Piotroski F-Score: A Model for Assessing Financial Health

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Abstract: *Globally, 90% of businesses are owned and run by families. They are the backbone of an economy. In India, the majority of the incorporated businesses are owned and run by family. They have decades of great history. Family-owned businesses contribute 79% to India's Gross Domestic Product, which is the highest in the world, and employ millions of people. FOBs operate businesses in diverse industries, and the cement industry is one among them. The cement industry in India is vital to the country's economy. After China, India is the world's second-largest producer of cement. There is a dearth of thorough research on the financial performance and wealth-creation potential of family-owned cement companies, despite their substantial contributions to the worldwide construction sector. The aim of the paper is to evaluate the strength of the financial soundness of selected family-owned cement companies applying the Piotroski F-Score model. The present study is desk research. The population of study comprises 24 family-owned cement companies listed in BSE as of Dec. 2023. With the use of a simple random sample, five companies were selected. The paper employed seven years of data obtained from annual reports. The data have been analyzed using the Piotroski F-Score model. The average F-Score of the sample family-owned cement companies was in Grey Zone indicating that they are in the neutral zone, they are neither particularly strong nor particularly weak. The F-statistic value shows that there are no statistically significant differences in the means of the F-Scores among the selected companies. Overall, family-owned cement companies tend to prioritize conservative financial management and efficient use of assets, cash flows, liquidity, leverage, equity capital, gross margin, and asset turnover more effectively.*

Keywords: Financial, F-Score, Health, Model, Piotroski.

INTRODUCTION

The role of family in the lives of human beings cannot be overstressed, which is just as true in business. Family-owned businesses (FOBs) in India contribute 79% to the country's Gross Domestic Product (GDP), the highest in the world, and it is possible to grow 80-85% by 2047 (Dorothy Neufeld, 2023). Globally, 90% of enterprises are run by family, which are key drivers of economic growth and employ millions of people. McKinsey research reveals that FOBs' returns to shareholders were twice as high as those of non-FOBs. Family-owned businesses spanning several industries and sectors make up some of the biggest corporations in India. Family businesses own 60% of India's 500 biggest businesses. Family enterprises established companies in every industry. Family business present is in cement business with above half of the cement companies' ownership. Cement plays a crucial role in the construction of several infrastructure developments like roads, bridges, dams, buildings, and canals.

Hence, any nation's economic development depends heavily on cement. India is the world's second largest manufacturer of cement, after China. It accounts for more than 8% of the global installed capacity. Financial health of a business firm is crucial for a business its own survival and lays the foundation for long-term growth and success. Business firms have to maximise shareholders' wealth and there by value of the firm in market. An investor or traders in equity stock have to evaluate the financial soundness of a firm before making an investment decision. Despite the significant contributions of family-owned cement companies to the global construction industry, no much analysis on their financial performance and wealth creation capabilities. The paper aimed to address this gap by applying the Piotroski F-Score model to assess the strength of the financial soundness of selected family owned cement companies, which categorizes key factors impelling their financial wealth creation capabilities. On the basis of Piotroski F-Score, are the select five family owned cement companies' financial wealth is in the weak, grey, or strong zone? And what is the contribution of each factor in the F-Score? Therefore, this study seeks to answer these questions.

LITERATURE REVIEW

Rao et al. (2024) aimed to identify, avoid investment in financially weak companies and improve the investment value by adopting the Piotroski F-Score. They randomly selected seven private banks operating in India. Financial data obtained from 2014 to 2020. They concluded that the F-Score model is useful in predicting a company's future performance; eliminate weak companies and enhancing the value of an investor. A similar study was done by Rangapriya & Meenakumari (2021) to identify the ability of the Piotroski F-Score model in evaluating the financial soundness of select 13 private sector banks in India between 2013-14 and 2019-20. Sample banks exhibited moderate financial health (grey zone) with a score of 3-7, and the remaining 18%, the financial health was weak with a score of 0-2. The researchers opine that the F-score helps to know the financial health of firms and is capable enough to provide early signs of financial stress.

Another researcher, Kusowska (2021) tried to understand the efficiency of the Piotroski F-score to verify whether the strategy of identifying firms' health leads to earn additional investment return. They consider the data from 2014 to 2019 from the Warsaw Stock Exchange (WSE), Poland. It is noted that the F-Score is more useful than directly depending on WIG30 index for value investing, there by earning larger returns. Portfolios with exclusively low F-score corporations appeared less effective when compared to those with high F-score companies. A similar study was carried by Tripathy & Pani (2017). They examined value investing strategy through the use of F-score helps or not. The paper considered 215 companies from nine sectors during 2009 to 2015. The annual reports data got from the database 'Centre for Monitoring Indian Economy (CMIE)'. The study found that applying F-Score can surge the performance of equity stock in the Indian market. The stock with higher F-score would perform better than the firms with lesser F-score. Chakraborty (2018) conducted a study to know the Piotroski F-Score of the Indian cement sector, choosing 10 cement companies and considering data from 2012 to 2017. They found that select companies are at different financial health zones.

Literature displays the application of the Piotroski F-score in research, yet cement industry was not covered. One paper covers the cement industry long back and did not classify companies as family-owned and non-family-owned. Therefore, the paper contributes to the existing literature.

Objective

The paper aimed to assess the financial health of select family-owned cement companies listed in BSE using the Piotroski F-score model.

METHODOLOGY

The present study is desk research. The population of study comprises 36 family-owned cement companies listed in BSE as of Dec. 2023. On the basis of 40% promoters' shareholding, the target population is 24. The 40% base is chosen on the basis of existing studies (Anderson & Reeb, 2003; Villalonga & Amit, 2006). A business is said be considered a family business when it fulfils any of the two conditions: (1) Family has equity ownership of at least 20% in the business, (2) CEO is from the founder family or the successor is related by blood or marriage, and (3) At least two members of family shall be in the management of business. Simple random sample technique applied for selection of five family-owned cement companies. They are UltraTech Cement Ltd. (UltraTech), The Ramco Cements Ltd. (Ramco), Deccan Cements Ltd. (Deccan), Shree Cement Ltd. (Shree) and JK Cement Ltd. (JK). Data from annual reports were used in the study. Period of study is seven years from 2016-17 to 2022-23. Piotroski F-Score is the metric for analysis of data.

Conceptual Framework of F-Score

The Piotroski score represents the total score assigned to each of the nine factors of the model that is used to assess a company's financial standing. The score shall be 0 to 9. In 2000, the score was named in honour of Joseph Piotroski, a Professor in the Accounting, University of Chicago. The nine criteria categorised and put under three heads: (1) Profitability; (2) Leverage, liquidity, funding source and (3) Operating efficiency.

The model used a binary scoring system, 'good or bad,' for assigning F-Score for each parameter. A corporate obtains one point for each criterion satisfied; if not, no points are granted. In other words, a firm is classified as 'good' on one parameter if scored one (1) and 'bad' if scored zero (0). Table 1 gives the details of F-Score calculation and basis of assigning score.

A company's financial health is determined by adding up all of the points scored under nine parameters. The Piotroski F-Score classifies companies considering the total score into three categories: Strong Zone (8-9) indicates a company with a score in this range is considered financially strong. Grey Zone (3-7) indicates companies with scores in this range are in a neutral zone and Weak Zone (0-2) indicates a company scoring in this range is generally considered financially weak.

Analysis and Discussion

Nine parameters of F-score are used for assessing financial health of sample cement companies viz., Return on Assets (ROA), Cash Flow from Operations (CFO), Changes in Return on Assets (ΔROA), Accruals amount, Changes in Leverage (ΔLeverage), Changes in Liquidity (ΔLiquid), Changes in Equity Capital, Changes in Gross Margin (ΔMargin), and Changes in Turnover (ΔTurnover). Seven-year average values of the sample cement companies and yearly averages of the sample companies (industry)

Table 1 Parameters of F-Score Calculation and basis of Assigning Score.

Factor/ Parameter	Calculation	Basis of Assigning Score
Profitability		
Return on Assets (ROA)	(Net income before extraordinary items/Opening Total assets for the year)*100	If ROA greater than 0, then the Score 1, else 0
Cash Flows from operations (CFO)	(Cash from operations / Opening Total assets for the year)*100	If CFO greater than 0, then the Score 1, else 0.
Change in Return on Assets (ΔROA)	(Present year ROA - Last year ROA)	If ΔROA greater than 0, then the Score 1, else 0.
Accruals	Cash from Operations - Income Before Extraordinary Items	If Accruals greater than 0, then the Score 1, else 0.
Leverage, Liquidity and Source of Funds		
Change in Leverage (ΔLeverage)	(Current-year long-term debt / Last Two-year Average Total Assets) - (Previous year long-term debts / Last Two-year Average Total Assets)	If ΔLeverage less than 0, then the Score 1, else 0.
Change in Liquidity (ΔLiquidity)	Current year's Current Ratio – Previous year Current Ratio	If ΔLiquid greater than 0, then the Score 1, else 0
Change in Equity (ΔEquity)	Present Equity Capital – Last Year Equity Capital	If ΔEquity capital greater than or equal to 0, then the Score 0, else 1
Assessment of Operational Efficiency		
Change in Margin (ΔMargin)	Current-year Gross Margin Ratio / Previous-year Gross Margin Ratio	If ΔMargin greater than 0, then the Score 1, else 0
Change in Turnover ΔTurnover	Current-year Asset Turnover Ratio – Previous-year Asset Turnover Ratio	If ΔTurnover greater than 0, then the Score 1 else 0
Source: Created by Author		

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Table 2 Yearly Average Values of F-Score Components of Sample Companies

Components of F-Score	UltraTech	Ramco	Deccan	Shree	JK	Industry (sample average)	Sample SD	Sample CV
ROA (%)	6.91	7.1	9.27	10.4	5.88	7.91	1.6629	0.2102
CFO (%)	12.34	13.04	11.9	18.72	14.27	14.05	2.4667	0.1756
Δ ROA (%)	(0.03)	(0.74)	(1.33)	(0.06)	0.62	(0.31)	0.6680	-2.1548
Accruals (Rs. in Crore)	5.42	5.94	2.62	7.43	8.38	5.96	1.9731	0.3327
Δ Leverage (Times)	4.48	1.33	1.32	1.33	1.01	1.89	1.2988	0.6871
Δ Liquidity (Times)	0.04	0.06	0.73	(0.05)	0.12	0.19	0.2804	1.5577
Δ Equity Capital (Rs. in Crore)	282.63	23.62	7.38	35.55	75.17	84.87	101.3823	1.1946
ΔGross Margin (%)	0.97	0.92	0.88	0.88	1.29	0.99	0.1546	0.1561
ΔTurnover (Times)	1.46	0.35	(0.17)	0.16	0.06	0.37	0.5692	1.5383

Source: Calculated by Authors on the basis of Annual Report data from the select companies

Note: Average values Calculated and Compiled from the Annual Reports of Sample Cement Companies.

Sample industry's financial position on the parameters of the Piotroski F-Score is good in seven parameters except for change in ROAs, leverage, and equity capital. Industry did not secure a score for these parameters as per the F-Score model. Individual sample companies' financial position during the study period is similar to the industry, except the change in liquidity of Shree Cements (-0.05times) and the change in turnover (-0.17times) at Deccan, and the change in ROA (0.62%) at JK.

When studied, the financial position of individual sample companies varies. The highest ROA, 10.4%, is recorded at Shree Cement, and the lowest, 5.88%, at JK Cement. CFOs are highest at 18.72% (Table 2).at Shree Cement and lowest at Deccan Cement. Change in ROA is negative in all companies except JK. Accruals showed highest at JK with Rs.8.38 crore and the lowest at Deccan with Rs.2.62 crore. Change in leverage, highest 4.48times and at UltraTech and the lowest 1.01times at JK. The liquidity position of all companies is poor, but as per the F-Score model, except for Shree Cement, all companies secure scores of 'one'. No company is eligible to score with regard to the equity capital parameter. Change in gross margin is high at JK with 1.29% and low (0.88%) at two companies, Deccan and Shree. The turnover performance is high at UltraTech with 1.46 times and low at 0.06 times at JK, but negative at Deccan. Change in Equity Capital shows more, since standard deviation (SD) is very high at 101. Highest coefficient of variation (CV) is recorded with the parameter change liquidity.

Piotroski F-Score

The average values of nine parameters may not provide right image when they are in value rather than of score format. Symbolically:

F-Score = ROA+CFO+ΔROA+Accrual+ΔLeverage+ΔLiquid+ΔEquity+ΔMargin+ ΔTurnover

The analysis was further extended by assigning a score for each parameter, year wise and company-wise. The total yearly score for nine parameters for each company is shown in Table-3.

The average F-Score of the sample industry fluctuated between the lowest 5.2 in 2022-23 and the highest 6.4 in 2016-17, with an industry average of 5.8 (see Table-3). It demonstrates that score declined under the period observation. All the sample cement companies recorded 'good' financial positioning against the sample companies average 5.8, except Deccan. No company was able to score points under the parameter variation in leverage and variation in equity capital. Changes in turnover besides liquidity are the other two parameters where score was not secured by two companies Shree and Deccan.

Based on the mean F-Score (Table 3), during the seven-year study period, all the sample companies were falling in the Grey Zone or neutral zone.

However, the Ramco Cement and JK Cement companies have higher average F-scores when compared to the other sample companies, indicating a to near strong financial position. The Deccan cement shows a moderate average F-Score suggesting a mix of strong and weak financial metrics positions. Standard deviation of F-Score is high at Deccan and low at JK cement. The sample companies' financial soundness does not significantly diverge from one another.

To validate this finding, a hypothesis has been formulated and tested using one-way ANOVA to test the statistical differences among the F-Scores of sample family-owned cement companies and results given in Table-4.

Ho: There is no significant difference in the F-Scores among the selected family-owned cement companies over the years.

HI: There is a significant difference in the F-Scores

Table 3 F-Score of Select Family-Owned Cement Companies

Year	UltraTech	Ramco	Deccan	Shree	JK	Industry (sample average)
2016-17	7	7	5	7	6	6.4
2017-18	6	6	6	5	7	6.0
2018-19	5	4	7	6	6	5.6
2019-20	6	6	5	7	6	6.0
2020-21	4	7	7	5	6	5.8
2021-22	7	7	3	5	6	5.6
2022-23	5	6	4	5	6	5.2
Mean	5.71	6.14	5.29	5.71	6.14	5.8
Variance	1.2380	1.1428	2.2380	0.9047	0.1428	01466
SD	1.1127	1.0690	1.4960	0.9512	0.3780	1.988
CV	0.1947	0.1740	0.2830	0.1665	0.0615	0.3954

Source : The score (1 or 0) is the sum of individual score given to the nine parameters used to calculated F-Score as per Piotroski mode.

Table 4 One-way ANOVA

Basis of Variation	Degree of freedom (df)	Sum of Squares (SS)	Mean Squares (MS)	F-Value	P-Value
Between Groups	4	2.006	0.5015	0.794	0.538
Within Groups	30	18.971	0.6324		
Total	34	20.977			

Source : Calculated by the authors on the basis of data from Table -3

The F-statistic of 0.7941 and probability (P-value) value of 0.5384 displays that there is insufficient proof to discard the null hypothesis. There are no statistically significant differences in the means of the F-Scores among the selected companies. The F-Scores across the sample five companies is not statistically significant.

Overall, family-owned cement companies tend to prioritize conservative financial management and efficient use of assets, cash flows, liquidity, leverage, equity capital, gross margin, and asset turnover more effectively. The F-scores of sample cement companies suggest maintaining a stronger and more stable financial position over the period.

CONCLUSION

On an average of sample cement companies' financial position on the parameters of the Piotroski F-Score is good in seven parameters except for change in ROAs, leverage, and equity capital. Individual sample companies' financial position during the study period is similar to the industry, except the change in liquidity of Shree Cements (-0.05 times) and the change in turnover (-0.17 times) at Deccan, and the change in ROA (0.62%) at JK. The average F-Score of the cement industry showed variations, and declined. All the sample cement companies recorded 'good' financial positioning cement industry average 5.8, except Deccan. Sample cement companies were not able to score points under the parameter change in leverage and change in equity

capital. Change in turnover and liquidity are the other two parameters where Sore was not secured by two companies Shree and Deccan. The average F-Score of the select family-owned cement companies was in Grey Zone indicating that they are in the neutral zone, they are neither financially strong nor weak. Standard deviation of F-Score is high at Deccan and low at JK cement. There is no considerable variance in financial soundness among sample companies.The F-statistic score indicates that there exists no statistically noteworthy variances in the means of the F-Scores among the selected companies. Overall, family-owned cement companies tend to prioritize conservative financial management and efficient use of assets, cash flows, liquidity, leverage, equity capital, gross margin, and asset turnover more effectively.

Sample companies have to improve the return on assets, improve leverage ratio and improve liquidity position for sound financial health and soundness. All the sample cement companies have to improve their financial soundness from grey zone to strong zone. Investors and traders have to assess the financial health and their impact of abnormal market return before investing in equity stock.

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