Research Article

Unveiling Financial Strength: Piotroski's F-Score Analysis in the Indian Automobile Industry

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Abstract— One of the main investment options that offers investors good returns is to invest in equity market. The return of these equity investments varies since share values are subject to vary with a number of factors. These external factors, such as interest rates, government policies, foreign exchange rates, etc., and firm-specific financial characteristics, such as turnover ratios, earning capacity ratio, dividend ratios, asset position, substantial capital investment, market value per share, etc., are the fundamental and strong factors that affect share prices. Piotroski's F score evaluates a company's financial health using nine fundamental ratios. Three distinct categories are evaluated by these ratios: operating efficiency, financial soundness, and profitability.
The study focuses on to measure the relationship between the determinants that lead to influence share prices and share performance. The study aims to measure the impact of Piotroski's F-score and financial factors affect share prices and firm value. Regression of Panel Data with Fixed Effect was applied. The study discovered that Financial Factors and Piotroski F-Score positively impact a firm's share prices. Furthermore, a substantial correlation has been observed between the Piotroski F score and share prices. The results of this study may provide practical insights for industry practitioners, such as finance professionals and executives within the automobile sector, helping them make more informed financial decisions.

Keywords— Financial Factors, Piotroski's F Score, Firm efficiency, Firm performance, earning capacity, earning to price

1. Introduction

Investors and traders can use technical analysis, fundamental research, or a combination of both to assist and decide on the best stock to buy or sell. It is usually the case that if certain elements indicate a good tendency towards investment, others indicate a negative trend. This study will guide investors to analyze investment and not just follow the market sentiments or herd behavior for investing.

F Score of Piotroski is analysed to determine whether using a certain fundamental research technique across high book-to-market stock, could result in significant returns on investment, Piotroski (2000) originally established this valuation indicator. Choosing to invest in equities with a higher F-score could result in much higher profits, according to the data. There are some analysis and guiding scores available, among which a popular one is the Piotroski F-score. A Piotroski F-score is named after American academic Joseph Piotroski. It is a discrete number ranging from 0 to 9 that reflects nine parameters used to assess the financial strength of a company. F-score is a binary scoring system generated from nine fundamental signals. The nine signs assess a stock's

financial health from three angles: profitability, financial leverage/liquidity, and operating efficiency. A basic signal is either good or bad, with one being good and zero being bad. The use of the Piotroski F-Score is intriguing. It's a composite financial score that assesses the financial health of a firm. Exploring how this metric relates to firm value within the automobile industry can provide valuable insights into the sector's financial stability and performance.

Thus considering the huge number of investors and money involved in the trading of shares has motivated the researcher to study this in-depth research on fundamental analysis and Piotroski F-score which will aid the investing decision of investors in the stock market. Also, this study will help investors to make informed decisions about the entry, hold, and exit from shares of any company considering its fundamental financial factors. The valuation and financial standing of enterprises in the automotive industry are of great interest to analysts, investors, and other stakeholders. Their financial tactics and judgments can be influenced by this research.

2. Review of Literature

The review of the literature was done to find research gaps. So, to find the answers to the questions, several literatures have been reviewed and found to focus on Financial Factors affecting Share Price. In this section, a paper review is presented related to Financial Factors' impact on Share Price.

Using Return on Assets (ROA) as a mediating variable, the impact of size, leverage ratio, and net profit margin on market prices was examined. The result depicts that DER significantly affects stock price favorably and ROA negatively. [1]. Organizations with higher profitability will deliver higher stock returns to shareholders. Furthermore, corporations that undertake stock splits have higher stock returns than those that do not[2]. It is found that, despite certain stocks' poor performance in the stock market, buying such shares at a discount can result in double returns down the road [3]. Most of the researchers have found the impact of the Piotroski F score on investing decisions but have not found the impact on the share price [4]. The findings demonstrate that the models' prediction accuracy reaches 66% and that, when employing moving window evaluation, stock market volatility can be predicted with a specific trend during particular time periods [5]. Because BSE indices are more erratic than NSE indices, investment through a BSE listing exposes an investor to greater risk [6]. The findings of this investigation should broaden our understanding on dividend policy by supporting earlier research conducted in developed and developing nations with data from the Pakistani stock market [7]. The results showed that selected board characteristics are negatively influencing to discretionary accruals. [8]. The bonds between corporate governance systems and financial performance seems one important factor deciding how much a firm is worth [9]. It is concluded that the share price was negatively impacted by both ROA and Basic EPS [10]

Also, a combined impact of financial factors (not considered in Piotroski F-Score) and Piotroski F-Score have been earlier measured. Thus after identifying the research gap, the hypothesis framed is as follows

H01: There is no significant impact of financial factors cum Piotroski F-Score on the share price of selected listed companies.

3. Research Methodology

3.1 Sample Design
The foundation of research is secondary data. Information was gathered from the official websites of Stock exchange and the respective companies' annual reports. The study proposed to examine fifty top companies from the Automobile Industry of the Indian Corporate Sector over 10 years.

3.2 Research Objective
To measure the extent of Piotroski's F-score and financial factors affecting share prices and firm value.

3.3 Variables and Statistical Tools
The average share price of the automobile sector has been considered as the dependent variable. Experimental variables include financial metrics such as market/net operating revenue, diluted earnings per share, PBIT margin ratio, and Piotroski F score of a subset of Indian automobile industry companies. Regression of Panel Data with Fixed Effect was applied.

Table 1 List of variables selected

Variable	Definition
Dependent Variables	
Average share price	Average share price
Experimental Variables	
Market_net operating revenue	Market price/ Net operating revenue
Diluted EPS per share	Diluted EPS = (Net Income – Preferred Dividends) ÷ Weighted Average of Diluted Common Shares Outstanding
Piotroski F Score	Profitability indicators+ Leverage, liquidity, and source of funds+ Operating efficiency
PBIT Margin	Profit Before Interest and Taxes.

Table 1 indicates the dependent and independent variables selected for the study. Average share price is the dependent variable while Market/ net operating revenue, Diluted Eps per share, Piotroski F score, and PBIT margin ratio have been used as independent variables
.

The purpose of the following equation is to investigate how financial issues affect a company's share price.

$AVG\_SHARE\_PRICE = C(1) + C(2)*MARKETCAP\_NET\_OPERATING\_REVENUE\_\_X\_ C(3)*DILUTED\_EPS\_\_PER\_SHARE\_RS\_\_ + C(4)*PIOTROSKI\_F\_SCORE + C(5)*PBIT\_MARGIN\_\_\_\_$

4. Result and Discussion

Table 2 Piotroski's F_Score

	Frequency	Percent	Valid Percent	Cumulative Percent
<1	15	30	30	30
1	1	2	2	32
3	3	6	6	38
4	10	20	20	58
5	6	12	12	70
6	11	22	22	92
7	2	4	4	96
8	2	4	4	100

Table 2 presents the status of Piotroski F_Score of all the fifty selected companies for the last 10 years (financial year March 2014 to March 2023). It indicates that 72% of companies have been found with scores either less than 1 or 4 or 6. The remaining 28% keep the other ranks

Table 3 Descriptive Statistics

	Range	Minimum	Maximum	Sum	Mean	SD (σ)	Variance
Avg Share Price	7910	23	7933	93843	1876.86	2237.931	5008336.627
Piotroski's F_Score	**8**		8	178	3.55	2.595	6.735
Diluted EPS	357	-85	272	3917	78.334	87.494	7655.285
PBIT Margin	16		16	507	10.14	4.225	17.850
Market Cap/Net Operating Revenue	3		3	65	1.30	.762	.581

Table 3 indicates the descriptive statistics. It is found that there is the highest variation in average share prices and diluted EPE of the selected companies. The remaining variables are stable in comparison to share prices.

Table 4 Correlations

		Avg Share Price	Piotroski F_Score	Diluted EPS	PBIT Margin
Piotroski's F_Score	Pearson Correlation	.265			
	Sig	.063			
Diluted EPS	Pearson Correlation	.875	.167		
	Sig.	.000	.246		
PBIT Margin	Pearson Correlation	.234	.074	.520	
	Sig.	.103	.612	.000	
Market Cap_NetOperatingRevenue	Pearson Correlation	.815	.107	.800	.450
	Sig.	.000	.460	.000	.001

Table 4 shows that all of the variables that were chosen—market capitalization to net operating revenue, diluted earnings per share, Piotroski F score, and PBIT margin—were found to be significant in the pooled model.

Table 5 shows the corrected R-square value of 0.8836, along with the large F value, was sufficient to explain the variables. The results of the cross-sectional random effect model did not change, as indicated by the updated R-square value. All of the variables in the fixed effect model were determined to be significant at the 5% level of significance, with an adjusted R-square of 92.7%. PBIT had a negative influence on share prices, although market capitalization to net operating revenue, diluted earnings per share, and Piotroski F Score indicated positive effects.

Selected factors were significant at the 5% level of significance, according to the pooled model. The estimation of a random effect model for the cross section was prompted by a significant BPLM value; however, the findings were not significantly improved. Huesman test revealed the existence of fixed effects and accordingly fixed effect model was estimated

Table 5 Results of Panel Data Regression

Variables	Average Share Price					
	Pooled		Random		Fixed	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
C	359.19	0.326	359.19	0.326	262.548	0.5528
Market net operating revenue	1049.69	0.0001	1049.69	0.0001	952.617	0.0013
Diluted EPS per Share	18.77	0	18.77	0	15.488	0
Piotroski F Score	109.71	0	109.71	0	119.286	0.0025
PBIT Margin	-168.81	0.0135	-168.81	0.0135	-124.762	0.0018
Adj R2	0.8836		0.8836		0.927	
F	94.0431		94.0431		65.116	
F Sig.	0		0		0	
D-W	1.2014		1.2014		2.0885	
BPLM	0.8558		N/A		N/A	
Hausman	N/A		0.0008		N/A	

Thus hypothesis is rejected; which means there is a significant impact of financial factors cum Piotroski F-Score on the share price of selected listed companies..

5. Conclusion

A thorough insight of the performance and financial health of Indian automobile sector organizations may be obtained by utilizing Piotroski's F-Score research to uncover their financial strength. With its nine essential financial indicators, the F-Score provides a strong framework for evaluating operational efficiency, leverage, profitability, and liquidity. Investors may differentiate between fundamentally good and weaker companies by using this research, which will help them make better investment selections.

The data shows that the F-Score works especially well at emphasizing the financial stability and room for expansion of Indian automakers. Companies with high F-Scores frequently exhibit higher financial health, indicating that they are better positioned to weather economic ups and downs and seize business opportunities. On the other hand, businesses with lower F-Scores could need further examination and might indicate greater investment risks.

All things considered, Piotroski's F-Score is a useful tool for investors trying to make their way through the shifting terrain of the Indian auto sector. The results of this investigation may have consequences for policy and regulations related to the automobile industry in India. It could guide policymakers in making informed decisions regarding industry regulations and support measures. It is significant as it combines industry relevance, a focus on key financial metrics, and potential implications for various stakeholders. It represents a valuable area of study for understanding the financial dynamics within the Indian automobile industry.

Data Availability Statement- Data that supports the findings of the study is available from the corresponding author on reasonable request.

Authors' Contributions
Author-1 focused on researched literature and conceived the study, applied statistical tools and research methodology, and wrote the first draft of the manuscript while author-2 wrote the result and discussion reviewed and edited the manuscript, and approved the final version of the manuscript.

References

[1] F. Sukesti, I. Ghozali, F. Fuad, A. K. Almasyhari, and N. Nurcahyono, "Factors Affecting the Stock Price: The Role of Firm Performance," *J. Asian Financ. Econ. Bus.*, Vol.**8**, No.**2**, **2021**, doi: 10.13106/jafeb.2021.vol8.no2.0165.

[2] N. P. Singh and A. Tandon, "The Effect of Dividend Policy on Stock Price: Evidence from the Indian Market," *Asia-Pacific J. Manag. Res. Innov.*, Vol.**15**, No.**1–2**, **2019**, doi: 10.1177/2319510x19825729.

[3] C. Kathiravan, M. Selvam, B. Maniam, and S. Venkateswar, "Relationship between crude oil price changes and airlines stock price: the case of Indian aviation industry," *Int. J. Energy Econ. Policy*, Vol.**9**, No.**5**, **2019**, doi: 10.32479/ijeep.7963.

[4] N. Velankar, A. Chandani, and A. K. Ahuja, "Impact of Eps and DPS on Stock Price: A Study of Selected Public Sector Banks of India," *Prestig. Int. J. Manag. IT - Sanchayan*, Vol.**6**, No.**1**, **2017**, doi: 10.37922/pijmit.2017.v06i01.008.

[5] J. L. Seng and H. F. Yang, "The association between stock price volatility and financial news – a sentiment analysis approach," *Kybernetes*, Vol.**46**, No.**8**, **2017**. doi: 10.1108/K-11-2016-0307.

[6] G. Tanty and P. K. Patjoshi, "A Study on Stock Market Volatility Pattern of BSE and NSE in India," *Asian J. Manag.*, Vol.**7**, No.**3**, **2016**. doi: 10.5958/2321-5763.2016.00029.9.

[7] S. A. Shah and U. Noreen, "Stock price volatility and role of dividend policy: Empirical evidence from Pakistan," *Int. J. Econ. Financ. Issues*, Vol.**6**, No.**2**, **2016.**

[8] Christiana Idowu Omotade, Etim Essien, Faith Obueni, Ukpabio Susan Ita, "How Corporate Governance Practices Shape Firm Transparency: A Deep Dive into Earnings Management in Nigeria," *International Journal of Scientific Research in Multidisciplinary Studies* , Vol.**9**, Issue.**12**, pp.**44-51, 2023.**

[9] G. Thouseef Ahamed, S. Aneel Amrutha Raju, "Corporate Governance Dynamics: Exploring Influence on Financial Performance and Market Valuation," *International Journal of Scientific Research in Multidisciplinary Studies*, Vol.**10**, Issue.**2**, pp.**8-17, 2024.**

[10] Faiz, M., & Das, D. (2024). A Study on the Factors Determining Share Price of aCompany. In International Journal of Research Publication and Reviews ,Vol.**5**, Issue.**2**, pp.**1107-1111**, **2024**.

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