

An Empirical Investigation of Equity Returns using the Fama–French Five-Factor Model

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Abstract

The equity returns of a company are affected by the market and the company's own characteristics. This study looks at how the Fama-French Five-Factor Model explains the equity returns of a specific enterprise software company in India. The Fama-French Five-Factor Model uses factors to explain equity returns, including Market Risk Premium, Size, Value, Profitability and Investment. The study uses data from reports, the stock market and financial databases to analyse the company's equity returns from 2015 to 2025. The study looks at the equity returns and the five factors every month. The researchers used methods to analyse the data, including looking at the numbers finding correlations and doing multiple regression. They also looked at how the company was doing by checking the Return on Assets Return on Equity and Earnings Per Share. The results of the study show that the Fama-French Five-Factor Model is very good at explaining the equity returns with an R-squared of 0.7592. The Market Risk Premium is very important in explaining the equity returns. The Size factor is also important. Not as much. The Value, Profitability and Investment factors are not as important in this study. They are still relevant to how stocks perform. The study found that the overall market risk is the factor that explains the equity returns. This is information for investors, people who manage portfolios, financial analysts and researchers who study how assets are priced in emerging markets like India. The Fama-French Five-Factor Model and equity returns of the company are important to these people because they help them make decisions. Equity returns and the Fama-French Five-Factor Model are tools, for understanding how the market works.

Keywords: Empirical Investigation, Fama-French Five-Factor Model, Financial Analysts, Factor Model, Equity Return.

Introduction

The rapid development of information technology has transformed the manner in which organizations conduct business, manage resources, and make strategic decisions. Digitalisation has become a strategic priority for organizations seeking operational efficiency, improved customer experience, cost reduction, and sustainable competitive advantage. Enterprise software has therefore emerged as an important component of modern business infrastructure because it integrates business functions, automates processes, supports decision-making, and improves resource allocation.

The enterprise software industry has evolved from independent systems for accounting, payroll, inventory, and human resources towards integrated cloud-based platforms. Artificial intelligence, machine learning, robotic process automation, predictive analytics, big-data analytics, Internet of Things technologies, and generative AI are increasingly shaping the sector. These developments create opportunities for growth while also exposing technology-oriented firms to rapid technological change, intense competition, cybersecurity risks, high research and development expenditure, talent constraints, and changing customer expectations.

India has developed into a major software and information-technology services market because of its skilled workforce, technological capabilities, relatively competitive operating costs, and supportive digital initiatives. The growth of cloud computing, SaaS, artificial intelligence, digital transformation, and data analytics has strengthened the strategic importance of enterprise software firms. At the same time, the market valuation of such firms can be sensitive to changing expectations about growth, profitability, investment, innovation, and broader market conditions.

In financial economics, the relationship between risk and expected return is commonly examined through asset-pricing models. The Capital Asset Pricing Model primarily considers systematic market risk, while the Fama–French three-factor model adds size and value effects. Fama and French subsequently extended the framework by incorporating profitability and investment factors, producing the Five-Factor Model. The model therefore provides a broader framework for analysing stock returns by considering market, size, value, profitability, and investment characteristics.

The present study applies this five-factor framework to the equity returns of a selected enterprise software company without identifying the company by name. The analysis is intended to determine which factors are associated with equity-return behaviour and to evaluate the overall explanatory power of the model. The study also considers firm-performance indicators such as ROA, ROE, and EPS as supporting measures for understanding how financial performance relates to investor confidence and market valuation.

Objectives

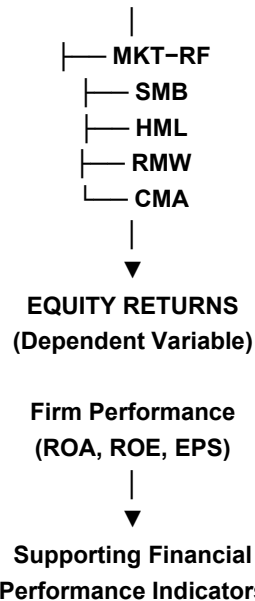
- To examine the relationship between the Fama–French Five Factors—MKT–RF, SMB, HML, RMW, and CMA—and stock returns.
- To analyse the individual impact of Market Risk Premium (MKT–RF), Size (SMB), and Value (HML) factors on stock returns.
- To assess the influence of Profitability (RMW) and Investment (CMA) factors on stock returns.
- To evaluate the explanatory power and overall effectiveness of the Fama–French Five-Factor Model in explaining stock returns.
- To assess company performance using Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) as key performance indicators.

Conceptual Framework and Review of Literature

Conceptual Framework

The idea behind the framework puts the Fama– Five Factors as things that stand on their own and equity return as what is being looked at. Company performance, shown through Return on Assets Return, on Equity and Earnings per Share is used to help explain how company performance connects with how stocks behave.

Conceptual Framework
Fama–French Five Factors



Review of Literature

Fama and French (2015): Created the Five-Factor Model by adding profitability and investment to the market, size and value factors. Their findings showed the ability to explain average stock returns and raised questions about the separate role of the value factor when profitability and investment were included.

Fama and French (2017): Expanded the five-factor model to international markets such as North America, Europe, Japan and Asia-Pacific. The results showed that the model worked well in developed markets but had results in emerging economies due to differences in market structure, accounting methods, and investor behavior.

Blitz, Hanauer, Vidojevic and van Vliet (2019): Looked at how factor premiums explained performance in countries. The profitability and investment factors helped improve portfolio performance while the impact of size and value factors changed depending on the market, showing how important local conditions are.

Sohor and Low (2024): Looked at studies about the Five-Factor Model. Found that many studies showed that the five-factor model was better than the three-factor model. However, the effects of profitability and investment were not the same in all markets, and sometimes other factors like momentum, liquidity, and quality were added.

Maulana, Komarudin and Tsuraya (2025): Did a review of studies and said that the Five-Factor Model usually worked better in developed markets. However, the results for emerging markets were not clear especially when it came to profitability and investment factors.

Research Methodology

This study is looking at how financial and factor variables behave. It uses analysis to understand this behavior and analytical techniques to see how the Fama–French factors are related to equity returns. The study only uses data and looks at what happened in the past with financial and market information.

Study period: The study looks at what happened with finances from 2015-16 to 2024-25. It uses observations of factors to analyze the data. There are 119 observations in the regression analysis that is reported.

Data sources: The study gets its data from reports and market information from the National Stock Exchange and Bombay Stock Exchange. It also uses databases, like Moneycontrol and Yahoo Finance which were mentioned in the project report.

Variables and Measurement

Variable	Role	Measurement / Meaning
MKT-RF	Independent	Market return minus the risk-free rate.
SMB	Independent	Small-cap return minus large-cap return; represents the size premium.
HML	Independent	High book-to-market return minus low book-to-market return; represents the value premium.
RMW	Independent	Robust-profitability return minus weak-profitability return.
CMA	Independent	Conservative-investment return minus aggressive-investment return.
Equity Return	Dependent	Periodic stock return, incorporating price change and dividend where applicable.
ROA	Supporting variable	Return on Assets used to indicate asset-based profitability.
ROE	Supporting variable	Return on Equity used to indicate return generated on shareholders' funds.
EPS	Supporting variable	Earnings Per Share used to indicate earnings attributable to each share.

The multiple regression model used in the study is:

$$R_p - R_f = \alpha + \beta_1(\text{MKT-RF}) + \beta_2\text{SMB} + \beta_3\text{HML} + \beta_4\text{RMW} + \beta_5\text{CMA} + \varepsilon$$

where R_p is the portfolio or equity return R_f is the risk-free rate α is the intercept, β_1 to β_5 are the factor coefficients and ε is the error term. Least Squares regression was used to estimate the factor loadings and assess statistical significance. Correlation analysis and descriptive interpretation were also used.

The study framed hypotheses for each of the five factors and for the supporting role of firm performance. The empirical discussion below focuses on the regression results in the project report; a separate mediation output, for ROA, ROE, and EPS, was not reported in the extracted analysis.

Analysis and Discussion

The study looks at how the five Fama-factors behave each month and how they connect to stock returns. The regression model that is shown tests how much the market factor, size factor, value factor, profitability factor and investment factor help explain the returns.

Regression Model Results

Variable	Estimate (β)	Std. Error	t-value	p-value	Interpretation
Intercept	0.88214	0.44626	1.977	0.0505	Marginally significant
MKT-RF	0.95540	0.06751	14.152	<0.001	Highly significant positive effect
SMB	0.46286	0.23402	1.978	0.0504	Marginally significant positive effect
HML	-0.04025	0.14124	-0.285	0.7762	Not significant
RMW	-0.69069	0.68067	-1.015	0.3124	Not significant
CMA	-0.48812	1.40106	-0.348	0.7282	Not significant

The regression produces an R-squared of 0.7592 and an adjusted R-squared of 0.7486. Thus, approximately 75.92 percent of the variation in equity excess returns is explained by the five factors included in the model. The F-statistic is 71.27 with a p-value below 2.2×10^{-16} , indicating that the model is statistically significant.

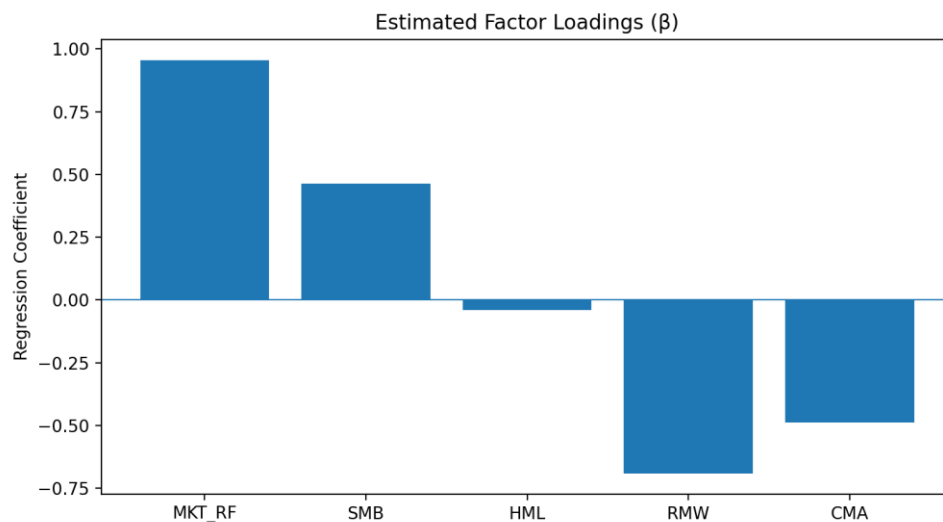


Figure 1: Estimated Factor Loadings

Model Explanatory Power

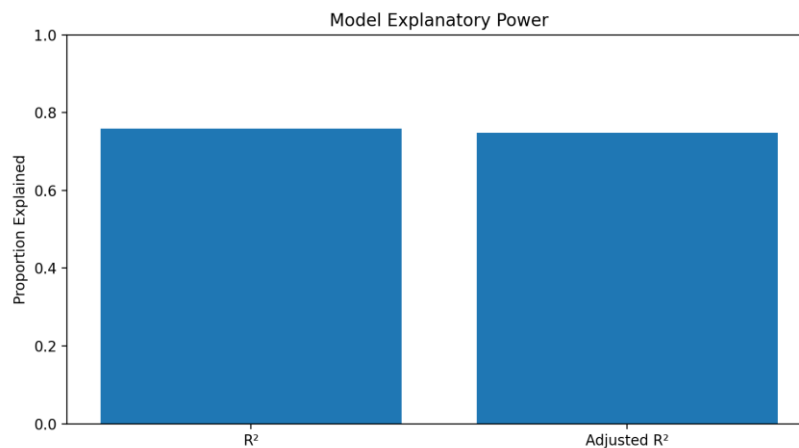


Figure 2: R-squared and adjusted R-squared

The R-squared value is 0.7592 which's pretty good. It means the factors we are looking at can explain a lot of what's going on. The difference between the R-squared and the adjusted R-squared is not that big it is 0.7592 versus 0.7486. This tells us that the factors are still doing a job of explaining things even when we take into account how many factors we are using. This result says that the five-factor framework is useful for this sample of data. However the five-factor framework does not explain everything, the five-factor framework only explains, about three-quarters of what's happening with the returns and about one-quarter of the return variation is not explained by the five-factor framework.

Actual and Fitted Returns

The plot that shows values versus fitted values gives a visual way to check how well the model is working. The fitted values mostly go in the direction as the real data but there are still differences for certain times. The summary of the residuals in the report goes from -9.004 to 6.105. The median residual is 0.169. This means the model catches a lot of the changes, in returns but doesn't remove the differences that happen during periods.

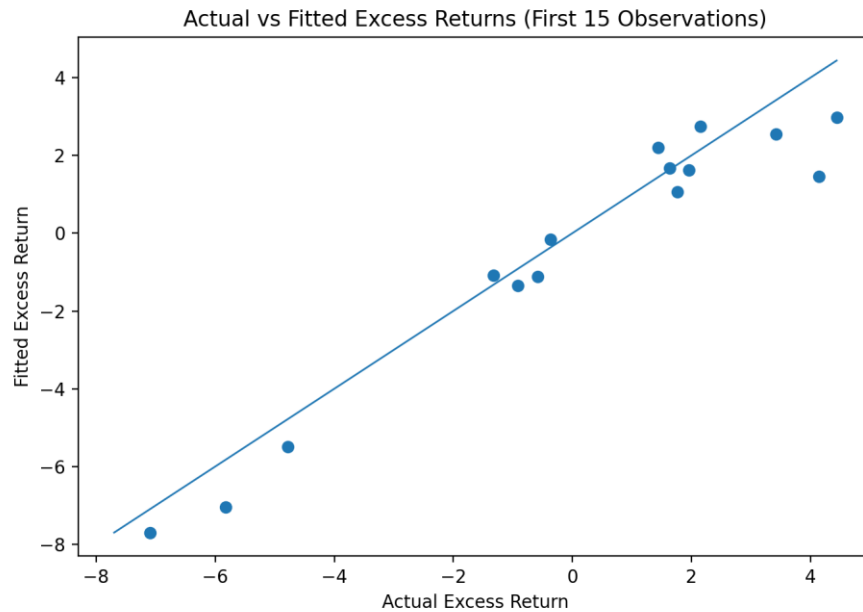


Figure 3: Actual versus fitted excess returns for the first 15 observations

Market Risk Premium

The Market Risk Premium is the strongest factor in the reported regression. Its coefficient is 0.95540 with a t-value of 14.152 and a p-value below 0.001. The positive coefficient indicates that higher market excess returns are associated with higher equity excess returns. This result shows that the selected enterprise software stock is strongly exposed to movements in the broader market. The finding is consistent with the central proposition of systematic risk: even firms with distinctive business characteristics remain influenced by general market conditions and investor sentiment.

Size Factor

The SMB coefficient is positive at 0.46286 and is marginally significant at the 10 percent level, with a p-value of 0.0504. The result indicates that size-related return differences have some explanatory relevance during the study period. Although the evidence is weaker than that for the market factor, the positive loading suggests that changes in investor preference between smaller and larger firms may have influenced the stock's return behavior.

Value Factor

The HML coefficient is 0.04025, and it does not have statistical significance with a p-value of 0.7762. This means that the value premium, as shown by book-to-market returns compared to low book-to-market returns does not offer a reliable explanation for the equity returns that were chosen in the model that was presented. The finding matches what other studies have found, which is that the value factor on its own can have effects in different markets and might be weaker when other factors, like profitability and investment, are also considered.

Profitability Factor

The RMW coefficient is -0.69069 with a p-value of 0.3124. This means the RMW coefficient does not really tell us anything about the relationship in the reported regression. The RMW coefficient is negative which suggests that the RMW coefficient has an effect during the sample period. However the RMW coefficient is not statistically significant. This means we should not think that the RMW coefficient is evidence of an effect on profitability.

The result of the RMW coefficient also shows us that we should look at profitability premiums in the context of the market and the institutions. We should not assume that the RMW coefficient and profitability premiums always have the effect. The RMW coefficient and profitability premiums can be different, in situations.

Investment Factor

The CMA coefficient is. It does not really mean anything because the p-value is 0.7282. This result tells us that the way people invest either being careful or taking risks does not really explain why equity returns are varying much in the study we are looking at.. Investment policy is still important because the project report says that putting money into technology and research and development and things like cloud computing and digital transformation is crucial, for doing well in the long run. The CMA coefficient and investment policy are what we are talking about here and even though the CMA coefficient is not significant investment policy is still key.

Firm Performance and Equity Returns

The project report uses ROA, ROE, and EPS as indicators of firm performance. The study's interpretation indicates that stronger financial performance can improve investor confidence, market valuation, and shareholder wealth. However, the extracted statistical analysis does not provide a separate mediation regression for these three indicators. Therefore, the present article treats firm performance as a supporting interpretive variable rather than claiming a statistically confirmed mediation effect.

Findings and Suggestions

Major Findings

- The Fama– Five-Factor Model explains a large part of the changes in equity returns with R squared equal to 0.7592 and adjusted R squared equal to 0.7486.
- Market Risk Premium is the most important and the most significant factor in the results of the regression with a positive number of 0.95540.
- The Size factor has a number of 0.46286 and is slightly significant at the 10 percent level.
- The Value factor is negative but not significant, which shows that it does not explain much on its own during the time of the study.
- The Profitability factor is also negative but not significant; therefore there is no effect of profitability that the regression shows.
- The Investment factor is not significant either which means that it does not explain much on its own in the model that is presented.
- The entire regression is significant as shown by an F statistic of 71.27 and a p-value than 2.2 times 10 to the power of minus 16.
- The report that's behind the project says that financial performance, innovation, cloud adoption, artificial intelligence and research and development are important, for long-term business competitiveness.

Suggestions

- Investors need to keep an eye on what's happening in the market and think about the big picture because the market has a big effect on the results.
- People who manage portfolios can use the Five-Factor Model to help them understand risk of just looking at how the market is doing.
- When investors are trying to figure out if a company's a good investment they should look at things like how well the company is doing how much money it is making and how much profit it has in addition to other factors.
- The people in charge of companies should keep working on making their companies more profitable using their money wisely innovating and making investment decisions because these things can affect how well the company does in the long run even if they do not seem important right now.
- Researchers should study Indian companies that make software and technology to get a better understanding of what is going on.
- Future studies should also think about things that can affect companies, such as how well they are doing recently how easy it is to buy and sell their stock what is happening in the economy interest rates, exchange rates and what is happening in the global market.
- Future research should use data and test its findings in different scenarios to see if the relationships between factors stay the same in different market conditions, such, as the Five-Factor Model and other investment factors.

Conclusion

This study looked at how money people make from stocks using the Fama–French Five-Factor Model. It focused on one company that makes software in India. The model included five things: the money people get for taking risks how big the company is, how much value it has, how profitable it is and how much it invests. The study used data from the years 2015–16 up to 2024–25.

The results showed that the five-factor model explains a lot of the differences in how money people make from stocks. It explains about 75.92 percent of the changes. The first factor, the Market Risk Premium was the important. It had an clear effect. The Size factor was a little important. The other three factors—Value, Profitability and Investment—did not have an effect on their own.

The study shows that the way the market works has an effect on how well a companys stock does, especially in a place where the economy is still growing. It also shows that the Fama–French factors do not always work the way in every place or for every company. Things like Return on Assets Return on Equity and Earnings Per Share are still useful for understanding how investors feel and how strong a company is.. The study did not find any strong proof that these things directly affect the results.

Overall the study says that the Fama– Five-Factor Model is a good way to look at how much money people make from stocks. It works best when used with information about the company itself. Investors and people who manage money can use the model to see what risks they are taking. Managers and people who study money can use the results to plan and check how well a company is doing. The study has some limits, like looking at one company and using old data. Future studies can do better by looking at companies using more time adding more factors and using better ways to study the numbers.

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