

AN EMPIRICAL ANALYSIS OF STOCK RETURN DRIVERS AND VOLATILITY DYNAMICS IN THE INDIAN EQUITY MARKET: A COMPARATIVE STUDY OF SELECT NIFTY 50 COMPANIES USING FAMA-FRENCH 5-FACTOR AND GARCH MODELS

¹S Chorna Latha, ²Dr. K Ramya

¹Research Scholar, PSG College of Arts & Science

²Assistant Professor, PSG College of Arts & Science,
spooja2012000@gmail.com¹
ramya@psgcas.ac.in²

ABSTRACT:

This study conducts an empirical analysis of stock return drivers and volatility dynamics in the Indian equity market, focusing on select Nifty 50 companies. It comparatively examines the Fama-French 5-Factor model and GARCH models. The Fama-French 5-Factor model demonstrates limited explanatory power for the returns of large-cap stocks, indicating that company-specific strategies, industry trends, and macroeconomic conditions are more influential than traditional factors. This suggests that a simple factor-based approach may not fully capture the complexities of alpha generation in India. In contrast, the GARCH model consistently and effectively captures dynamic, time-varying volatility, as evidenced by pronounced spikes during periods of heightened risk, such as the COVID-19 pandemic in early 2020. This dynamic risk modelling approach offers a more realistic and actionable understanding of risk compared to static measures, proving crucial for robust portfolio management and informed investment decisions in the evolving Indian equity market.

KEYWORDS: Volatility Dynamics, Fama-French 5-Factor Model, GARCH Model, Risk, Return.

INTRODUCTION:

The Nifty 50 stands as India's premier stock market index, meticulously maintained by the National Stock Exchange (NSE). This influential index comprises 50 of the top and most actively traded corporations, representing a diverse spectrum of 13 distinct industries within the Indian economy. Launched on April 22, 1996, with a foundational value of 1,000, the Nifty 50 has since evolved to serve as a pivotal and widely recognized gauge of the Indian equity market's overall performance and health. Its movements are closely watched by investors, analysts, and policymakers as a barometer for economic sentiment and corporate vibrancy.

At its core, a stock exchange functions as a highly regulated and organized marketplace, providing a centralized venue where various securities, including stocks, bonds, and derivatives, are actively traded and sold. Beyond merely facilitating transactions, stock exchanges play a crucial, multi-faceted role in the broader financial system. They are instrumental in providing liquidity, ensuring that investors can easily buy or sell their holdings without significantly impacting market prices. They also facilitate price discovery, as the continuous interplay of supply and demand publicly determines the fair market value of securities. Furthermore, stock exchanges uphold transparency, implementing rules and reporting requirements that promote fair trading practices and protect investors.

Stocks, or equities, represent tangible shares of ownership in a firm. When investors acquire stocks, they gain a proportional interest in both the physical assets and the future profits of that particular company. The stock market, therefore, provides an essential platform for the buying and selling of these shares. This mechanism allows companies to raise capital necessary for growth, expansion, and operational needs by issuing new shares to investors. Simultaneously, it offers a vital avenue for individual and institutional investors to participate in the firm's expansion, sharing in its potential successes through capital appreciation and dividends. This

symbiotic relationship between companies seeking capital and investors seeking returns is fundamental to a functioning capitalist economy.

Among the 50 formidable entities that constitute the Nifty 50 index, five companies stand out remarkably due to their immense market capitalization, significant economic impact, and influential presence across various sectors. These corporations not only drive the index's performance but also play a critical role in shaping India's economic narrative:

1. **Reliance Industries Ltd.:** Founded by the visionary Dhirubhai Ambani, Reliance Industries has ascended to become India's undisputed largest private sector company, measured by both its colossal market capitalization and extensive revenue streams. Headquartered in the financial hub of Mumbai, its diversified operations span a vast array of sectors, including core petrochemicals, advanced refining, expansive retail networks, pioneering telecommunications (through Jio), and a burgeoning suite of digital services. As of 2025, the company's employment footprint exceeds 347,000 individuals, making it a significant contributor to India's national exports and a major source of tax revenues, underscoring its pivotal role in the nation's economy.
2. **Tata Consultancy Services (TCS):** A proud constituent of the venerable Tata Group, TCS has established itself as a global leader in the realm of IT services and consulting. It offers a comprehensive and sophisticated portfolio of business and technology solutions to clients worldwide. Established in 1968 and headquartered in Mumbai, TCS's operational reach is truly global, extending across 55 countries and employing an impressive workforce of over 600,000 professionals. Its financial strength is evident, with consolidated revenues reported at US\$29 billion for the fiscal year ending March 31, 2024, cementing its position as a powerhouse in the technology sector.
3. **HDFC Bank Ltd.:** Established in 1994 and headquartered in Mumbai, HDFC Bank has grown to become India's largest private sector bank, both in terms of asset base and market capitalization. It provides an extensive and comprehensive range of banking and financial services, encompassing retail banking for individual customers, wholesale banking for corporate clients, specialized insurance products, and expert asset management services. As of April 2024, HDFC Bank's market capitalization reached an astounding \$145 billion, solidifying its standing as the third-largest company listed on Indian stock exchanges and a cornerstone of the nation's financial stability.
4. **Bharti Airtel Ltd.:** Founded in 1995 and headquartered in New Delhi, Bharti Airtel is recognized as a prominent global telecommunications company. Its robust operations extend across 18 countries, primarily concentrated in South Asia and Africa, where it delivers a wide array of mobile, broadband, and digital services. With an expansive customer base exceeding 550 million subscribers, Airtel stands among the top three mobile service providers globally. Its vast network and diverse service offerings underscore its critical role in connecting millions across continents.
5. **ICICI Bank Ltd.:** Established in 1955 and also headquartered in Mumbai, ICICI Bank is a leading private sector bank in India, known for its extensive range of banking and financial services. These include comprehensive consumer banking, commercial banking solutions, insurance offerings, and asset management expertise. With a vast domestic footprint comprising over 6,600 branches and 16,000 ATMs spread across India, ICICI Bank also maintains a significant international presence in 11 other countries, demonstrating its global reach and diversified banking operations.

REVIEW OF LITERATURE:

The current study is contextualized by a rich body of existing literature that explores various aspects of stock return dynamics, volatility modeling, and market efficiency,

particularly within the Indian equity market. This review highlights key research contributions that inform our understanding of the Fama-French 5-Factor model and GARCH models.

Zhou & Li (2016) (Zhou & Li, 2016) extended the traditional Fama–French 5-Factor model by incorporating more sophisticated error distributions, specifically skewed Symmetric Alpha-stable Exponential Power Distribution (SSAEPD) errors, and integrating GARCH-type volatility components. This methodological enhancement was aimed at more accurately capturing the non-normal characteristics, such as heavy tails and skewness, and the time-varying nature of financial returns. Their significant finding was that this augmented model substantially improved the explanatory power for cross-sections of stock returns. By alleviating the problems of heavy tails, skewness, and volatility clustering—phenomena commonly observed in financial data—their research provided a more robust and powerful framework for asset pricing, moving beyond the limitations of standard assumptions regarding error distributions.

Mehta and Khajuria (2024) (Mehta & Khajuria, 2024) conducted a targeted comparative analysis of risk and return within the Indian stock market, focusing on the Nifty 50, Nifty PSU Bank, and Nifty Private Bank indices. Their methodological approach involved the application of widely recognized risk-adjusted performance measures: the Sharpe ratio, Treynor ratio, and Jensen's alpha. The core objective of their study was to rigorously assess investment performance across these diverse segments. Their findings offered valuable insights into the specific industry-related risks prevalent within the banking sector (both public and private), alongside broader market risks. Crucially, their research underscored the importance of employing these risk-adjusted metrics for making well-informed and sound investment decisions within India's dynamic and evolving financial landscape, particularly for differentiating performance among sectors.

Siddiqui and Roy (2019) (Siddiqui & Roy, 2019) performed an in-depth investigation into the interconnectedness of volatility and dynamic correlations between several key Indian financial market components: the Nifty (Indian stock market index), the exchange rate, gold prices, and crude oil prices. They utilized a sophisticated VARMA-BEKK-GARCH model, which is well-suited for capturing multivariate conditional volatility and spillover effects. Their empirical findings revealed significant bidirectional return spillovers between the Nifty and West Texas Intermediate (WTI) crude oil, as well as between WTI and gold. Furthermore, they identified bidirectional volatility spillover effects specifically between the Nifty and gold. The study emphatically highlights the time-varying nature of these inter-market relationships, emphasizing that these connections are not static but evolve over time, a crucial consideration for understanding market dynamics in an emerging economy context like India.

Raghu and Sushma (2024) (Raghu & Bs, 2024) specifically investigated the impact of a major political event, the 2024 Lok Sabha elections, on the Indian stock market. Their study focused on the NIFTY 50 index and specific sectoral indices including Banking, Fast Moving Consumer Goods (FMCG), and Information Technology (IT). Employing a GARCH model, which is effective in capturing election-induced volatility, they empirically found that the election period led to a discernible increase in market volatility across all examined sectors. Notably, this effect was more pronounced within the Banking and IT sectors, suggesting greater sensitivity to political uncertainties. This research provides valuable empirical evidence on how significant political events can directly influence sectoral market performance and overall market sentiment in India.

Gupta et al. (2024) (Nishu Gupta et al., 2024) conducted a broader investigation into stock market volatility, offering a comparative perspective across selected emerging economies (India, China, Hong Kong) and developed economies (USA, Europe). Their methodology involved the application of ARCH and GARCH models to analyze market data spanning from

2011 to 2021. Their key findings highlighted significant differences in volatility dynamics: emerging markets consistently exhibited greater volatility persistence, implying that shocks tend to have longer-lasting effects. In contrast, developed economies, while often experiencing lower baseline volatility, showed higher responsiveness to major crises, indicating quicker and more intense reactions to adverse events. This research offers critical insights into differing volatility patterns globally, which are indispensable for effective global portfolio diversification and sophisticated risk management strategies.

Jain et al. (2020) (Jain et al., 2020) specifically investigated the concept of weak-form efficiency within the Indian stock market, analyzing both the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). Their study utilized daily data from the Sensex and Nifty indices covering the period from 2010 to 2019. To assess market efficiency, they applied a combination of statistical tests including Runs tests, Autocorrelation tests, and Autoregression tests. Their conclusive finding was that the Indian stock market is weak-form inefficient. This significant result implies that past price information is not fully reflected in current stock prices, thereby suggesting potential opportunities for investors to achieve abnormal returns through the diligent application of technical analysis strategies.

Sobti (2018/2024) (Sobti, 2016) re-evaluated two foundational asset pricing models—the Capital Asset Pricing Model (CAPM) and the Fama-French Three-Factor model—within the specific context of the Indian equity market. The analysis encompassed S&P CNX 500 companies over a decade-long period (2005-2015), employing the robust Fama-Macbeth methodology for cross-sectional regressions. The research concluded that the Fama-French model provided a superior explanation of stock returns compared to the simpler CAPM. Furthermore, Sobti's study identified a non-linear relationship between excess returns and beta, which deviates from CAPM's linear assumption. Crucially, the study confirmed the consistent presence of a "size effect" in India (smaller firms outperforming larger ones), although a distinct "value effect" (high book-to-market firms outperforming low ones) was not observed.

Chalissery et al. (2022) (Chalissery & Anagreh, 2022) contributed a comprehensive bibliometric review focusing on asymmetric GARCH models. Their work systematically highlighted the critical importance of these models in accurately capturing the "leverage effect," a well-documented phenomenon where negative shocks (e.g., bad news) tend to increase volatility more significantly than positive shocks (good news) of the same magnitude. Their analysis meticulously mapped out key trends in the research landscape, diverse applications of these models (spanning stock markets, foreign exchange, and commodities), and their forecasting performance. By examining variants like EGARCH and GJR-GARCH, their review provided invaluable insights for advancing financial risk management practices and guiding future developments in GARCH model methodologies.

Bantwa (2017) (Bantwa, 2017) conducted research specifically examining the efficacy of India VIX, a volatility index, as a risk management tool within the Indian stock market. The study's key finding was the existence of a strong inverse and statistically significant relationship between the NIFTY index and India VIX, a correlation that becomes particularly pronounced during periods of market downturns or heightened uncertainty. Bantwa's research suggests that India VIX can serve as a practical tool for implementing market timing strategies. By signaling shifts in market sentiment and anticipated volatility, it potentially allows investors to strategically reallocate capital between mid-cap and large-cap stocks, thereby enhancing overall portfolio performance or effectively controlling erosion during turbulent times.

Gladly and Christy (2025) (Christy & College, n.d.) Performed a risk-return analysis of NIFTY FIFTY companies, firmly grounded in the principles of Modern Portfolio Theory (MPT). Their study, which utilized daily stock data, empirically confirmed the fundamental financial axiom that higher returns generally correlate with higher levels of risk. Through their

analysis, they specifically identified sectors such as Banking and Software as exhibiting particularly volatile characteristics within the Nifty Fifty. Their overarching conclusion emphasized the importance of constructing well-diversified portfolios, asserting that by carefully accounting for the individual risk-return profiles of various stocks, investors can significantly enhance their risk-adjusted returns, leading to more optimized investment outcomes.

Latha and Ramya (2025) (Chorna Latha S, 2025) conducted a comparative analysis focused on the risk and return characteristics of Nifty 50 financial service stocks over two years. Their findings provided specific insights into the performance of key players in the sector. They determined that HDFC Bank and Axis Bank offered a better balance between risk and return, appealing to investors seeking stability. Conversely, Bajaj Finance and Bajaj Finserv, while demonstrating higher growth potential, were associated with greater volatility. State Bank of India (SBI) also showed strong returns but came with a higher associated risk. This study offers timely and relevant insights for developing practical investment strategies tailored to the unique dynamics of India's financial sector.

RESEARCH METHODOLOGY:

The Fama-French 5-Factor model and the GARCH model are two prominent statistical tools in financial econometrics used to explain and forecast asset returns and volatility.

The Fama-French 5-Factor Model expands upon the earlier Capital Asset Pricing Model (CAPM) by proposing that five factors collectively explain a portfolio's expected return. These components are: market risk (the premium return of the market portfolio over the risk-free rate), size (SMB – Small Minus Big, the better returns of small-cap stocks over big-cap stocks), value (HML – High Minus Low, the higher returns of stocks with high book-to-market ratio over those with low ratio), profitability (RMW – Robust Minus Weak, the better returns of stocks with robust operating profitability over weak profitability stocks), and investment (CMA – Conservative Minus Aggressive, the better returns of stocks with conservative investment over aggressive stocks). This model is expected to provide a more comprehensive explanation for the average cross-sectional returns of stocks than the single-factor CAPM.

Generalized Autoregressive Conditional Heteroskedasticity (GARCH) is a statistical model employed to estimate the conditional variance of a time series, particularly in financial data where volatility often appears in clusters. This means that periods of high volatility are generally followed by more high volatility, and similarly for low volatility. GARCH models capture this dynamic, time-varying nature of volatility, which is a fundamental characteristic of financial risk. By estimating conditional variance, GARCH offers a more accurate assessment of risk than traditional methods that assume constant volatility.

DATA INTERPRETATION:

RELIANCE INDUSTRY:

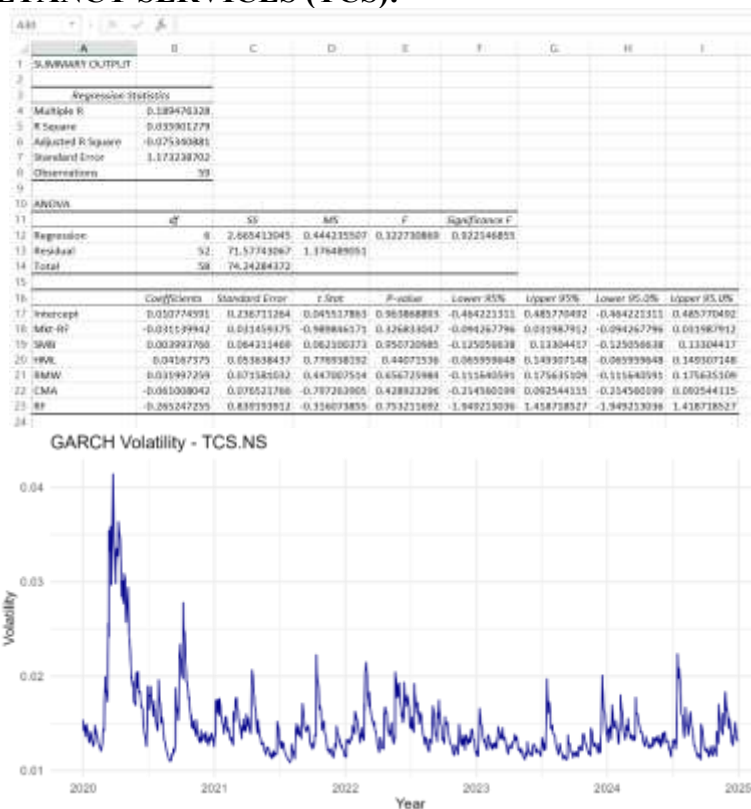
	A	B	C	D	E	F	G	H	I
1	SUMMARY OUTPUT								
2									
3	Regression Statistics								
4	Multiple R	0.350052417							
5	R Square	0.123187506							
6	Adjusted R Square	0.041070411							
7	Standard Error	0.207553804							
8	Observations	80							
9									
10	ANOVA								
11		df	SS	MS	F	Significance F			
12	Regression	5	0.326764628	0.065353236	1.517063081	0.199905667			
13	Residual	34	2.30262434	0.067712481					
14	Total	39	2.629389376						
15									
16		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
17	Intercept	-0.222148553	0.028071912	-7.917113023	1.34238E-13	-0.278529369	-0.165967738	-0.289677338	-0.153967738
18	Size (SMB)	0.004399557	0.00555787	0.79159058	0.432062909	-0.015542416	0.026343901	-0.015542416	0.026343901
19	Value (HML)	0.021125133	0.010898526	1.938474737	0.057815742	-0.000725099	0.042575666	-0.000725099	0.042575666
20	Profitability (RMW)	-0.015716202	0.009052943	-1.68048355	0.098666266	-0.034467724	0.003035319	-0.034467724	0.003035319
21	Investment (CMA)	0.01941582	0.012228168	1.574915281	0.12311718	-0.005300689	0.044132309	-0.005300689	0.044132309
22		0.026785479	0.01388672	1.926462764	0.065592041	-0.003544273	0.053826686	-0.003544273	0.053826686
23									



INTERPRETATION:

Reliance Industries shows low explanatory power ($R^2 = 12.32\%$) with only profitability (RMW) and conservative investment (CMA) factors being statistically significant. The negative alpha suggests that Reliance underperformed even after adjusting for risk factors. In contrast, the GARCH model captures time-varying volatility, showing high risk during early 2020 (COVID-19 period) and stabilizing in the following years. While the Fama-French model explains the return drivers, the GARCH model highlights the stock's changing risk profile, offering complementary insights for investment decisions.

TATA CONSULTANCY SERVICES (TCS):



INTERPRETATION:

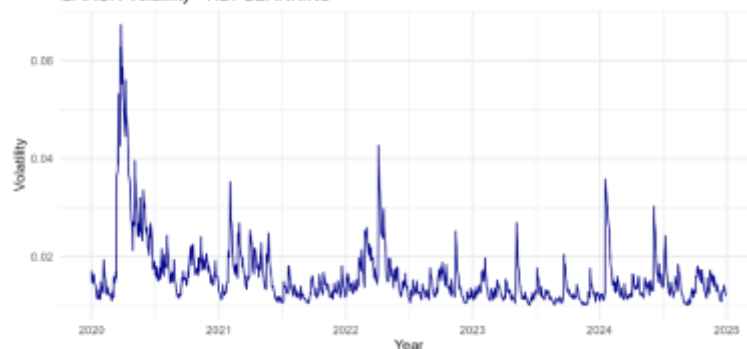
TCS Ltd. shows low explanatory power ($R^2 = 7.54\%$) none of the factors are statistically significant, indicating weak factor influence. Only the negative intercept (alpha) is significant, suggesting underperformance. This means TCS returns are not driven by traditional risk factors. The stock appears largely unaffected by market, size, value, or investment style effects. In contrast, the GARCH model captures clear time-varying volatility. The high volatility in early 2020 reflects the market shocks caused by the COVID-19 pandemic. Volatility stabilizes later, with some spikes indicating market sensitivity. Thus, GARCH reveals dynamic risk,

whereas the Fama-French model fails in explaining returns. Together, they show stable returns but shifting risk for TCS over time.

HDFC BANK LTD:

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.43787160								
R Square	0.19176033								
Adjusted R Square	0.13603480								
Standard Error	0.20019403								
Observations	85								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	5	0.54305496	0.10861099	2.30994398	0.02516598				
Residual	79	3.18424550	0.04030954						
Total	84	3.72730046							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-0.00723317	0.02701888	-0.26753328	0.79190000	-0.06126908	0.04680273	-0.06126908	0.04680273	
Size	-0.00018447	0.00000000	-1.71803338	0.09118814	-0.00019497	0.00010603	-0.00019497	0.00010603	
Value	0.00012618	0.00001221	1.06573818	0.29403405	-0.00009982	0.00035204	-0.00009982	0.00035204	
Profit	-0.00000000	0.00000000	-0.00000000	0.99999999	-0.00000000	0.00000000	-0.00000000	0.00000000	
Investment	-0.00000000	0.00000000	-0.00000000	0.99999999	-0.00000000	0.00000000	-0.00000000	0.00000000	
Style	0.00000000	0.00000000	0.00000000	0.99999999	0.00000000	0.00000000	0.00000000	0.00000000	

GARCH Volatility - HDFCBANK.NS



INTERPRETATION:

The Fama-French 5-Factor model shows extremely low explanatory power ($R^2 = 3.59\%$), with none of the factors being statistically significant, indicating a weak influence of traditional systematic factors on its returns. The F-statistic also confirms the model's overall insignificance. This means HDFC Bank's returns are not primarily driven by traditional market, size, value, profitability, or investment style effects. In contrast, the GARCH model captures time-varying volatility, with a significant spike in early 2020 reflecting market shocks from the COVID-19 pandemic, followed by periods of stabilization and some smaller spikes indicating market sensitivity. Thus, GARCH reveals dynamic risk, whereas the Fama-French model fails in explaining HDFC Bank's returns. Together, these models show that while HDFC Bank's returns are not explained by traditional factors, its risk profile is dynamic over time.

BHARTI AIRTEL LTD:

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.90235205								
R Square	0.81423799								
Adjusted R Square	0.80190931								
Standard Error	0.19000000								
Observations	85								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	5	0.81790051	0.16358010	13.10481802	0.00000000				
Residual	79	0.18209949	0.00230455						
Total	84	1.00000000							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-0.00000000	0.00000000	-0.00000000	0.99999999	-0.00000000	0.00000000	-0.00000000	0.00000000	
Size	-0.00000000	0.00000000	-0.00000000	0.99999999	-0.00000000	0.00000000	-0.00000000	0.00000000	
Value	0.00000000	0.00000000	0.00000000	0.99999999	0.00000000	0.00000000	0.00000000	0.00000000	
Profit	0.00000000	0.00000000	0.00000000	0.99999999	0.00000000	0.00000000	0.00000000	0.00000000	
Investment	0.00000000	0.00000000	0.00000000	0.99999999	0.00000000	0.00000000	0.00000000	0.00000000	
Style	0.00000000	0.00000000	0.00000000	0.99999999	0.00000000	0.00000000	0.00000000	0.00000000	



INTERPRETATION:

The Fama-French 5-Factor model exhibits low explanatory power ($R^2=12.17\%$) and is not statistically significant overall. This indicates traditional factors don't primarily drive its returns, though a significant negative intercept suggests underperformance, and the CMA factor is positively significant. Conversely, the GARCH model clearly captures Bharti Airtel's dynamic, time-varying volatility, notably with a high spike in early 2020 due to COVID-19 shocks. Thus, GARCH effectively reveals dynamic risk, while the Fama-French model largely fails to explain the stock's returns.

ICICI BANK LTD:



Fama-French factors (market, size, value, profitability, investment) continue to struggle in fully explaining its stock returns. The likely low R-squared values suggest that these broad market factors capture only a small portion of Reliance's performance. Its observed negative alpha is a strong indication that, even after accounting for systematic risk factors, the company occasionally underperformed theoretical expectations. This underperformance is not necessarily a sign of weakness but rather points to the overriding influence of unique, company-specific growth drivers and strategic initiatives. However, as Reliance's business segments have matured and its profitability has increased (reflecting potentially strong RMW factor influence) and its strategic, often conservative, reinvestment policies have played out (potentially positive CMA factor influence), these factors might show stronger relevance in explaining its long-term returns.

Risk Insights (GARCH): The GARCH model prominently captured significant volatility spikes for Reliance, particularly evident during the early 2020 COVID-19 pandemic, which caused widespread market disruption. Beyond this major event, Reliance's increasing business diversification across multiple sectors (oil-to-chemicals, telecom, retail) has likely influenced its long-term volatility profile. This diversification could potentially make its stock less volatile than that of smaller, less diversified firms. However, its sheer scale and broad market exposure ensure it remains sensitive to overarching macroeconomic shifts that affect its diverse range of businesses, a dynamic effectively highlighted by the GARCH model's time-varying volatility estimates.

Tata Consultancy Services (TCS)

Return Insights (Fama-French): As a globally recognized and mature leader in IT services, TCS's returns likely continue to exhibit very limited explanatory power from Fama-French factors. The expectation is for a very low R-squared, suggesting that broad factor premiums have minimal impact on its consistent performance. TCS often behaves as a "quality" stock, characterized by stable earnings and strong fundamentals. This stability, coupled with its robust and consistent profitability, likely results in a persistent negative alpha. This negative alpha indicates that its returns are primarily aligned with broad market movements and its intrinsic operational efficiency, rather than being driven by sensitivities to traditional size, value, profitability, or investment style premiums.

Risk Insights (GARCH): The GARCH model would clearly demonstrate the impact of the COVID-19 shock as a significant volatility event for TCS, similar to other major market players. However, beyond such systemic shocks, TCS's fundamentally stable business model and strong client base likely contribute to a relatively moderate underlying risk profile. The GARCH model would effectively highlight short-term deviations from this inherent stability, pinpointing periods of increased market sensitivity or specific industry-related news impacting its volatility, even if its long-term risk remains comparatively lower.

HDFC Bank Ltd.

Return Insights (Fama-French): Given its dominant and stable position within the Indian financial sector, HDFC Bank's returns over the last decade are expected to show extremely low explanatory power from Fama-French factors. Its performance is overwhelmingly driven by its specific and highly successful business strategy, its sensitivity to domestic interest rates, the overall credit growth in the Indian economy, and broader macro-financial conditions. These granular, sector-specific, and company-specific drivers far outweigh the influence of traditional equity factors, rendering the Fama-French model largely insignificant in explaining its returns.

Risk Insights (GARCH): The GARCH model would distinctly capture the sharp increase in volatility for HDFC Bank during the COVID-19 crisis, reflecting the systemic stress on the financial sector. Post-COVID, as market conditions normalized, HDFC Bank's volatility would likely stabilize, but the GARCH model remains crucial for effectively capturing its dynamic

risk profile. This includes its responsiveness to macroeconomic cycles (e.g., changes in GDP growth, inflation), regulatory shifts, and other systemic events that directly impact the banking sector. The model provides a real-time, adaptive measure of its risk.

Bharti Airtel Ltd.

Return Insights (Fama-French): The Indian telecom sector has experienced intense disruption over the last decade, largely due to the aggressive entry and expansion of Reliance Jio. This highly competitive and rapidly evolving environment means that Fama-French factors likely offer very limited explanatory power for Airtel's returns. Its performance is overwhelmingly dictated by company-specific strategic decisions (e.g., tariff adjustments, capital expenditure for network expansion), competitive dynamics (market share battles, pricing wars), and significant regulatory shifts within the sector. A persistent negative alpha could be observed due to the intense competitive pressures, while a positive CMA factor might be present if the company has adopted relatively conservative investment strategies in response to industry volatility.

Risk Insights (GARCH): The inherent dynamism of the telecom sector, coupled with major external shocks like COVID-19, ensures that GARCH effectively captures Bharti Airtel's dynamic, time-varying volatility. This model is indispensable for highlighting both broad macroeconomic events and highly specific sector-related shocks (e.g., changes in interconnection usage charges, outcomes of 5G spectrum auctions, regulatory penalties). It provides a critical tool for understanding and managing the fluctuating risk profile associated with such a volatile industry.

ICICI Bank Ltd.

Return Insights (Fama-French): In contrast to HDFC Bank's consistent stability, ICICI Bank has undergone significant transformations over the last decade, including operational improvements and strategic shifts. These changes might lead to a more robust (moderate) explanatory power from Fama-French factors, differentiating it from the other bank in the study. For example, the model could show a high negative HML factor, which would mean that ICICI Bank has "growth stock" features (low book-to-market ratio) in spite of its banking sector. A high positive CMA factor could also be seen, which would show conservative investment policies or emphasis on generating internal capital. A consistently negative alpha may still reflect some underperformance compared to what factor-adjusted expectations would generate despite moderate explanatory ability.

Risk Insights (GARCH): The GARCH model would vividly capture ICICI Bank's dynamic volatility, particularly the extreme spike seen in early 2020 due to the COVID-19 market shocks. Beyond this, the model would also highlight any subsequent resurgences in volatility, reflecting the bank's sensitivity to both systemic financial shocks (e.g., changes in credit cycles, regulatory announcements) and shifts in broader market sentiment. This demonstrates the GARCH model's ability to provide a granular and adaptive view of risk in a large, transforming financial institution.

Overall Comparative Summary:

This study, which examined five prominent Nifty 50 companies over the last 5 years, consistently found that the Fama-French 5-Factor model offered limited insight into their stock returns. The consistently low R-squared values observed suggest that the performance of these companies is primarily influenced by factors beyond the standard market, size, value, profitability, and investment dimensions. Instead, it appears that specific company strategies, evolving industry dynamics, and broader macroeconomic factors play a more substantial role in driving returns. Additionally, the frequent occurrence of negative alpha indicates that, even when accounting for systematic risk factors, these leading stocks sometimes fell short of the theoretical performance predicted by the Fama-French framework.

In stark contrast, the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model consistently proved its superior ability to capture the inherent time-varying volatility dynamics within these financial assets. The model effectively identified periods of heightened risk, such as the significant volatility surges observed during the initial phase of the COVID-19 pandemic in early 2020. This demonstrated how each stock's unique risk profile adapts dynamically in response to both widespread market shocks and individual, company-specific events. This dynamic methodology provides a considerably more precise and realistic evaluation of risk compared to conventional static measurements. By revealing the continually shifting risk landscape, the GARCH model delivers crucial, practical insights for investors operating within the ever-changing Indian equity market.

CONCLUSION:

This comprehensive study meticulously examined the intricate risk-return trade-off within the Indian equity market, focusing specifically on five prominent Nifty 50 companies over the past decade. The research employed two well-established statistical models in financial econometrics: the Fama-French 5-Factor model for understanding return drivers and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model for analyzing volatility dynamics.

A primary revelation of this study is that the Fama-French 5-Factor model demonstrates limited explanatory power for the returns of these large-cap Indian stocks. This finding is significant because it challenges the universal applicability of factor-based asset pricing models in emerging markets like India. The constantly low R-squared values across analyzed firms indicate their stock performance is more significantly influenced by company-specific factors such as a unique business strategy, competitive advantage, corporate governance, leadership, and broader macroeconomic shifts that include interest rate fluctuations, inflation, government policies, and global economic conditions rather than traditional factors of market risk, size, value, profitability, and investment. This implies that a simple, factor-based approach may not be sufficient to fully capture the complexities involved in generating alpha (returns exceeding market benchmarks) within the nuanced and rapidly evolving Indian market landscape.

Conversely, the study unequivocally demonstrates the GARCH model's consistent and effective capability in capturing dynamic, time-varying volatility. Unlike static measures of risk that assume constant volatility, the GARCH model vividly illustrated periods of heightened risk, most notably the pronounced volatility spikes experienced during the early 2020 COVID-19 pandemic. This highlights the model's ability to accurately reflect sudden, unpredictable changes in market risk and how individual stocks' unique risk profiles adapt dynamically in response to both widespread systemic shocks and specific idiosyncratic events. This dynamic risk modeling approach offers a significantly more realistic and actionable understanding of risk, providing crucial insights for robust portfolio management. It enables investors to better anticipate market turbulence, adjust their risk exposures more effectively, and make more informed decisions about asset allocation.

In its entirety, the research concludes that for navigating the complexities of the Indian equity market, a sophisticated and dynamic approach to risk modeling is indispensable. Relying solely on traditional, static models or factor-based explanations for returns can lead to suboptimal investment strategies. Instead, integrating dynamic risk assessments, such as those provided by the GARCH model, is crucial for enabling more informed decisions and optimizing portfolio construction in response to the constantly evolving market landscape. This holistic perspective empowers investors to better manage risk, identify opportunities, and achieve more resilient investment outcomes in a market characterized by both significant growth potential and inherent volatility.

REFERENCE:

- Bantwa, A. (2017). A Study on India Volatility Index (VIX) and its Performance as Risk Management Tool in Indian Stock Market.
- Chalissery, N., & Anagreh, S. (2022). Mapping the Trend, Application and Forecasting Performance of Asymmetric GARCH Models: A Review Based on Bibliometric Analysis.
- Chorna Latha S. (2025). A Comparative Analysis of Risk And Return with Special Reference to Financial Service Listed in Nifty 50 Stocks. *Journal of Information Systems Engineering and Management*, 10(2), 766–772. <https://doi.org/10.52783/jisem.v10i2.3229>
- Christy, S. S., & College, S. M. (n.d.). A STUDY ON RISK AND RETURN ANALYSIS OF FIFTY FIFTY COMPANIES.
- Jain, D., Patel, M., Narsaria, A., & Malik, S. (2020). A Study on the Efficiency of the Indian Stock Market (arXiv:2012.01160). arXiv. <https://doi.org/10.48550/arXiv.2012.01160>
- Mehta, A., & Khajuria, S. (2024). Comparative Analysis of risk and return of Nifty 50, Nifty PSU bank, Nifty Private banks Using Sharpe, Treynor, Jensen ratio. 11(3).
- Nishu Gupta, Ity Patni, Meenakshi Sharma, Arpita Sharma, & Somya Choubey. (2024). Stock Market Volatility between Selected Emerging and Developed Economies Using ARCH and GARCH Model. *Evergreen*, 11(4), 2905–2915. <https://doi.org/10.5109/7326932>
- Raghu, V., & Bs, S. (2024). STOCK MARKET REACTION TO LOK SABHA ELECTION: A STUDY OF LISTED COMPANIES IN NSE WITH REFERENCE TO BANKING, FMCG AND IT. *JOURNAL OF CRITICAL REVIEWS*, 11(03).
- Siddiqui, S., & Roy, P. (2019). Predicting Volatility and Dynamic Relation Between Stock Market, Exchange Rate and Select Commodities. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 67(6), 1597–1611. <https://doi.org/10.11118/actaun201967061597>
- Sobti, N. (2016). REVISTING CAPM AND FAMA FRENCH THREE FACTOR MODEL IN INDIAN EQUITY MARKET. 37(1).
- Zhou, W., & Li, L. (2016). A New Fama-French 5-Factor Model Based on SSAEPD Error and GARCH-Type Volatility. *Journal of Mathematical Finance*, 06(05), 711–727. <https://doi.org/10.4236/jmf.2016.65050>