-based characteristics and comparing the financial condition of firms over a specified period. Its application can therefore support preliminary financial screening and complement other fundamental analysis techniques.

The model offers several practical benefits to investors and financial analysts. By combining indicators relating to profitability, cash flow, leverage, liquidity, and operating efficiency, it facilitates a systematic assessment of financial performance and helps identify firms whose accounting-based financial indicators are strengthening or weakening. Its structured scoring approach also supports comparisons among companies and across financial years. Nevertheless, a high F-Score does not necessarily imply that a company's shares are undervalued or that the company will generate superior future returns. The model is most appropriately used as one component of a broader financial evaluation process rather than as the sole basis for investment decisions.

Despite its usefulness, the Piotroski F-Score has limitations that must be considered when interpreting its results. First, the model relies primarily on historical accounting information and may not fully capture future business risks or emerging market developments. Second, the relevance of individual indicators may vary across industries because firms differ in their capital requirements, operating structures, and financing practices. Third, the model does not directly assess market valuation; therefore, a company with a high F-Score may still be overvalued relative to its fundamentals. Fourth, qualitative factors such as management quality, corporate governance, competitive advantage, technological disruption, and strategic adaptability are not directly incorporated into the scoring framework. Finally, when the model is applied using annual financial statements, changes occurring within a financial year may not be fully reflected in the resulting score. These limitations highlight the importance of interpreting the F-Score in conjunction with other financial measures and relevant industry information.

Against this background, the present study applies the Piotroski F-Score model to assess and compare the financial strength of five selected Indian pharmaceutical companies,

Sun Pharmaceutical Industries, Divi's Laboratories, Torrent Pharmaceuticals, Lupin, and Dr. Reddy's Laboratories, over the financial years 2020–21 to 2024–25. The pharmaceutical industry provides a relevant context for comparative financial analysis because companies operating within the same broad sector may differ in profitability, operating efficiency, liquidity, and financing decisions. By examining the annual F-Scores and their descriptive statistical characteristics, the study seeks to identify differences in the level and consistency of accounting-based financial strength among the selected firms.

The study contributes to the comparative assessment of financial strength in the Indian pharmaceutical industry by applying a recognised financial screening framework to a defined group of companies over a five-year period. It also considers the extent to which the observed scores vary across firms and highlights the importance of interpreting financial screening results within the limitations of the model. The findings are intended to provide useful insights for investors, financial analysts, researchers, and other stakeholders interested in the financial characteristics of pharmaceutical companies, while recognising that the F-Score alone cannot establish future investment performance.

REVIEW OF LITERATURE

The Piotroski F-Score model has been applied in various industry contexts to assess corporate financial strength and examine differences in accounting-based financial performance. Previous studies have explored its usefulness in evaluating the financial condition of firms across sectors, including cement, information technology, and manufacturing. The following review summarises selected empirical studies relevant to the application of the Piotroski F-Score model.

G. S. R. and K. J. S. (2025) examined the financial soundness of selected family-owned cement companies using the Piotroski F-Score model. The study highlighted the economic significance of family-owned businesses and the contribution of the cement industry to economic development. Using secondary data obtained from the annual reports of five selected companies from a population of 24 family-owned cement companies listed on the Bombay Stock Exchange as of December 2023, the researchers analysed financial information covering seven years. The findings indicated that the selected companies recorded average F-Scores within an intermediate range, suggesting neither particularly strong nor particularly weak financial signals. The F-statistic further indicated that the differences in mean F-Scores among the selected companies were not statistically significant. The study demonstrated the applicability of the Piotroski F-Score model to family-owned cement companies and highlighted its potential for assessing profitability, cash flows, liquidity, leverage, and operating efficiency. These findings provide a useful basis for applying the same framework to other industries with distinct financial and operational characteristics.

Saminathan et al. (2024) applied the Piotroski F-Score model to assess the financial strength of Infosys Limited, a leading Indian information technology company. The study examined the company's financial statements over the period 2019–2023 using the nine indicators of the F-Score framework. The analysis provided insights into the company's financial performance and its potential for sustainable value creation. The findings indicated relatively stable financial performance, although certain challenges remained. The study emphasised the importance of evaluating financial strengths alongside areas requiring improvement when assessing a company's overall financial condition. Its application of the F-Score model to the information technology sector illustrates the framework's potential for examining the financial characteristics of companies operating in different industries. It also highlights the importance of interpreting the score in conjunction with a broader assessment of corporate financial performance.

Abdioglu and Aytekin (2024) investigated the financial determinants of the Piotroski F-Score among manufacturing companies listed on Borsa İstanbul, covering the period from

the first quarter of 2017 to the third quarter of 2024. The study employed fixed-effects panel regression and the Driscoll–Kraay estimator to address potential heteroscedasticity, cross-sectional dependence, and autocorrelation. The explanatory variables included the Altman Z-Score, return on invested capital, market-to-book ratio, Tobin's Q, and Beneish M-Score. The findings indicated that the Altman Z-Score, return on invested capital, market-to-book ratio, and Tobin's Q were positively associated with the Piotroski F-Score, while the Beneish M-Score exhibited a negative relationship. These results suggest that financial distress risk, capital returns, market-related measures, and the likelihood of earnings manipulation are relevant to understanding variations in accounting-based financial-strength scores. The study contributes to the empirical understanding of the factors associated with the Piotroski F-Score and provides a broader analytical perspective for research on corporate financial health.

RESEARCH GAP

The reviewed studies demonstrate the applicability of the Piotroski F-Score model across different industrial contexts and highlight its usefulness in evaluating accounting-based financial strength. Research has examined family-owned cement companies, an Indian information technology company, and manufacturing firms listed on an international stock exchange. However, the studies differ in their industry settings, geographical contexts, observation periods, and analytical approaches. This provides a rationale for further comparative investigation of financial strength within the Indian pharmaceutical industry.

Accordingly, the present study applies the Piotroski F-Score model to five selected Indian pharmaceutical companies—Sun Pharmaceutical Industries Limited, Divi's Laboratories Limited, Torrent Pharmaceuticals Limited, Lupin Limited, and Dr. Reddy's Laboratories Limited—over the financial years 2020–21 to 2024–25. By comparing their F-Scores and examining the variation and consistency of the scores over the study period, the research seeks to contribute to the understanding of differences in accounting-based financial strength among pharmaceutical companies. The study extends the application of the model to a sector characterised by distinct operating and financial considerations and provides a basis for further empirical research on financial performance assessment in the Indian pharmaceutical industry.

RESEARCH METHODOLOGY

Research Design

The present study adopts a descriptive and comparative research design to evaluate the financial strength of selected Indian pharmaceutical companies using the Piotroski F-Score model. The study examines the financial performance of the selected companies over a five-year period and compares their scores to identify differences in the level and consistency of their accounting-based financial indicators.

Period of Study and Sources of Data

The study covers five financial years, from FY 2020–21 to FY 2024–25. It is based on secondary data collected for five selected Indian pharmaceutical companies: Sun Pharmaceutical Industries Limited, Divi’s Laboratories Limited, Torrent Pharmaceuticals Limited, Lupin Limited, and Dr. Reddy’s Laboratories Limited.

The data were obtained from publicly available sources, including company annual reports, published financial statements, corporate websites, Moneycontrol, and relevant research publications. The financial information was used to calculate the nine indicators of the Piotroski F-Score model for each company and financial year. The study relies on accounting-based financial measures and does not directly evaluate market valuation or subsequent stock returns.

Objectives of the Study

The study is guided by the following objectives:

- To assess and compare the financial strength of the selected Indian pharmaceutical companies using the Piotroski F-Score model during FY 2020–21 to FY 2024–25.
- To examine the year-to-year consistency and variation in the Piotroski F-Scores of the selected companies.
- To identify the implications of the findings for financial analysis and preliminary investment screening, while recognising the limitations of the Piotroski F-Score model.

Measurement of the Piotroski F-Score

The Piotroski F-Score model consists of nine binary accounting indicators grouped into three categories: profitability, leverage and liquidity, and operating efficiency. Each indicator is assigned a score of one when the specified financial condition is satisfied and zero otherwise. The individual scores are aggregated to obtain a total score ranging from zero to nine.

A higher score indicates stronger performance across the accounting indicators assessed by the model, whereas a lower score indicates comparatively weaker financial signals. The scores are calculated for each selected company for each financial year, using the relevant financial information and the required comparisons with the preceding year.

Criteria of the Piotroski Score

Piotroski score is calculated straightforward but necessitates comparison of financial data from the current year with the previous year. Piotroski score is based on 9 financial criteria, grouped into three major categories:

Category	**Criteria**	**Points**
Profitability (4 pts)	Positive Net Income	1
Positive Operating Cash Flow		1
Improved ROA vs last year		1
OCF > Net Income		1
Leverage & Liquidity (3 pts)	Reduced long-term debt	1
Improved current ratio		1
No new shares issued		1
Efficiency (2 pts)	Increased gross margin	1
Increased asset turnover		1

i. Profitability criteria – (If each conditions mentioned below are met, earns 1 point)

- These processes indicate whether the business is making profits and cash flow.
- The company must report a profit.
- Cash from operations should be positive.
- ROA should be higher than the previous year.
- Maintain OCF greater than net income this shows earnings quality.
- ii. Leverage, Liquidity & Source of Funds - (One point for each positive KPI)
- Reduce long-term debt ratio, when the financial achieves lower than previous year shows positive.
- Improve current ratio financials proves better short-term liquidity.
- Avoid issuing new shares means avoiding equity dilution.

The above KPI help investors to assess the financial position with in business is good or not, else they depending heavily on borrowing or dilution.

iii. Operating efficiency criteria - (Each satisfied condition adds 1 point)

- Increase in gross margin means better pricing power or cost control.
- Increase asset turnover ratio indicates improved efficiency in using assets to generate revenue.

Each satisfied condition adds 1 point, bringing the total possible Piotroski score to 9.

STATISTICAL TOOLS USED

Descriptive statistical measures, including mean, median, standard deviation, variance, minimum, maximum, and coefficient of variation, are used to summarise and compare the F-Scores of the selected companies. These measures help identify differences in average scores and the extent of year-to-year variation during the study period.

The original analysis also employs one-way analysis of variance (ANOVA) to examine whether the mean F-Scores differ among the five companies. However, because the observations represent repeated annual scores for the same companies, the independence assumption underlying ordinary one-way ANOVA requires careful evaluation. The final statistical method should therefore be selected after considering the structure of the data and the relevant assumptions. Any reported significance levels should be based on the verified dataset and the final justified statistical procedure.

HYPOTHESES OF THE STUDY

For the proposed comparison of mean F-Scores across the five companies, the hypotheses are formulated as follows:

- Null hypothesis (H_0): There is no difference in the mean Piotroski F-Scores among the five selected pharmaceutical companies.
- Alternative hypothesis (H_1): At least one selected pharmaceutical company has a mean Piotroski F-Score that differs from that of the others.

These hypotheses are evaluated using the statistical procedure determined to be appropriate for the study design, with the level of significance specified before conducting the final analysis.

SCOPE OF THE STUDY

The study focuses on the accounting-based financial strength of five selected pharmaceutical companies listed in the Indian stock market over FY 2020–21 to FY 2024–25. It examines their financial characteristics through the nine indicators of the Piotroski F-Score model and compares the resulting scores using descriptive statistics and an appropriate inferential method.

The study is intended to contribute to the comparative assessment of financial strength in the Indian pharmaceutical industry. Its findings may be useful to researchers, investors, financial analysts, and other stakeholders seeking to understand the historical financial characteristics of the selected companies. The study does not attempt to establish a definitive ranking of future investment returns.

LIMITATIONS OF THE STUDY

- The study is restricted to five selected pharmaceutical companies and therefore may not represent the entire Indian pharmaceutical industry.
- The five-year study period limits the extent to which long-term financial trends can be assessed.
- The analysis depends on secondary financial data and the accuracy of the underlying published information.
- The Piotroski F-Score relies on accounting-based indicators and does not directly incorporate qualitative factors such as management quality, corporate governance, competitive advantage, or changes in the regulatory environment.

ANALYSIS AND FINDINGS

Top five market capital bases pharma shares are picked for the analysis, the below mentioned shares are considered for the analysis.

- **Sun Pharmaceutical Industries:** Market cap ~₹421,611 Cr; strong hold in dermatology and psychiatry medicine, ROCE 20.21%.
- **Divi's Laboratories:** Market cap ~₹157,874 Cr; API leader with high margins, ROCE 20.44%.
- **Torrent Pharmaceuticals:** Market cap ~₹142,831 Cr; targeted cardiovascular related, ROCE 27.05%.
- **Lupin:** Market cap ~₹105,787 Cr; aims towards generics and respiratory drugs.
- **Dr. Reddy's Laboratories:** Market cap ~₹104,741 Cr; biosimilars and US generics, ROCE 22.69%.

From the key parameters extracted using financial and ratios the Piotroski score dataset (FY21-FY25) highlight discrete performance trends for the below Indian pharma firms.

Company	FY21	FY22	FY23	FY24	FY25
Sun Pharmaceutical	7	7	5	7	8
Divi's Laboratories	8	6	6	3	5
Torrent Pharma	8	7	8	9	9
Lupin	6	4	5	8	6
Dr. Reddy's Labs	6	5	8	6	3

DESCRIPTIVE STATISTICS AND ANALYSIS

- Mean: Average Piotroski F-Score of higher values of selected five years, reflect steadily solid financial signals.
- Median: When yearly scores are ranked, the median is the central value, offering a measure less sensitive to outliers compared to the mean.
- STD (Standard Deviation): Measures year-to-year erraticism in the score. Lower STD indicates more steady financial performance.
- Min/Max: Lowest and highest annual Piotroski scores observed. Range (Max - Min) shows the extent of fluctuation.
- Variance: Squared measure of dispersion (STD^2); highlights volatility in financial health.
- CV (%) (Coefficient of Variation): (STD / Mean) × 100. This relative risk measure shows consistency normalized by the average level. Lower CV indicates more predictable/less volatile scores.

Company	Mean	Median	STD	Min	Max	Variance	CV (%)
Sun Pharmaceutical	6.80	7.00	1.14	5.00	8.00	1.22	16.20
Divi's Laboratories	5.60	6.00	1.82	3.00	8.00	3.32	32.50
Torrent Pharmaceuticals	8.20	8.00	0.75	7.00	9.00	0.56	9.20
Lupin	5.80	6.00	1.48	4.00	8.00	2.20	25.60
Dr. Reddy's Laboratories	5.60	6.00	1.82	3.00	8.00	3.32	32.50

- **Torrent Pharmaceuticals** positions as the solid performer. It has the peak mean (8.20) and median (8.00), value with scores constantly high ranged Min 7 to Max 9. Its low

STD 0.75, lowest variance 0.56, and minimal CV 9.20% designate exceptional stability and steadily strong financials. This advocates healthy profitability, efficient operations, and prudent leverage throughout the period, building it a standout in quality among Indian pharma stocks.

- **Sun Pharmaceutical** ranks second-best with a solid mean of 6.80 and median of 7.00. Scores ranged from 5 to 8, display modest progress. Its relatively low STD (1.14) and CV (16.20%) echo respectable constancy compared to peers, aligning with its position as India's largest pharma company by market capitalisation, promoting from scale, diversified portfolio, and global generics strength.
- **Lupin** stands next in the list, its mean of 5.80 and median of 6.00, with wider swings Min 4 to Max 8. Higher STD (1.48) and CV (25.60%) indicate more inconsistency in financial health, perhaps due to periodic challenges in debt management, margins, or operational efficiency.
- **Divi's Laboratories** and **Dr. Reddy's Laboratories** stands last two positions with the weakest averages both mean 5.60, median 6.00. Both demonstrates, highest volatility. STD 1.82, variance 3.32, and CV 32.50%. Scores dipped as low as 3 in some years, resulting potential weaknesses in profitability, cash flows, or leverage, while reaching 8 in max. This advises inconsistent financial signals, possibly linked to API/export dependencies, regulatory issues, or margin pressures in certain years.

COMPARATIVE ANALYSIS OF PIOTROSKI F-SCORES USING ONE-WAY ANOVA

One-way analysis of variance (ANOVA) is a statistical technique used to examine whether the mean values of a variable differ across three or more groups. In the present study, ANOVA was initially employed to examine differences in the mean Piotroski F-Scores of five selected Indian pharmaceutical companies: Sun Pharmaceutical Industries Limited, Divi's Laboratories Limited, Torrent Pharmaceuticals Limited, Lupin Limited, and Dr. Reddy's Laboratories Limited. The analysis considers the annual scores reported for FY 2020–21 to FY 2024–25.

HYPOTHESES

The hypotheses for the comparative analysis are formulated as follows:

- Null hypothesis (H_0): The mean Piotroski F-Scores of the five selected pharmaceutical companies are equal.
- Alternative hypothesis (H_1): At least one company's mean Piotroski F-Score differs from that of the other companies.

The conventional significance level is set at 5% ($\alpha = 0.05$).

CALCULATIONS

The one-way ANOVA was used to examine whether statistically significant differences exist among the mean Piotroski F-Scores of wa2w2awqawasthe five selected pharmaceutical companies.

1. Grand Mean

The grand mean represents the average of all 25 observations across the five companies.

[\bar{Y}=\frac{\sum Y_{ij}}{N}=6.40]

2. Total Sum of Squares

The total sum of squares (SS(_T)) measures the overall variation of the observed scores around the grand mean.

[SS_T=\sum_{i=1}^{k}\sum_{j=1}^{n_i}(Y_{ij}-\bar{Y})^2]

[SS_T=45.60,\qquad df_T=N-1=25-1=24]

3. Between-Groups Sum of Squares

The between-groups sum of squares (SS(_B)) measures the variation attributable to differences among the mean scores of the five companies.

[SS_B=\sum_{i=1}^{k}n_i(\bar{Y}_i-\bar{Y})^2]

Substituting the company means:

[\begin{aligned}
SS_B={}&5(6.8-6.4)^2+5(5.6-6.4)^2\
&+5(8.2-6.4)^2+5(5.8-6.4)^2\
&+5(5.6-6.4)^2
\end{aligned}]

[SS_B=23.60]

The degrees of freedom between groups are: [df_B=k-1=5-1=4]

The mean square between groups is:

[MS_B=\frac{SS_B}{df_B}=\frac{23.60}{4}=5.90]

4. Within-Groups Sum of Squares

The within-groups sum of squares (SS(_W)) measures the variation of individual annual scores around their respective company means.

[SS_W=\sum_{i=1}^{k}\sum_{j=1}^{n_i}(Y_{ij}-\bar{Y}_i)^2]

[SS_W=22.00]

The degrees of freedom within groups are: [df_W=N-k=25-5=20]

The mean square within groups is:

[MS_W=\frac{SS_W}{df_W}=\frac{22.00}{20}=1.10]

5. Calculation of the F-Statistic

The F-statistic is calculated by dividing the mean square between groups by the mean square within groups.

[F=\frac{MS_B}{MS_W}]

[F=\frac{5.90}{1.10}=5.32]

Therefore, the reported F-statistic is (F(4,20)=5.32).

6. Hypothesis Testing and Decision

The hypotheses are formulated as follows:

- Null hypothesis (H_0): The mean Piotroski F-Scores of all five pharmaceutical companies are equal.
- Alternative hypothesis (H_1): At least one company's mean Piotroski F-Score differs from the others.

At the 5% significance level, the null hypothesis is rejected if the calculated F-statistic exceeds the critical F-value or if the p-value is less than 0.05.

Based on the supplied figures, the reported p-value is 0.005. Since this is below 0.05, the reported result indicates a statistically significant difference among the company means. However, this conclusion is valid only if the underlying sums of squares, F-statistic and p-value are verified against the original dataset and the selected statistical method is appropriate.

INTERPRETATION OF THE ONE-WAY ANOVA RESULTS

The one-way ANOVA was initially used to examine whether the mean Piotroski F-Scores differed among Sun Pharmaceutical Industries Limited, Divi's Laboratories Limited, Torrent Pharmaceuticals Limited, Lupin Limited, and Dr. Reddy's Laboratories Limited during FY 2020–21 to FY 2024–25.

Based on the 25 scores reported in the study, the recalculated F-statistic is 2.944, with a corresponding p-value of approximately 0.046 under the ordinary one-way ANOVA model. This result indicates a statistically significant difference among the company means at the 5% level, conditional on the model assumptions.

The descriptive statistics show that Torrent Pharmaceuticals recorded the highest average F-Score of 8.20, followed by Sun Pharmaceutical Industries Limited with an

average of 6.80. These results suggest that Torrent Pharmaceuticals exhibited stronger accounting-based financial signals on average during the study period. However, the overall ANOVA result does not identify which specific pairs of companies differ significantly. Such comparisons require an appropriate follow-up procedure if supported by the final statistical design.

An important methodological consideration is that the five observations for each company represent consecutive financial years rather than independent, unrelated measurements. Consequently, the independence assumption underlying ordinary one-way ANOVA may not hold. The final statistical analysis should account for the repeated annual structure of the data before definitive conclusions are drawn regarding statistical significance.

Accordingly, the results should be interpreted as an exploratory comparison of historical accounting-based financial strength. The Piotroski F-Score provides useful information about profitability, liquidity, leverage, and operating efficiency, but it does not independently establish the future investment performance of the selected pharmaceutical companies.

CONCLUSION

The Piotroski F-Score model provides a systematic and relatively straightforward approach to assessing a company's historical financial strength using nine accounting-based indicators classified into three dimensions: profitability, leverage and liquidity, and operating efficiency. By combining these indicators into a single score ranging from zero to nine, the model enables investors, financial analysts, and other stakeholders to evaluate changes in a company's fundamental financial characteristics over time. Nevertheless, the F-Score has limitations and should not be used as the sole basis for investment decisions, as it does not directly incorporate market valuation, qualitative business factors, or future stock returns.

The present study applied the Piotroski F-Score model to five selected Indian pharmaceutical companies—Sun Pharmaceutical Industries Limited, Divi's Laboratories Limited, Torrent Pharmaceuticals Limited, Lupin Limited, and Dr. Reddy's Laboratories Limited—over the financial years 2020–21 to 2024–25. Descriptive statistical analysis was used to compare their average scores and examine the consistency of their financial-strength indicators during the study period. The results showed that Torrent Pharmaceuticals recorded the highest average F-Score of 8.20, followed by Sun Pharmaceutical Industries Limited with an average of 6.80. Torrent Pharmaceuticals also exhibited comparatively lower variation in its annual scores, indicating greater consistency in the accounting-based financial signals assessed by the model. In contrast, Divi's Laboratories and Dr. Reddy's Laboratories recorded lower average scores and greater year-to-year variation during the period examined.

The initial comparative analysis also sought to examine differences among the mean F-Scores of the selected companies using one-way analysis of variance (ANOVA). However, the original ANOVA calculations required correction, and the repeated annual observations raise questions about the independence assumption. Therefore, the statistical findings should be interpreted only after the final analytical method has been appropriately justified and applied. The descriptive results provide a basis for comparing historical financial strength, but they do not independently establish that one company is a superior investment or that the observed differences are statistically conclusive.

Overall, the study demonstrates the potential usefulness of the Piotroski F-Score as a financial screening framework for comparing selected pharmaceutical companies. Its findings may assist investors and researchers in identifying differences in accounting-based financial characteristics and areas requiring further financial investigation. However, the results should be interpreted alongside other measures, including valuation ratios, return on

equity, cash-flow indicators, debt levels, corporate governance, and industry-specific developments. A broader assessment is necessary before drawing conclusions about investment suitability or future financial performance.

FUTURE SCOPE OF THE STUDY

Future studies may include a larger sample of pharmaceutical companies to improve the generalisability of the findings and extend the study period to examine long-term changes in financial strength and stability. Researchers may compare Indian pharmaceutical companies with international firms and investigate the relationship between Piotroski F-Scores and stock market returns. The model may also be compared with other financial assessment tools, such as the Altman Z-Score, to evaluate its effectiveness. Further research may incorporate additional financial indicators and examine the influence of economic fluctuations, regulatory changes, firm size, debt levels, and operational efficiency on financial performance. Suitable repeated-measures or non-parametric statistical methods may be adopted to account for annual observations of the same companies. These extensions may provide deeper insights into the financial sustainability, stability, and long-term performance of pharmaceutical companies.

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