

A Study on Risk-Adjusted Portfolio Performance Evaluation of Leading NSE-Listed Equities Across Banking, IT, and FMCG Sectors

Project Report

Submitted in partial fulfillment of the requirements for the Award of the Degree of

MASTER OF BUSINESS ADMINISTRATION

Submitted By

SATHYAN R

Reg. No: 23MBA067

Under the guidance of

Dr. S. PRASANTH

Assistant Professor



JAMAL INSTITUTE OF MANAGEMENT

Building Values & Leadership

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A++' Grade by NAAC (4th cycle) with CGPA 3.69 out of 4.0
(Affiliated to Bharathidasan University)

Tiruchirappalli, Tamil Nadu.



APRIL – 2025



JAMAL INSTITUTE OF MANAGEMENT

Building Values & Leadership

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A++' Grade by NAAC (4th cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli, Tamil Nadu.



CERTIFICATE

This is to certify that the Project report entitled "**A Study on Risk-Adjusted Portfolio Performance Evaluation of Leading NSE-Listed Equities Across Banking, IT, and FMCG Sectors**" is a bonafide record of the work done by **Mr. SATHYAN R**, Register No.**23MBA067** in partial fulfillment of the requirement for the award of degree of **MASTER OF BUSINESS ADMINISTRATION**, submitted to the Jamal Institute of Management, Jamal Mohamed College (Autonomous), Tiruchirappalli, during the year 2024 - 25.

Guide

Director

External Examiner



Bharath Shopping Mall, Opposite to GH, Trichy-620017

Email id: crm@ventural.com Website: www.ventural.com

To Whom So Ever It May Concern

Date: 05.12.2024

Dear Sir/Madam

This is to certify that SATHYAN R (REG NO: 23MBA067) a student from Jamal Mohamed college (Autonomous), Tiruchirappalli has successfully completed a project at our investment and trading company from the Duration: 12/11/2024 to 05/12/2024.

Throughout this duration, he demonstrated a strong interest and enthusiasm in acquiring knowledge about the securities market and investment strategies.

We extend our best wishes for his success in all his future endeavours.

With Regards,

Viji G

Assistant Marketing Manager,

Ventura Securities Ltd.,

Trichy - 620017

Mob no: +91 98437 00333

Email id: g.viji@ventural.co



VENTURA SECURITIES LTD, T4, Bharath Shopping Mall, 3rd Floor, opp. To Government Hospital
Puthur, Tiruchirappalli, Tamil Nadu 620017



Plagiarism Checker X - Report

Originality Assessment

12%

Overall Similarity

Date: Apr 9, 2025 (12:48 PM)
Matches: 1530 / 12617 words
Sources: 60

Remarks: Moderate similarity detected. Consider enhancing the document if necessary.

Verify Report:
Scan this QR Code



S. M.
LIBRARIAN
Jamal Institute of Management
Jamal Mohamed College (Autonomous)
TIRUCHIRAPPALLI - 620 020.

ACKNOWLEDGEMENT

I am obliged to express my humble and heartiest gratitude to the **Almighty** for showering his blessings upon me in every step of my work to finish this project successfully.

I extend my gratitude to the members of **Management Committee** for permitting me to do this course and to finish the project work successfully.

I am very much grateful to **Dr. A. KHAJA NAZEEMUDEEN**, Secretary and Correspondent, Jamal Mohamed College for permitting me to pursue my MBA Program in this institution.

I am deeply indebted to **Dr. D.I. GEORGE AMALARETHINAM**, Principal, Jamal Mohamed College for having given me the opportunity to pursue MBA Program in this institution.

I am grateful to **Dr. G. SIVANESAN**, Director., Jamal Institute of Management, Jamal Mohamed College for providing me an excellent environment for undergoing the professional course, given me official permission to do this project.

My deep gratitude to thank My Guide **Dr. S. PRASANTH**, Associate Professor, Jamal Institute of Management, Jamal Mohamed College, whose invaluable support, guidance made this project an enlightening educational experience. he guided, supported and helped me a lot throughout this project and his guidance made me to complete the project in an efficient way.

I also wish to thank my company guide **MR.VIJI**, Branch Manager at Ventura Securities Ltd, Trichy, for his continuous guidance and support in the execution of the research work.

I am very grateful and thankful to all the Faculty Members of Jamal Institute of Management, Jamal Mohamed College, for their constant inspiration and valuable suggestion of this research work. I extend my hearty thanks to all the Non-Teaching Staffs of Jamal Institute of Management, Jamal Mohamed College. I express my sincere thanks to each and every one who helped me in this project to complete it in a successful manner.

SATHYAN R

SATHYAN R

23MBA067

Jamal Institute of Management.

Jamal Mohamed College (Autonomous)

Tiruhiappalli-20

DECLARATION

I, SATHYAN R hereby declare that the dissertation entitled "A Study on Risk-Adjusted Portfolio Performance Evaluation of Leading NSE-Listed Equities Across Banking, IT, and FMCG Sectors" Submitted to the Jamal Mohamed Collage (Autonomous), in partial fulfilment of the requirements for the award of the Degree of MASTER OF BUSINESS ADMINISTRATION is a record of the original research work done by me during 2024 -2025 under the supervision and guidance of Dr. S. PRASANTH, Assistant Professor, Department of Master of Business Administration and it has not formed the basis for the award of any degree or fellowship or other similar title to any candidate any University.

Place: Tiruchirappalli

Date:

Signature of the Candidate

SATHYAN R

CHAPTER NO.	CONTENTS	Page No.
CHAPTER I	INTRODUCTION TO THE RESEARCH CONCEPT (i) Introduction ii) Need iii) Statement of the Problem iv) Objectives of the study v) Hypotheses vi) Limitations and Scope vii) Chapterization or Chapter scheme	1-5
CHAPTER II	REVIEW OF LITERATURE i) Related Review of Literature ii) Framework of Risk Adjusted Return iii) Profile of Companies	6-16
CHAPTER III	RESEARCH METHODOLOGY (i) Research Design (ii) Period of the study (iii) Nature of the Data (iv) Data Analysis (v) Companies Selection	18-20
CHAPTER IV	DATA ANALYSIS AND INFERENCES	21-54
CHAPTER V	FINDINGS, SUGGESTIONS AND CONCLUSION	55-60
	BIBLIOGRAPHY i) References	61-63
	ANNEXURE 1. Participation Certificate 2. Company Attendance Sheet	

LIST OF TABLES

S.No	TITLE	Page No.
1	Test of Normality for the Returns of Selected Securities	22
2	White Noise Test for Selected Companies' Returns	24
3	Descriptive Statistics	26
4	Test of Autocorrelation and Partial Autocorrelation of Banking Sector	28
5	Test of Autocorrelation and Partial Autocorrelation of IT Sector	34
6	Test of Autocorrelation and Partial Autocorrelation of FMCG Sector	40
7	Stationarity Test	46
8	Result of Treynor Ratio Analysis of Banking Sector Portfolio	48
9	Result of Jensen Alpha Analysis of Banking Sector Portfolio	49
10	Result of Treynor Ratio Analysis of IT Sector Portfolio	50
11	Result of Jensen Alpha Analysis of IT Sector Portfolio	51
12	Result of Treynor Ratio Analysis of FMCG Sector Portfolio	52
13	Result of Jensen Alpha Analysis of FMCG Sector Portfolio	53
14	Result of Sharpe Ratio Analysis of Banking, IT and FMCG Sector Portfolio	54

LIST OF GRAPHS

S.No	TITLE	Page No.
1	Autocorrelogram HDFC Bank Ltd of Returns	30
2	Partial Autocorrelogram HDFC Bank Ltd of Returns	30
3	Autocorrelogram ICICI Bank Ltd. of Returns	31
4	Partial Autocorrelogram ICICI Bank Ltd. of Returns	31
5	Autocorrelogram State Bank of India of Returns	32
6	Partial Autocorrelogram State Bank of India of Returns	32
7	Autocorrelogram Kotak Mahindra Bank Ltd. of Returns	33
8	Partial Autocorrelogram Kotak Mahindra Bank Ltd. of Returns	33
9	Autocorrelogram Tata Consultancy Services Ltd. of Returns	36
10	Partial Autocorrelogram Tata Consultancy Services Ltd. of Returns	36
11	Autocorrelogram Infosys Ltd. of Returns	37
12	Partial Autocorrelogram Infosys Ltd. of Returns	37
13	Autocorrelogram HCL Technologies Ltd. of Returns	38
14	Partial Autocorrelogram HCL Technologies Ltd. of Returns	38
15	Autocorrelogram Wipro Ltd. of Returns	39
16	Partial Autocorrelogram Wipro Ltd. of Returns	39
17	Autocorrelogram Hindustan Unilever Ltd. of Returns	42
18	Partial Autocorrelogram Hindustan Unilever Ltd. of Returns	42
19	Autocorrelogram Nestle India Ltd. of Returns	43
20	Partial Autocorrelogram Nestle India Ltd. of Returns	43
21	Autocorrelogram Godrej Consumer Products Ltd. of Returns	44
22	Partial Autocorrelogram Godrej Consumer Products Ltd. of Returns	44
23	Autocorrelogram ITC Ltd. of Returns	45
24	Partial Autocorrelogram ITC Ltd. of Returns	45

CHAPTER 1

INTRODUCTION TO THE RESEARCH CONCEPT

CHAPTER 1

INTRODUCTION TO THE RESEARCH CONCEPT

1.1 Risk-Adjusted Return

A basic investment management goal is to generate positive returns. Yet, simply measuring these returns gives only a partial picture unless it is framed within the risks taken in order to achieve such returns. Therefore, a technique called risk-adjusted return analysis has developed and is now widely accepted; this system measures an investment's profitability in comparison to its inherent risk. By synthesizing risk factors into performance measures, financial analysts and investors are able to make better-informed decisions, ensuring that the returns are commensurate with the risk taken.

Risk-adjusted return is a metric that tells us the proportion of return an investment yields, considering the risk taken to achieve that return. It gives a proportionate basis to compare, thereby facilitating comparisons between various investments on a comparable platform. Conventional performance measures can tell us that an investment yields high returns; but without the addition of the risk factor, the comparison remains incomplete. Risk-adjusted measures bridge this gap by telling us the proportion of return an investment yields for every unit of risk taken.

The importance of risk-adjusted return analysis in investment choice cannot be overstated. Investors are generally presented with investment options in different investment instruments having dissimilar risk and return characteristics. By resorting to risk-adjusted measures, they are able to choose investments having higher relative returns over the risk incurred. This enables an informed view and aids in eliminating the quest for high returns without an adequate view of the risk incurred. It also enables the formation of diversified investment portfolios according to an investor's risk-bearing capacity and expected returns.

Standard Measures for Risk-Adjusted Returns

Sharpe Ratio: William F. Sharpe created the Sharpe ratio that is utilized to quantify the risk premium (or excess return) on a basis of volatility of an investment instrument or trading strategy. The calculation of this measure is the difference between the portfolio average return and the risk-free rate divided by the portfolio return standard deviation. The higher the Sharpe ratio, the better the risk-adjusted performance.

Treynor Ratio: Like the Sharpe ratio, the Treynor ratio measures returns over those which might be realized in a risk-free investment, discounted by every unit of market risk. Unlike the Sharpe ratio, which employs standard deviation as a measure of risk, the Treynor ratio employs beta, a measure of the responsiveness of the returns of the investment to movement in the market.

Jensen's Alpha, or simply alpha, is the return on an investment or a portfolio that is average in comparison to the projected return from the Capital Asset Pricing Model (CAPM) and is a function of the portfolio beta and the overall market return. A positively alpha-showing investment has done better than its beta-expected return.

Risk-adjusted return analysis is a part of portfolio management, especially of asset allocation and measurement of performance. Portfolio managers attempt to create portfolios that achieve the highest returns at a prespecified level of risk or achieve a prespecified level of risk at a given return. By analyzing the risk-adjusted returns, these experts can determine the assets or portfolios of assets that have the best risk-return trade-off. Risk-adjusted return analysis is also useful in making decisions regarding rebalancing, performance attribution, and the establishment of realistic performance objectives.

Risk-adjusted return analysis is characterized by its dynamic nature, with continuous research efforts to overcome existing limitations and enhance the solidity of such measures. Recent advances include the construction of models that account for regime-switching behavior in an effort to more accurately replicate market dynamics, as well as the application of machine learning algorithms in the identification of more solid risk-return measures. All these advances are aimed at providing more accurate and flexible tools for risk measurement in investment analysis.

Risk-adjusted return analysis is one of the defining characteristics of contemporary investment analysis, providing a top-level view that balances potential return with risk. By various measures including the Sharpe ratio, Treynor ratio, Sortino ratio, and Jensen's Alpha, investors are able to make more sophisticated decisions based on their own risk tolerance and investment goals. As financial markets evolve further, the continued improvement of these measures will be a core contribution to the resolution of the intricacies of investment performance measurement.

1.2 Need of the study

This study aims to fill a vital knowledge gap by examining the heterogeneous impact of key political and economic events, i.e., American and Indian elections, on evaluating the performance of investment portfolios of the Indian equity market. Political events in the form of national elections have inclined towards augmenting market volatility, impacting investor mood and decision-making. Since world markets are interlinked, American elections have a significant impact on economic trends and flows of capital, which, in turn, influence the Indian stock market. Examining the impact of such political events on portfolio performance is valuable for investors aiming to optimize risk-adjusted returns.

This study looks into portfolio efficiency variations in the Nifty 50 index amidst major political and economic events. Through the comparison of risk-adjusted return measures like the Sharpe ratio, Treynor ratio, and Jensen's alpha, this work seeks to identify how portfolio returns react to the change in political and economic scenarios. Performance measurement across various stages—pre-election, election stage, and post-election—assists in arriving at significant interpretations regarding market trends and risk handling techniques.

1.3 Statement of the Problem

The major objective of the current study is to determine the performance of a portfolio of equities of the Nifty 50 index, with a focus on risk-adjusted return and the movement of the market. Through the study, the objective is to examine how much the portfolio is able to achieve a trade-off between return and risk, particularly with political and economic uncertainty in the form of the United States of America and India elections, influencing the mood and volatility of the market.

This research mainly seeks to assess the impact of political events on portfolio performance according to the measurement of risk-adjusted return indicators like the Sharpe ratio, Treynor ratio, and Jensen's alpha. According to the use of these measurement indicators, the research expects to determine the extent to which the portfolio responds to altered market conditions and to what extent investors can improve their strategies for managing periods of higher volatility. According to this analysis, the research expects to come up with useful information on portfolio management strategies that ensure stability and return maximization under market volatility conditions.

1.4 OBJECTIVES OF THE STUDY

- ❖ To assess the performance of chosen stocks of the Banking, FMCG, and IT sectors traded on NSE based on risk-adjusted return metrics.
- ❖ To compare and analyze the performance of chosen stocks with benchmark indices to ascertain investment efficiency.
- ❖ To utilize quantitative measures like Sharpe Ratio, Treynor Ratio, and Jensen's Alpha in measuring risk-return efficiency of the portfolio.
- ❖ To provide practical recommendations for investors by providing insights into sectoral portfolio selection, return maximization, and optimal risk management.

1.5 Hypothesis

- ❖ The returns of the chosen securities are normally distributed.
- ❖ No trend is apparent in the selected returns.
- ❖ The returns of the chosen securities are non-stationary.

1.6 LIMITATIONS AND SCOPE

This research is targeting the returns of those securities included in the Nifty 50 index, excluding other market indices and sectors by choice. The research mainly works with risk-adjusted returns, excluding other measures of performance. The research also examines the influence of significant political events, such as the elections that have taken place in India and the United States, on the returns of investment while discounting other economic factors at the global level. The results are derived from historical data, and the future market situation may differ, which may influence the applicability of the results.

1.7 CHAPTERIZATION

Chapter 1

This chapter comprises introduction, need, research problem, objectives, hypotheses and scope and limitations

Chapter 2

This chapter consists of literature review and framework.

Chapter 3

This chapter includes research methodology.

Chapter 4

This chapter includes data analysis and interpretation of normality test, white noise test, descriptive statistics, autocorrelation and partial auto correlation stationary test and Risk Adjusted Measurements.

Chapter 5

This chapter includes findings, recommendations and conclusions.

CHAPTER II
REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

2.1 RELATED REVIEW OF LITERATURE

"Heng-Hsing Hsieh (2013): A Review of Performance Evaluation Measures for Actively-Managed Portfolios.": The paper examines the applicable measures employed in ascertaining the risk-adjusted return and risk profile of a portfolio, for instance, risk-adjusted performance as well as market timing ability. It examines measures including the Sharpe ratio, Treynor measure, and Jensen's Alpha and gives details on how they may be employed in measuring actively managed portfolios.

Jaydip Sen et al. (2022) used sophisticated analytical techniques such as time series forecasting, machine learning, and deep learning to forecast stock prices in different Indian industries. They aimed to create portfolios with the lowest variance in consideration of the trade-off between risk and return. The research progressed in the application of data science in finance through the introduction of new tools for portfolio building and optimization.

Dr. Rachna Jawa and Ms. Monika (2022) examined the connection between capital structure and financial performance of chosen service sector firms listed on the BSE Sensex from 2016 to 2021. Their regression findings indicated that companies with greater debt-to-equity ratios reported lower returns on equity, implying that high leverage could have a negative impact on profitability in service industries.

Qur'anitasari, Nila Firdausi Nuzula, and Ari Darmawan (2019) evaluated the performance of LQ-45 index stocks as an investment based on three evaluation techniques—Sharpe, Treynor, and Jensen—under one index model. Although all three methods indicated similar trends, the Sharpe ratio proved to be the most reliable instrument through robustness testing. Still, the research accepted its limitation of measuring only a single portfolio every year and proposed adding other measures such as the M2 and Information Ratio to future research for better results.

Rena Yuliana et al. (2024) explored the key contributors to portfolio efficiency, underlining the importance of performance evaluation tools such as the Sharpe, Treynor, Jensen, and Sortino ratios. The study also brought attention to non-financial elements, like individual household preferences, which play a role in influencing investment returns. Additionally, the research stressed the importance of diversification and emphasized using Value-at-Risk (VaR) as a dynamic method for assessing risk exposure, offering a holistic view of what shapes portfolio outcomes.

L. Bhuvaneswari (2024) conducted an in-depth evaluation of portfolio returns by incorporating risk-adjusted metrics such as total returns, alpha, beta, and the Sharpe ratio. The study gave prominence to various risk-mitigation techniques, including strategic asset allocation, diversification, and the use of hedging tools. Furthermore, it compared actively managed portfolios with passive ones, advocating for aligning investment strategies with investor-specific financial objectives. It also emphasized that continuous monitoring and sound fundamental analysis are crucial for sustaining portfolio health in changing market conditions.

Vanita Chandavar, Komal Gadade, and Sagar Patil (2022) analyzed data spanning from 2017 to 2022 for companies listed under the BSE-30. They grouped these firms into portfolios based on their beta scores and assessed performance using Sharpe, Treynor, and Jensen indicators. The study concluded that higher beta portfolios were more sensitive to market changes, implying that volatility has a notable influence on portfolio performance and should be a consideration during portfolio construction.

Himanshu Puri (2010) carried out a performance evaluation of 30 equally weighted mutual fund schemes in India during the years 2007 to 2010, on the basis of performance metrics such as mean return, beta, total risk, and risk-adjusted measures including Sharpe, Treynor, and Jensen's Alpha. HDFC Growth Fund emerged as a top-performing fund while JM Financial Dividend Fund fell short. The research presented applied benchmarks to effectively evaluate mutual fund performance in Indian investment.

Umair Zuhair and Agha Amad Nabi (2015) studied Pakistan's mutual fund industry performance between 2014 and 2017, and their analysis involved 45 funds covering equity and money market funds. Their analysis found consistently high Sharpe ratios, which mean good risk diversification by mutual fund managers. The research emphasizes the role of financial skills in the performance of mutual funds.

Chandradew Sharma and Kinjal Banerjee (2015) investigated stock market behavior in India through the analysis of daily returns of sectoral indices for eight years. They discovered robust autocorrelation within sectors and strong cross-sectoral linkages, contradicting the hypothesis of market randomness. They suggested the inclusion of higher-order statistical factors such as skewness and kurtosis for better portfolio modeling.

Ruchi Nityanand Prabhu (2019) Risk & return analysis of Nifty stock in Indian capital market. Here she computes standard deviation, covariance, Coefficient of correlation and beta for calculation of return and risk. She discovered that From the Betas of 50 stocks, one discovers that there exist some stocks which move in a reverse direction to the market, there are some stocks which move in the direction of the market, there are some stocks which are less volatile than the market and there are some stocks which are more volatile than the market.

"EVALUATING PORTFOLIO PERFORMANCE OF COMPANIES' STOCK LISTED IN LQ45 BASED ON SHARPE, TREYNOR AND JENSEN METHOD" by Vernando A. Zakarias and Ferdinand Tumewu (2015): The study evaluates the portfolio performance of the stocks listed in the LQ45 index using Sharpe, Treynor, and Jensen methods. In evaluating the performance of the selected stocks, the study aims to find out whether there is a difference between the three methods. According to the study, there is no difference between the methods, where any one of them can be used by investors in evaluating portfolio performance.

"A Comparative Analysis of Risk-Adjusted Returns in FMCG, Automobile, and Banking Industries" by Venkata Rao Valluri and Vaka Naga Lakshmi (2025): In this research, the authors compare the risk-adjusted returns of the given companies in FMCG, Automobile, and Banking industries for a period of ten years from 2014 to 2024 based on Sharpe Ratio, Treynor Ratio, and beta values. The result provides data on the volatility and performance of these industries, which can help investors in portfolio selection.

"Application of Single Sharpe Index on the Optimal Portfolio Selection of Energy and FMCG Sector Stocks in India" by Mohith et al. (2017): This work formulates an optimal portfolio of NSE 50 index stocks in the energy and FMCG sector using the Sharpe Single Index model. January 1, 2012, to May 31, 2017, daily stock prices were considered, and the effectiveness of the model in portfolio optimization in these sectors was observed.

"An Analysis of Stock Market Performance Using Jensen, Sharpe and Treynor Measures" by Prof. Mohammed Farzana Begum, Prof. Devika Rani P. Vyas, and Jayesh Arvind: Stocks listed on the NSE NIFTY, i.e., the 30 largest market-capitalization firms between 2015 and 2019, are compared in this study. Sharpe, Jensen, and Treynor ratios are used to measure stock performance, which will help investors in choosing performing stocks.

2.2 THEORETICAL FRAMEWORK OF RISK ADJUSTED RETURN

RETURN

Return is the basic measure in portfolio performance evaluation, which describes the profitability of an investment when compared to its original cost. In portfolio management, returns not only are compared in absolute figures but also judged using risk-adjusted measures in order to find out if the gains adequately pay for the risk taken. Historical returns can be used by investors to measure the efficacy of asset allocation methods and contrast results based on various market environments. This method provides a better grasp of whether or not a portfolio is achieving its financial goals and helps make informed choices for future portfolio revisions.

RISK

Risk is the uncertainty of investment returns, as measured by the level of variability or deviation from the return expected. In a portfolio, risk depends not only on asset volatility but also on the interaction between assets, as seen in their variances and covariances. Successful risk management in many cases consists of diversification, which is the technique of putting together varying stocks to decrease the overall portfolio risk. By wisely choosing assets with non-telephone-related return patterns, investors can depress the effect of negative movements in any one stock, stabilizing portfolio performance.

BENCHMARK (NIFTY 50)

For this research, the benchmark used is the Nifty 50 index. The Nifty 50 is the leading 50 stocks listed on the National Stock Exchange (NSE) and is computed on the free-float market capitalization basis. It is considered to be a barometer of the Indian stock market and a gauge of broad investor sentiment and economic trends. The index is determined by an array of elements such as company earnings, general market conditions in the world, government policies, and economic signals. The application of the Nifty 50 as a reference point enables worthwhile comparisons between the risk-adjusted performance of the chosen portfolio and the overall market.

MEASURING THE PORTFOLIO PERFORMANCE

In the measurement of portfolio performance, risk-adjusted return measures are key to gauging how well an investment compensates an investor in comparison to risk taken. Three main measures are utilized in this research:

Sharpe Ratio (1966, Sharpe):

The Sharpe Ratio measures the excess return of a portfolio over the risk-free rate per unit of total risk, where risk is quantified by the standard deviation of returns. The formula is:

$$\text{Sharpe Ratio} = \frac{E(RP) - R_f}{\sigma(RP)}$$

$E(RP)$ = Expected portfolio return

f = Risk-free return

(RP) = Portfolio return standard deviation

This measure takes a return to be normally distributed and does not differentiate between upside and downside risk. Though it has several disadvantages, it is still one of the most popular performance measures.

Treynor Ratio (Treynor, 1965)

The Treynor Ratio is concerned with systematic risk (beta) rather than overall risk. It is particularly appropriate for portfolios within a larger diversified investment. The formula is:

$$T = \frac{E(R_p) - R_f}{B_p}$$

In contrast to the Sharpe Ratio, the Treynor Ratio only accounts for market-based risk and is therefore sensitive to the selection of the benchmark index on which beta is calculated.

Jensen's Alpha (1968, Jensen):

Jensen's Alpha quantifies the abnormal return of a portfolio relative to its expected return as predicted by the Capital Asset Pricing Model (CAPM). It is calculated as:

$$\alpha_p = (R_p - R_f) - \beta_p (R_m - R_f)$$

α_p = Portfolio return

R_m = Market return

R_f = Risk-free return

β_p = Portfolio beta

Positive alpha means better performance as a result of good management, whereas negative alpha indicates underperformance.

2.3 COMPANY PROFILES

Banking Sector

HDFC Bank Limited.

HDFC Bank Limited is India's largest private sector bank by assets and market capitalization. It was started as a subsidiary of Housing Development Finance Corporation (HDFC) in 1994 and has expanded through organic growth as well as strategic acquisition. HDFC Bank provides a diversified set of financial products and services such as retail banking, wholesale banking, treasury operations, and digital banking solutions. The bank has a strong asset quality, stable financials, good risk management practices, and an enormous branch and ATM network in urban and rural India. In April 2022, HDFC Bank merged with parent HDFC Ltd., forming one of India's largest financial groups. The bank has been awarded for technology innovation, customer service excellence, and sustainable growth practices. HDFC Bank has a strong presence in big cities as well as small towns with a diversified customer base ranging from individual account holders to blue-chip companies.

ICICI Bank Limited.

ICICI Bank Limited is one of India's top private sector banks with a robust global presence. Established in 1994 as Industrial Credit and Investment Corporation of India, ICICI Bank transitioned into a full-service bank with retail banking, corporate banking, investment banking, mortgage loans, wealth management, and insurance offerings. The bank has a vast branch network in India and international operations in several countries. ICICI Bank has been a leader in digital banking innovation in India, launching several technology initiatives to increase customer convenience and operational efficiency. The bank has strategically emphasized growing a diversified loan book in retail, corporate, and small-and-medium enterprise spaces. ICICI Bank is known for its robust risk management system, solid capital base, and financial inclusion. The bank has persistently emphasized building its retail franchise while possessing a solid corporate banking franchise, enabling it to leverage diversified growth opportunities in India's dynamic financial services ecosystem.

State Bank of India (SBI)

State Bank of India (SBI) is India's largest commercial bank and a 200-year-old public sector banking company. It was established in 1806 as Bank of Calcutta, became Imperial Bank of India, and ultimately State Bank of India in 1955 after the government acquired the stake of Reserve Bank of India. SBI possesses the largest banking network in India with thousands of branches and ATMs and caters to more than 450 million customers. The bank provides a variety of financial services including retail banking, corporate banking, investment banking, mortgage loans, and international banking operations. As a government bank, SBI plays an important role in the execution of various schemes sponsored by the government and financial inclusion programs. The bank has been focusing on digital transformation to enhance customer experience and operational efficiency and has introduced a chain of digital banking platforms and services. SBI's extensive presence in rural and semi-urban regions makes it a large institution for the distribution of banking services to the under-served segments. SBI has been making an effort to improve efficiency, reduce non-performing assets, and maximize shareholder value through strategic restructuring and modernization programs despite its huge size.

Kotak Mahindra Bank Limited.

Kotak Mahindra Bank Limited began its journey in 1985 as Kotak Mahindra Finance Ltd., a non-banking financial institution, before it became a full-service commercial bank in 2003. Under the leadership of its founder Uday Kotak, the bank has grown to become one of India's best-respected financial institutions with its risk-averse approach to taking risks and innovation. Kotak Mahindra Bank offers holistic banking services including retail banking, commercial banking, treasury operations, and wealth management. The bank has strengthened its market position through strategic acquisitions, most notably the acquisition of ING Vysya Bank in 2015 that added significantly to its geographical reach and customer base. Kotak Bank is known for its strong capital adequacy, high-quality asset portfolio, and digital innovation focus. The bank has earned a reputation for prudent lending and industry-leading net interest margins. Kotak Mahindra Bank has a customer-centric model with a focus on creating customized financial solutions for different customer segments. The bank is committed to strengthening its digital capabilities while ensuring efficient branch operations, achieving a balance between traditional and modern banking experiences.

IT Industry

Tata Consultancy Services (TCS) Ltd.

Tata Consultancy Services Limited is India's largest IT services firm and one of the largest information technology and business solutions providers in the world. It was founded in 1968 as a subsidiary of Tata Sons and has grown as a global organization with a presence in over 46 countries. TCS offers a broad array of services including consulting, technology solutions, digital transformation, cloud computing, artificial intelligence, blockchain, and business process outsourcing. TCS offers services to clients in various industries such as banking and financial services, retail, manufacturing, telecom, and healthcare. The organization has over 600,000 professionals on its rolls across the world, making it one of the largest private sector employers in India. TCS has been acclaimed for its ability to adapt to changing market dynamics and technology trends with consistent growth and profitability. The organization has been praised for its good governance policy, people-centric culture, and sustainability initiatives. TCS continues to make substantial investments in research and development with a focus on emerging technologies to enable clients to embark on their digital transformation journey.

Infosys Ltd.

Infosys Limited is a global leader in next-generation digital services and consulting. Founded in 1981 by seven software professionals with a capital of just \$250, Infosys is today one of India's largest IT companies with a global presence in 50+ countries. The company provides services in business consulting, information technology, and outsourcing, leveraging emerging technologies like artificial intelligence, machine learning, cloud computing, and blockchain. Infosys pioneered the development of the Global Delivery Model that is a benchmark for IT services outsourcing worldwide. The company provides services to customers across industries like financial services, retail, communications, manufacturing, and healthcare. Infosys is known for its high innovation intensity with huge investments in research and development through its Infosys Labs division. The company is focused on education and sustainability through the Infosys Foundation and other corporate social responsibility initiatives. Infosys has been recognized for its corporate governance practices, transparent business, and value-based leadership focus. The company continues to expand its service offerings to meet the rapidly changing digital transformation needs of global businesses.

HCL Technologies Ltd.

HCL Technologies Limited is a leading IT services provider in the world that began life as a hardware firm in 1976 before it expanded as a full-fledged technology services firm. HCL Tech, headquartered in Noida, India, has expanded its wings to over 50 nations in the Americas, Europe, Asia Pacific, and the Middle East. The company offers a wide range of services from digital transformation, cloud, and cybersecurity to Internet of Things (IoT), engineering and R&D services, and infrastructure management. HCL Tech is distinct from others because of its "Mode 1-2-3" business model, focused on core services, emerging technologies, and innovative products and platforms. The company offers services to customers from various industries including financial services, manufacturing, technology, retail, and healthcare. HCL Technologies is famous for its "Employees First, Customers Second" philosophy, focused on empowering employees as a way to achieving customer delight. The company has expanded significantly through strategic acquisitions and alliances, strengthening its capabilities in certain areas and geographies. HCL Tech continues to invest in intellectual property creation and technology innovation to maintain its competitive edge in the rapidly changing digital economy.

Wipro Limited.

Wipro Limited is a leading global information technology, consulting, and business process services company that began in 1945 as a producer of vegetable oil before expanding into IT business in the 1980s. It's one of India's greatest corporate turnarounds. Wipro was founded in Bangalore, but today it is a global organization with presence in more than 60 countries and customers across six continents. Wipro offers a broad range of services from digital strategy, cloud transformation, and enterprise applications to data analytics, artificial intelligence, and business process outsourcing. Wipro offers services to numerous vertical industries like banking, insurance, healthcare, retail, energy, manufacturing, and telecom. Wipro is proud of its corporate citizenship and sustainability commitment, one of India's earliest companies to adopt renewable energy and water conservation methods. Wipro has earned a reputation of

quality and reliability, and industry certifications for services and processes. With Rishad Premji, son of founder Azim Premji, at the helm, Wipro has continued to transform its service business while maintaining its tradition of values-based business and integrity. Wipro has been investing in its digital expertise by strategic acquisitions and partnerships to align with the changing needs of global businesses.

FMCG Sector

Hindustan Unilever Limited (HUL)

Hindustan Unilever Limited is India's largest fast-moving consumer goods company with a legacy of over 90 years in the Indian market. HUL was established in 1933 as Lever Brothers India Limited and is the Indian arm of consumer goods giant Unilever. The company manufactures and markets over 35 brands in 20 categories like soaps, detergents, personal wash, foods, beverages, water purifiers, and home care products. HUL's brand portfolio boasts iconic names such as Lux, Lifebuoy, Surf Excel, Rin, Wheel, Fair & Lovely, Pond's, Vaseline, Lakmé, Brooke Bond, Lipton, Knorr, and Pureit. HUL operates through a massive distribution network that covers over 9 million retail outlets in urban and rural India. HUL is known for its high marketing abilities, consumer insights, and new product innovation. The company has pioneered several sustainable business practices through its 'Unilever Sustainable Living Plan' with a focus on reducing environmental footprint while expanding social footprint. HUL employs over 18,000 people and manufacturing facilities located across India. The company continues to invest in emerging categories and digital transformation initiatives to maintain its leadership position in India's competitive consumer goods market.

Nestle India Ltd.

Nestle India Limited is a subsidiary of Nestlé S.A. of Switzerland, a multinational food and beverage corporation. Nestle India started operations in India in 1912 and has grown to become one of India's leading food and beverage companies with a history spanning over a century. The company produces and distributes a wide array of products ranging from infant nutrition, dairy, to beverages, prepared dishes, cooking aids, and confectionery. Nestle India's household brands include Maggi, Nescafé, KitKat, Munch, Milkmaid, Cerelac, and Nestlé Milk. The company operates eight plants in India and directly and indirectly employs thousands of people. Nestle India has faced challenging issues, most recently the 2015 ban on Maggi noodles, which it later overcame successfully by regaining consumer confidence and strengthening quality control processes. The company has been emphasizing growth strategies on innovation, health and wellness, and rural market development. Nestle India has also been investing in sustainability initiatives on responsible sourcing, water stewardship, and packaging innovation. The company has a strong focus on nutrition, health, and wellness in its product portfolio, maintaining pace with shifting consumer trends towards healthier food.

Godrej Consumer Products Ltd. (GCPL)

Godrej Consumer Products Limited is a subsidiary of the larger Godrej Group, one of India's oldest and most respected conglomerates with a history dating back to 1897. GCPL was formed as a separate business in 2001 to focus on the consumer products business. GCPL has grown organically and through strategic acquisitions to become a fast-growing player in the Indian FMCG sector with strong international reach, led by Asia, Africa, and Latin America. GCPL manufactures and markets personal care, home care, and hair care products under three broad categories: household insecticides, personal wash, and hair care. GCPL has a portfolio of strong brands like Good Knight, Hit, Cinthol, Godrej No. 1, Expert, Renew, Nupur, and Ezee. GCPL has pursued a '3 by 3' growth model, focusing on three geographies (Asia, Africa, Latin America) and three product ranges. GCPL has been greatly valued for its efforts in sustainability, innovation, and inclusive business practices. GCPL has had a strong focus on meeting the needs of the emerging markets through affordable and innovative offerings. The company continues to invest in R&D to develop more sustainable and eco-friendly product formulations and to expand its distribution network to reach out to the underserved markets.

ITC Limited.

ITC Limited is a leading Indian private sector company with diversified business interests in multiple business segments. Established in 1910 as Imperial Tobacco Company of India, ITC has evolved from a tobacco business to a multi-business entity with significant interests in FMCG, hotels, paperboards and packaging, agri-business, and information technology. In the FMCG segment, ITC is a market leader with a differentiated portfolio that ranges from packaged foods, personal care products, education and stationery products, incense sticks, and safety matches. The company's leading FMCG brands are Aashirvaad, Sunfeast, Bingo, Yippee, Vivel, Superia, Fiama, Savlon, Engage, and Mangaldeep. ITC has been attributed with the creation of world-class Indian brands that have battled and emerged victorious against the best of the world in the Indian marketplace. The company takes pride in its triple bottom line philosophy that is economic, environmental, and social in nature. ITC has been carbon positive, water positive, and solid waste recycling positive for more than a couple of decades. The company has a gigantic distribution network that reaches out to millions of retail outlets in India. ITC's e-Choupal programme, one of rural India's largest internet-based initiatives, has empowered millions of farmers with information and procurement services. The company is steadily increasing its FMCG portfolio while building leadership in its other businesses.

CHAPTER III

RESEARCH METHODOLOGY

CHAPTER III

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

The research uses a descriptive research design that utilizes known methods to assess risk-adjusted returns of selected stocks from the NSE. The method uses known statistical methods and performance measurement measures to analyze how efficient investment portfolios perform in terms of generating returns against the risk incurred.

3.2 Period of Study

The analysis utilizes monthly data for the selected stocks, covering the period from January 2020 to January 2025.

3.3 Data Collection Methods

Monthly stock price data for the companies shortlisted across Banking, IT, and FMCG industries were obtained from credible financial portals like Investing.com and Money control. Market index data (based on Nifty 50) and risk-free rate data based on government bond yields were also obtained from secondary sources to be used for the calculation of risk-adjusted performance statistics.

3.4 Data Analysis

Once data were collected, the stock prices were translated into series of monthly returns for every company chosen. Analysis was performed employing a mixture of computer programs like EViews 7, GRETL 2025, and XLSTAT. The process was implemented in different stages:

Stage 1: Normality and White Noise Tests

The normality of the return series was tested by employing statistical tests like the Box-Pierce, Ljung-Box, and McLeod-Li statistics. White noise tests were also conducted to confirm that there are no systematic patterns in the returns.

Stage 2: Descriptive and Time Series Analysis

Descriptive statistics, i.e., measures like mean, median, and standard deviation, were calculated for the return series. Also, autocorrelation and partial autocorrelation functions were examined and graphically represented using correlograms to interpret the time-dependent nature of the data.

Stage 3: Testing for Stationarity

Stationarity of the return series was verified by the Augmented Dickey-Fuller (ADF) test so that the data are suitable for subsequent econometric modelling and analysis.

Stage 4: Risk-Adjusted Performance Measurement

Lastly, the performance of the portfolio was gauged using risk-adjusted return measures—namely, the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha. These were calculated in order to determine how well the stocks chosen offset risk.

3.5 COMPANY SELECTIONS

This study evaluates the returns of selected companies listed on the National Stock Exchange (NSE), categorized into three major sectors: Banking, Information Technology (IT), and Fast-Moving Consumer Goods (FMCG).

In the Banking Sector, the chosen companies are HDFC Bank Ltd (HDBK), ICICI Bank Ltd (ICBK), State Bank of India (SBI), and Kotak Mahindra Bank Limited (KOTAK).

In the IT Sector, the selected firms include Tata Consultancy Services Ltd (TCS), Infosys Ltd (INFY), Wipro Ltd (WIPRO), and HCL Technologies Ltd (HCLT).

For the FMCG Sector, the study includes Hindustan Unilever Ltd (HINDUNILVR), ITC Ltd (ITC), Nestlé India Ltd (NESTLEIND), and Godrej Consumer Products Ltd. (GCPL)

These companies were selected based on their leading market positions, high market capitalization, and consistent performance. The selection ensures a diversified representation of each sector to facilitate effective risk-adjusted performance evaluation.

CHAPTER IV
DATA ANALYSIS AND INFERENCES

CHAPTER IV
DATA ANALYSIS AND INFERENCES

TABLE 1

TEST OF NORMALITY FOR THE RETURNS OF SELECTED SECURITIES

PORTFOLIO	SECURITIES	Box-Pierce Statistic			Ljung-Box Statistic			McLeod-Li Statistic		
		df	value	p-value	df	value	p-value	df	value	p-value
Banking Sector	HDFC Bank Ltd (HDBK)	6	4.882	0.559	6	5.315	0.504	6	3.856	0.696
	ICICI Bank Ltd	6	7.652	0.265	6	8.326	0.215	6	4.610	0.595
	State Bank of India (SBI)	6	3.177	0.786	6	3.474	0.747	6	10.857	0.093
	Kotak Mahindra Bank Ltd (KOTAKBANK)	6	4.541	0.604	6	5.021	0.541	6	6.331	0.387
IT Sector	Tata Consultancy Services (TCS)	6	6.935	0.389	6	7.146	0.336	6	2.278	0.892
	Infosys Ltd (INFY)	6	3.936	0.685	6	4.346	0.630	6	1.081	0.982
	HCL Tech (HCLT)	6	10.907	0.091	6	11.950	0.063	6	10.114	0.120
	Wipro Ltd (WIPRO)	6	3.919	0.688	6	4.262	0.641	6	1.597	0.953
FMCG Sector	Hindustan Unilever Ltd (HINDUNILVR)	6	2.830	0.830	6	3.054	0.802	6	3.128	0.793
	Nestle India Ltd (NESTLEIND)	6	5.312	0.505	6	5.837	0.442	6	3.636	0.726
	Godrej Consumer Products (GOCP)	6	3.514	0.742	6	3.874	0.694	6	2.319	0.888
	ITC Ltd (ITC)	6	6.929	0.327	6	7.717	0.260	6	2.101	0.910

Inference

The test of normality results for the returns of selected companies based on Banking, IT, and FMCG sectors listed in the stock exchange reveal that all securities display normal distribution characteristics. The Box-Pierce Statistic, Ljung-Box Statistic, and McLeod-Li Statistic confirm this normality at a 5% insignificance level with 6 degrees of freedom. All p-values exceed 0.05, with the lowest p-value being 0.063 for HCL Tech in the Ljung-Box test. Notably, the banking sector securities show p-values ranging from 0.215 to 0.786, while IT sector securities demonstrate p-values between 0.063 and 0.982, and FMCG sector securities exhibit p-values from 0.260 to 0.910. This confirmation of normality validates that the returns of the selected securities satisfy the fundamental normality assumption, making them suitable for further statistical analysis and portfolio optimization.

TABLE 2
WHITE NOISE TEST FOR SELECTED COMPANIES' RETURNS

PORTFOLIO	COMPANY	Box-pierce			Ljung-Box			McLeod-Li		
		df	Value	p-Value	df	Value	p-Value	df	Value	p-Value
BANKING SECTOR	HDFC Bank Ltd (HDBK)	12	10.015	0.615	12	11.475	0.489	12	14.999	0.241
	ICICI Bank Ltd (ICBK)	12	9.513	0.659	12	10.590	0.564	12	12.514	0.405
	State Bank of India (SBI)	12	8.888	0.712	12	10.575	0.566	12	30.984	0.002
	Kotak Mahindra Bank Ltd (KOTAKBANK)	12	11.657	0.474	12	13.683	0.321	12	17.633	0.127
IT SECTOR	Tata Consultancy Services (TCS)	12	13.870	0.309	12	16.293	0.178	12	4.865	0.962
	Infosys Ltd (INFY)	12	9.362	0.672	12	11.071	0.523	12	2.287	0.999
	HCL Tech (HCLT)	12	14.816	0.252	12	16.714	0.161	12	11.761	0.465
	Wipro Ltd (WIPRO)	12	6.892	0.865	12	7.865	0.796	12	7.847	0.797
FMCG SECTOR	Hindustan Unilever Ltd (HINDUNILVR)	12	8.084	0.779	12	8.917	0.710	12	5.880	0.992
	Nestle India Ltd (NESTLEIND)	12	12.320	0.420	12	14.550	0.267	12	6.048	0.914
	Godrej Consumer Products (GOCP)	12	7.983	0.786	12	8.410	0.752	12	3.384	0.992
	ITC Ltd (ITC)	12	10.429	0.578	12	11.968	0.448	12	5.890	0.922

Inference

Table 2 presents the results of white noise tests for returns of the selected securities, examining whether patterns or trends exist in these returns. The Box-Pierce statistic, Ljung-Box statistic, and McLeod-Li statistic at 12 degrees of freedom indicate that almost all companies show no significant patterns in their returns at a 5% significance level. The p-values generally exceed 0.05, ranging from 0.127 to 0.999 across most companies. However, State Bank of India (SBI) is an exception with a McLeod-Li statistic p-value of 0.002, which is statistically significant. This anomaly in SBI suggests the presence of potential patterns or heteroscedasticity in its returns, while all other analyzed securities across Banking, IT, and FMCG sectors display random, unpredictable return behavior. This randomness in returns is consistent with the efficient market hypothesis and suggests these securities generally follow a random walk pattern.

TABLE 3
DESCRIPTIVE STATISTICS

S.No	Portfolio	Company Name	Mean	Minimum	Maximum	Std. dev.
1	Banking Sector	HDFC Bank Ltd (HDBK)	1467.188	861.900	1796.050	209.819
		ICICI Bank Ltd (ICBK)	807.748	323.750	1300.100	276.274
		State Bank of India (SBI)	511.014	161.300	872.400	199.304
		Kotak Mahindra Bank Ltd (KOTAKBANK)	1745.933	1224.000	2031.150	183.156
2	IT Sector	Tata Consultancy Services (TCS)	3251.956	1781.590	4553.750	647.292
		Infosys Ltd (INFY)	1425.048	637.910	1943.700	333.805
		HCL Tech (HCLT)	1127.806	431.680	1910.980	350.933
		Wipro Ltd (WIPRO)	222.211	95.470	357.680	61.658
3	FMCG Sector	Hindustan Unilever Ltd (HINDUNILVR)	2398.944	2017.560	2946.570	212.539
		Nestle India Ltd (NESTLEIND)	2012.210	1535.940	2689.950	322.937
		Godrej Consumer Products (GOCP)	933.180	520.850	1481.200	232.550
		ITC Ltd (ITC)	316.064	164.240	518.150	113.555

Inference

Table 3 displays the descriptive statistics for the selected securities across three sectors. In the Banking sector, Kotak Mahindra Bank Ltd. has the highest mean price at 1745.933, followed by HDFC Bank Ltd. at 1467.188, while SBI has the lowest at 511.014. The IT sector shows TCS with the highest mean price (3251.956) and Wipro with the lowest (222.211). In the FMCG sector, Hindustan Unilever leads with a mean price of 2398.944, while ITC has the lowest at 316.064. Regarding volatility, ICICI Bank shows the highest standard deviation (276.274) in the Banking sector, TCS (647.292) in the IT sector, and Nestle India (322.937) in the FMCG sector. The price ranges (between minimum and maximum) are particularly wide for TCS (1781.590 to 4553.750) and ICICI Bank (323.750 to 1300.100), indicating substantial price movements during the study period. These descriptive statistics provide crucial insights into the central tendency and dispersion of security prices, forming a foundation for understanding risk and return characteristics.

TABLE 4
**TEST OF AUTOCORRELATION AND PARTIAL AUTOCORRELATION
OF BANKING SECTOR**

Lag	HDFC Bank Ltd (HDBK)		ICICI Bank Ltd (ICBK)		State Bank of India (SBI)		Kotak Mahindra Bank Ltd (KOTAKBANK)	
	ACF	PACF	ACF	PACF	ACF	PACF	ACF	PACF
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	-0.216	-0.216	-0.228	-0.228	-0.026	-0.026	-0.014	-0.014
2	-0.014	-0.064	0.128	0.080	0.019	0.019	-0.155	-0.155
3	0.005	-0.013	0.078	0.131	0.206	0.207	-0.137	-0.145
4	0.053	0.053	0.040	0.079	-0.069	-0.060	0.015	-0.017
5	-0.088	-0.068	-0.203	-0.221	-0.039	-0.053	-0.082	-0.132
6	0.155	0.131	0.101	-0.017	0.057	0.016	0.160	0.140
7	-0.026	0.032	-0.035	0.034	-0.007	0.025	-0.188	-0.233
8	-0.269	-0.279	-0.116	-0.088	-0.109	-0.102	-0.155	-0.157
9	-0.057	-0.195	-0.089	-0.153	-0.207	-0.247	-0.051	-0.103
10	0.061	-0.032	0.036	-0.033	-0.002	-0.009	0.177	0.051
11	-0.070	-0.055	-0.084	0.002	-0.081	-0.018	0.108	0.090
12	-0.028	-0.057	-0.012	-0.004	-0.184	-0.129	-0.117	-0.196
13	0.007	-0.036	-0.045	-0.102	-0.020	-0.084	-0.039	0.041
14	-0.036	0.020	-0.032	-0.098	0.031	0.059	0.078	0.042
15	-0.081	-0.075	-0.031	-0.017	-0.076	0.014	0.057	0.022
16	0.101	-0.047	-0.040	-0.058	-0.087	-0.135	-0.121	-0.194
17	-0.066	-0.138	-0.072	-0.137	0.073	-0.016	-0.014	-0.044
18	-0.058	-0.132	0.111	0.055	0.018	0.033	-0.163	-0.110

Inference

Table 4 reveals the autocorrelation and partial autocorrelation patterns of banking sector securities. The results indicate that present returns for HDFC Bank exhibit negative first-order autocorrelation (-0.216) and stronger negative eighth-order autocorrelation (-0.269), suggesting price reversals at these lags. ICICI Bank shows negative first-order correlation (-0.228) and negative fifth-order correlation (-0.203), indicating cyclical patterns in its returns. SBI demonstrates weaker first-order correlation (-0.026) but stronger positive third-order correlation (0.206), suggesting quarterly seasonality effects. Kotak Mahindra Bank exhibits negative correlations at lags 2, 3, 7, and 8 (-0.155, -0.137, -0.188, and -0.155 respectively). The PACF values further refine these insights, with HDFC Bank showing significant partial autocorrelation at lags 1, 8, and 9 (-0.216, -0.279, and -0.195), while ICICI Bank exhibits significant values at lags 1 and 5 (-0.228 and -0.221). These patterns indicate that past returns influence current returns in banking stocks, but the relationship varies across different time lags and specific securities.

HDFC BANK LTD

FIGURE 1

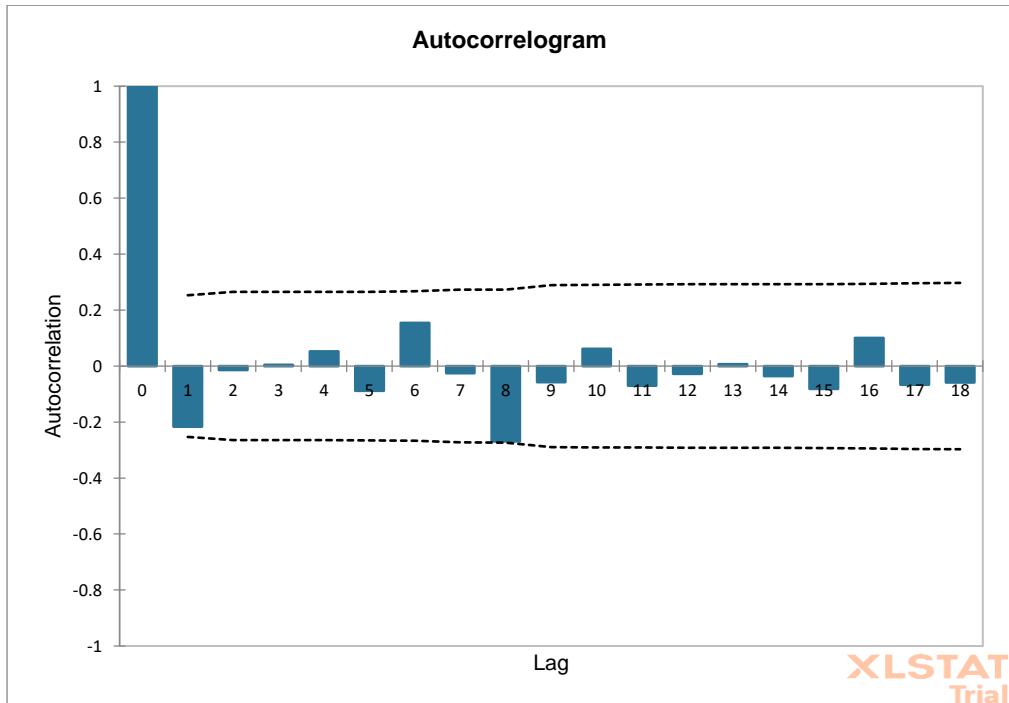
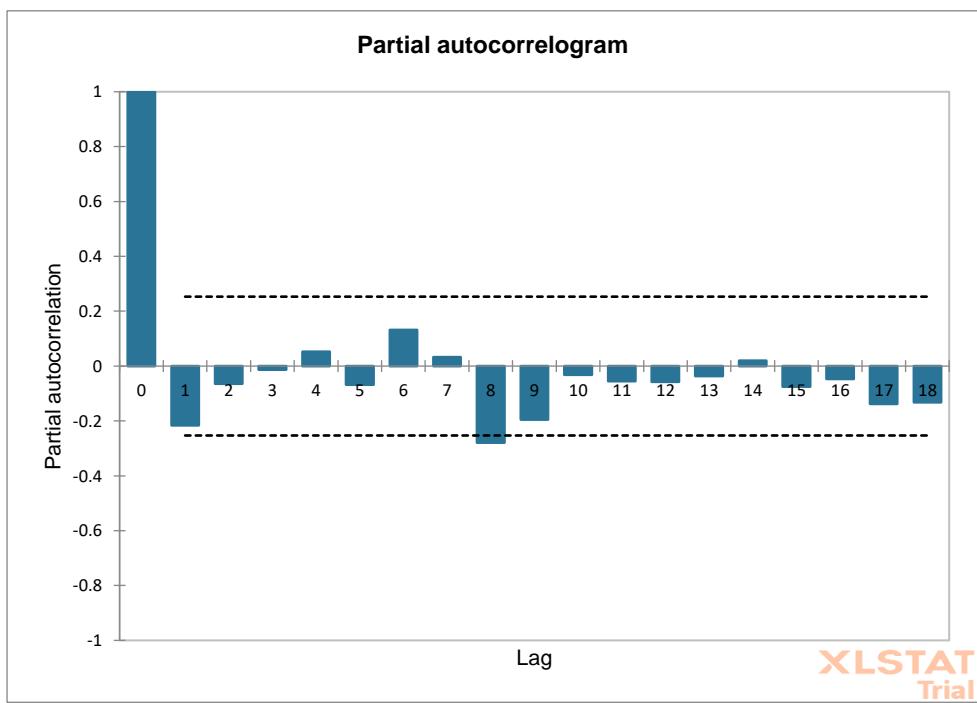


FIGURE 2



ICICI BANK LTD

FIGURE 3

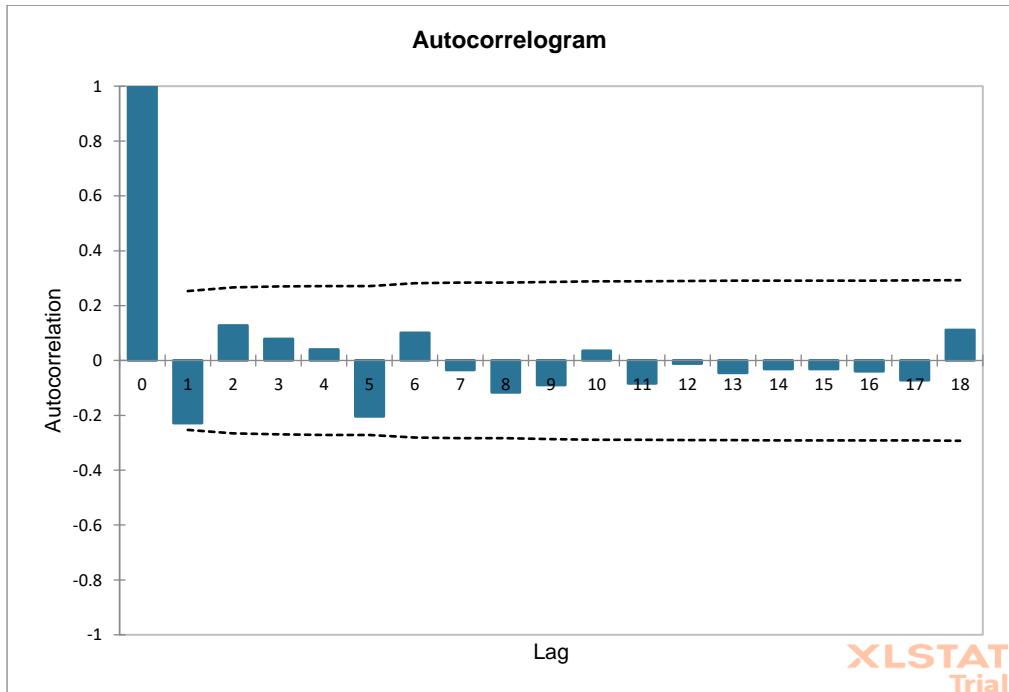
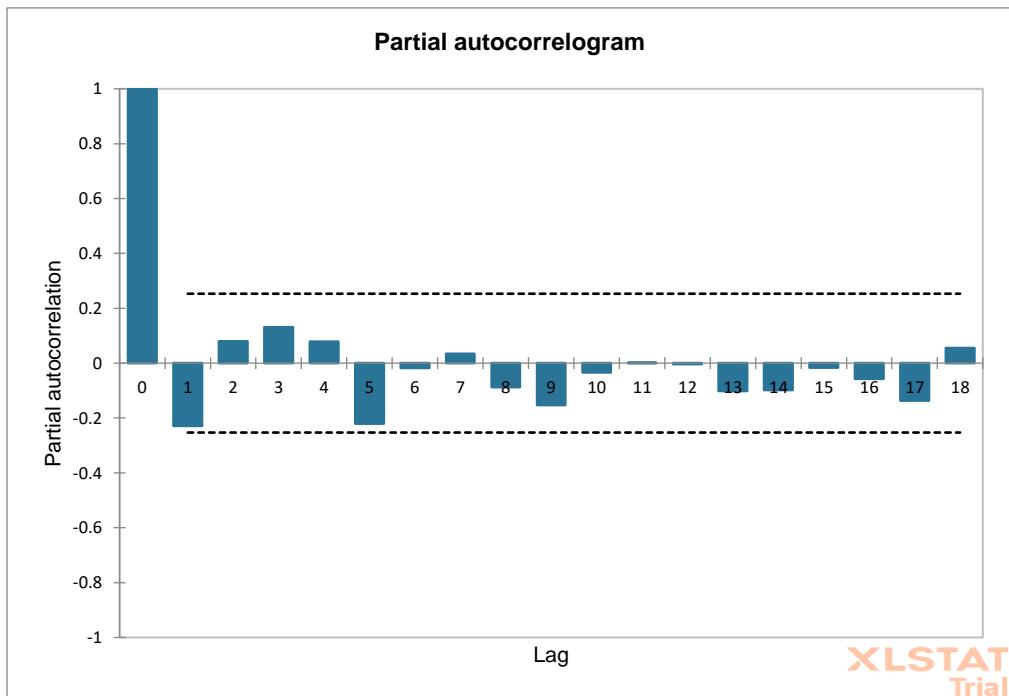


FIGURE 4



State Bank of India

FIGURE 5

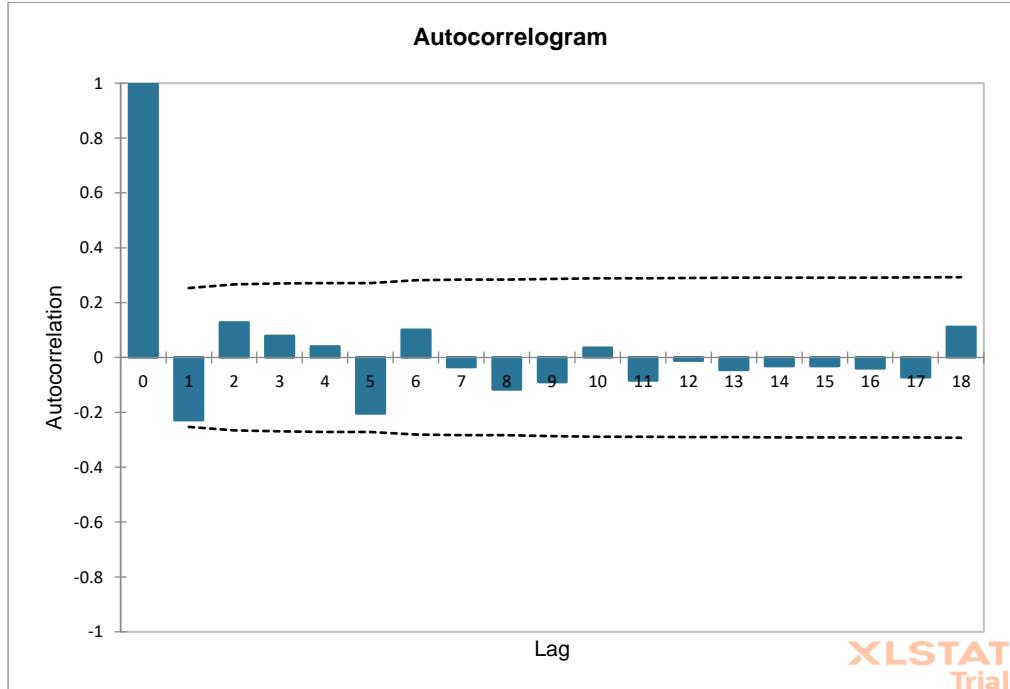
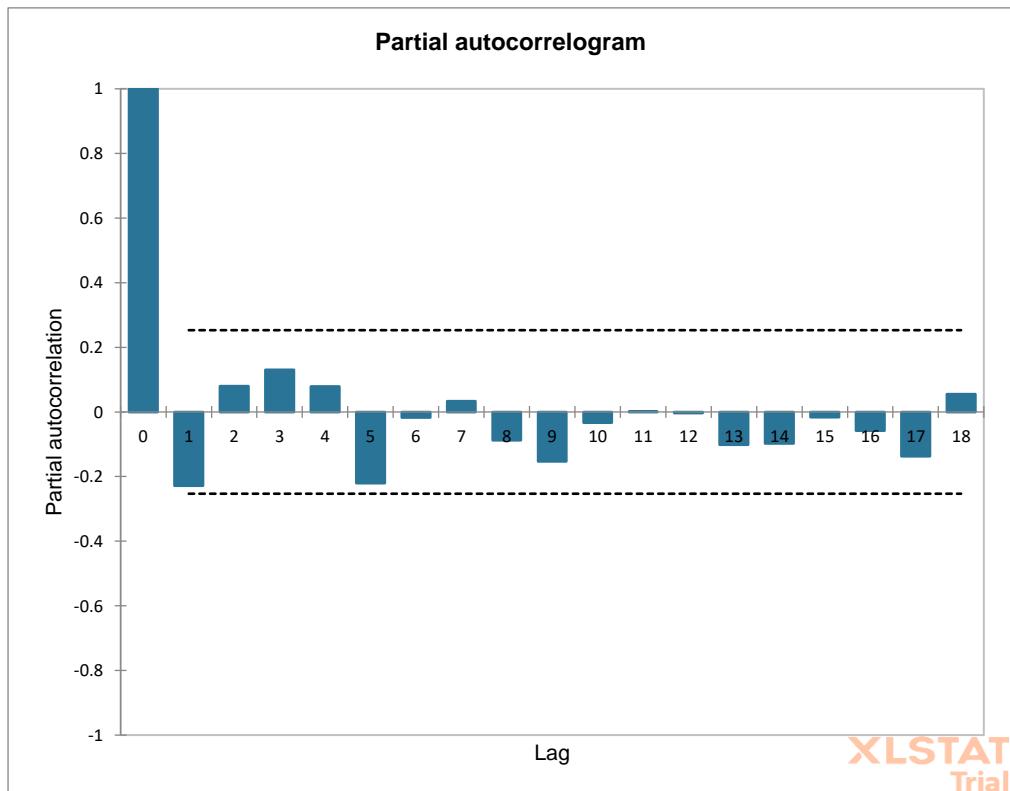


FIGURE 6



Kotak Mahindra Bank Limited.

FIGURE 7

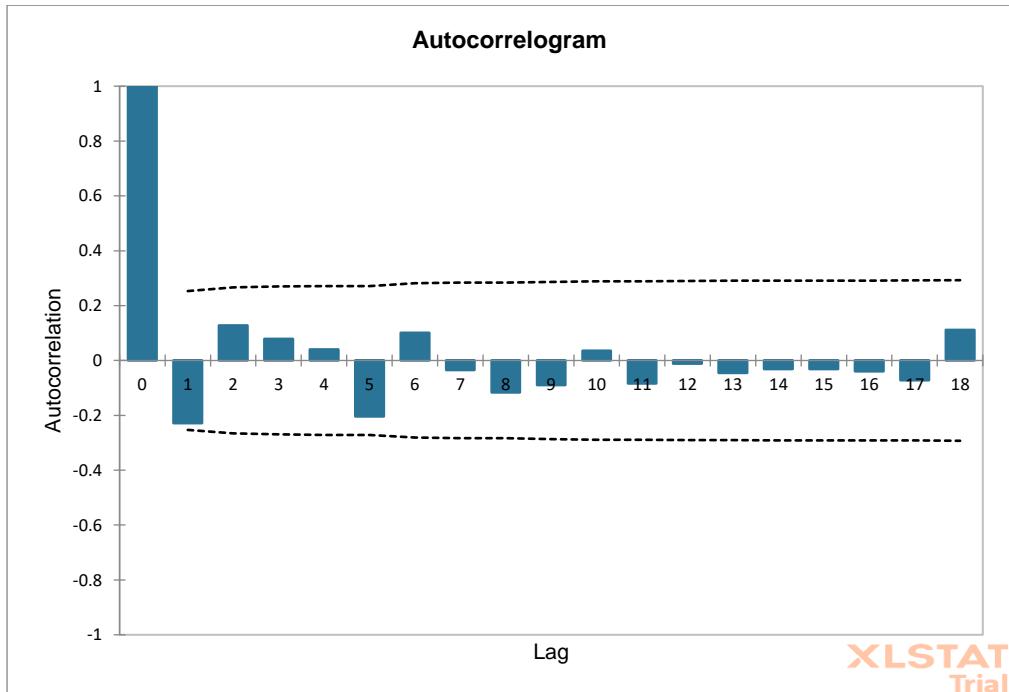


FIGURE 8

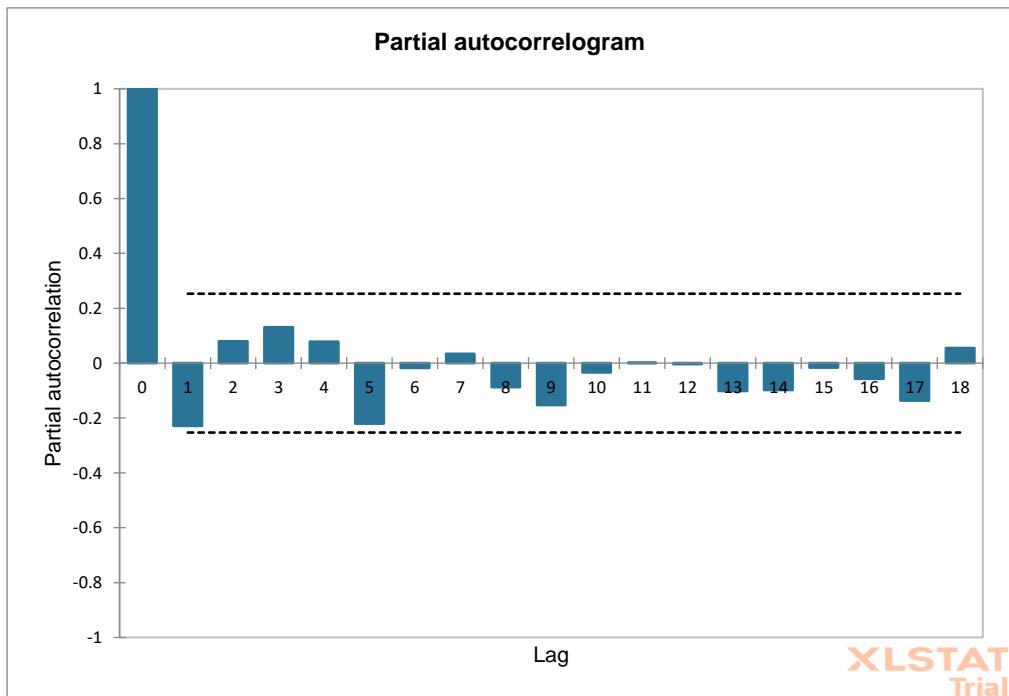


TABLE 5
**TEST OF AUTOCORRELATION AND PARTIAL AUTOCORRELATION
OF IT SECTOR**

Lag	Tata Consultancy Services (TCS)		Infosys Ltd (INFY)		HCL Tech (HCLT)		Wipro (WIPRO)	
	ACF	PACF	ACF	PACF	ACF	PACF	ACF	PACF
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	-0.185	-0.185	0.002	0.002	-0.109	-0.109	0.048	0.048
2	-0.089	-0.128	-0.088	-0.088	-0.090	-0.103	0.164	0.162
3	0.170	0.134	0.112	0.114	0.253	0.236	0.125	0.113
4	-0.149	-0.107	-0.186	-0.199	-0.307	-0.285	0.120	0.090
5	0.110	0.100	0.070	0.105	0.041	0.051	0.058	0.017
6	-0.004	-0.016	0.077	0.020	-0.048	-0.181	0.053	0.007
7	0.103	0.170	0.056	0.123	-0.111	0.041	0.169	0.140
8	0.044	0.045	0.121	0.071	0.154	0.018	0.015	-0.016
9	-0.130	-0.066	-0.149	-0.127	-0.077	-0.005	-0.055	-0.119
10	-0.123	-0.226	-0.062	-0.042	-0.040	-0.082	-0.009	-0.050
11	0.240	0.218	0.195	0.186	0.116	0.057	0.096	0.100
12	-0.154	-0.139	0.093	0.141	-0.090	-0.046	-0.092	-0.083
13	-0.059	-0.029	-0.038	-0.087	0.036	0.049	-0.058	-0.080
14	0.229	0.091	0.006	-0.044	0.147	0.110	-0.075	-0.088
15	-0.188	-0.027	-0.073	-0.043	0.007	0.104	-0.080	-0.052
16	-0.024	-0.083	-0.178	-0.138	-0.118	-0.196	-0.204	-0.142
17	-0.039	-0.054	0.041	0.035	0.025	0.033	0.001	0.061
18	-0.108	-0.158	-0.077	-0.173	-0.267	-0.359	-0.264	-0.251

Inference

Table 5 exhibits the autocorrelation and partial autocorrelation patterns of IT sector securities. TCS displays negative first-order autocorrelation (-0.185) and positive third-order autocorrelation (0.170), suggesting quarterly cyclical patterns, with strong positive eleventh-order correlation (0.240) indicating potential annual seasonality. Infosys shows negligible first-order correlation (0.002) but substantial negative fourth-order correlation (-0.186) and positive eleventh-order correlation (0.195), suggesting quarterly and annual patterns. HCL Tech demonstrates significant third-order correlation (0.253) and fourth-order correlation (-0.307), indicating strong quarterly effects. Wipro shows positive second-order correlation (0.164) and seventh-order correlation (0.169), suggesting bi-monthly and quarterly patterns. The PACF values provide additional insights, with TCS showing significant partial autocorrelations at lags 1, 10, and 11 (-0.185, -0.226, and 0.218), while HCL Tech exhibits strong values at lags 3, 4, and 18 (0.236, -0.285, and -0.359). These autocorrelation patterns reveal that past returns continue to influence current returns in IT stocks, with varying degrees of persistence across different time horizons.

Tata Consultancy Services (TCS)

FIGURE 9

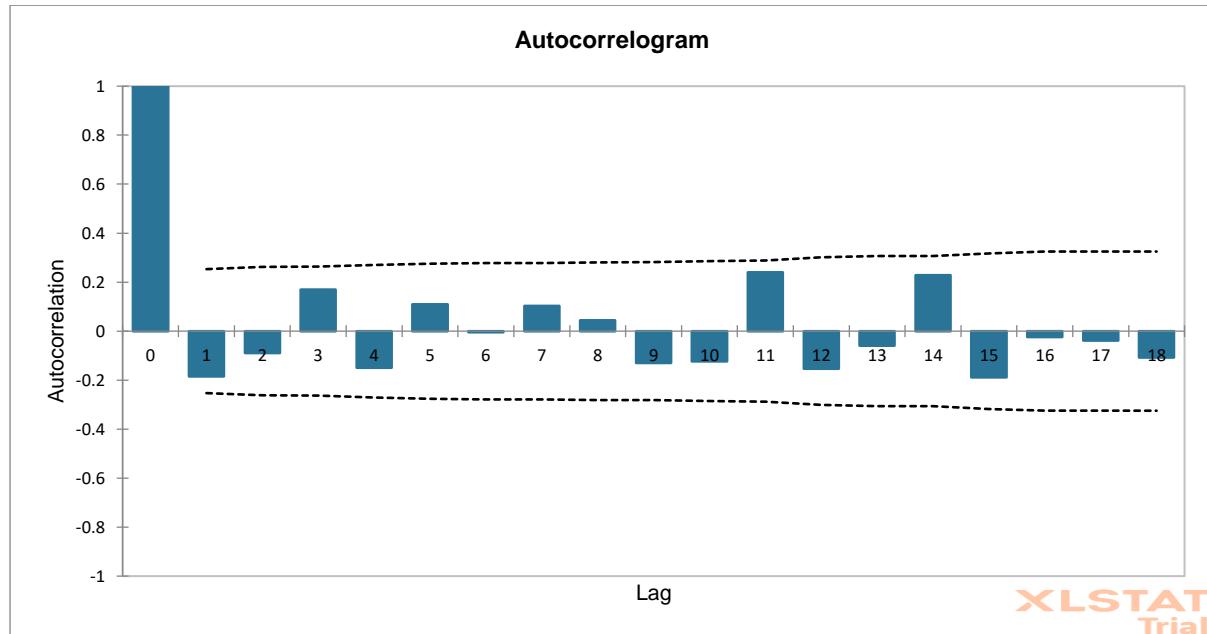


FIGURE 10

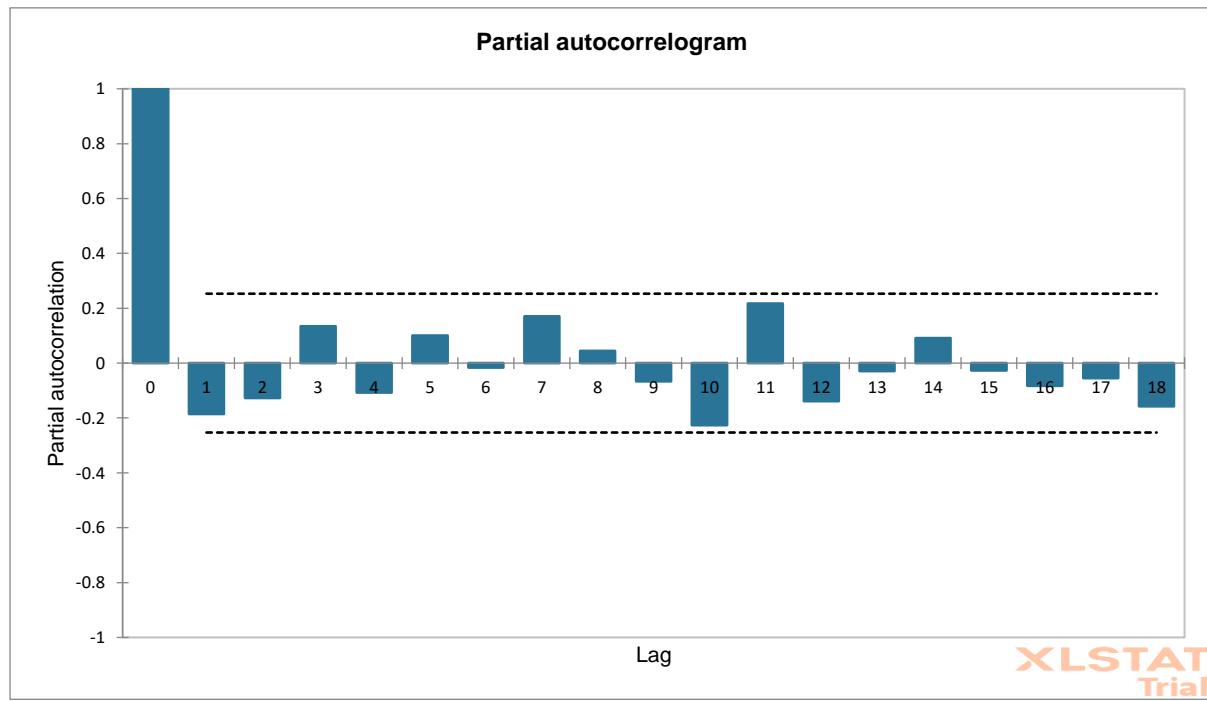


FIGURE 11

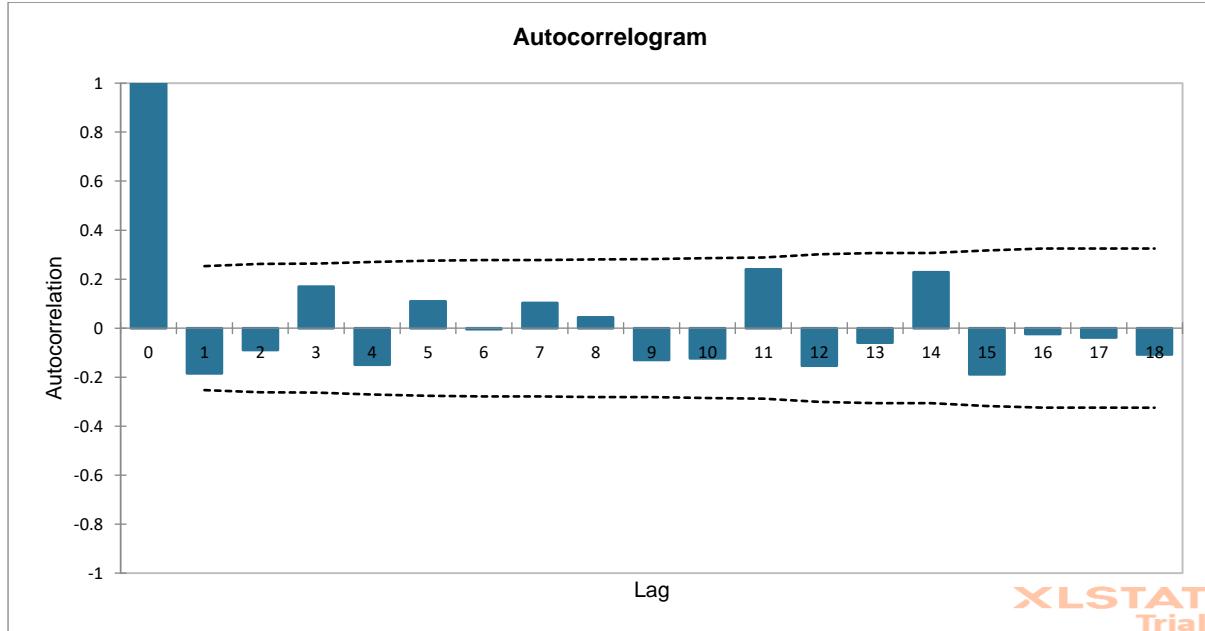


FIGURE 12

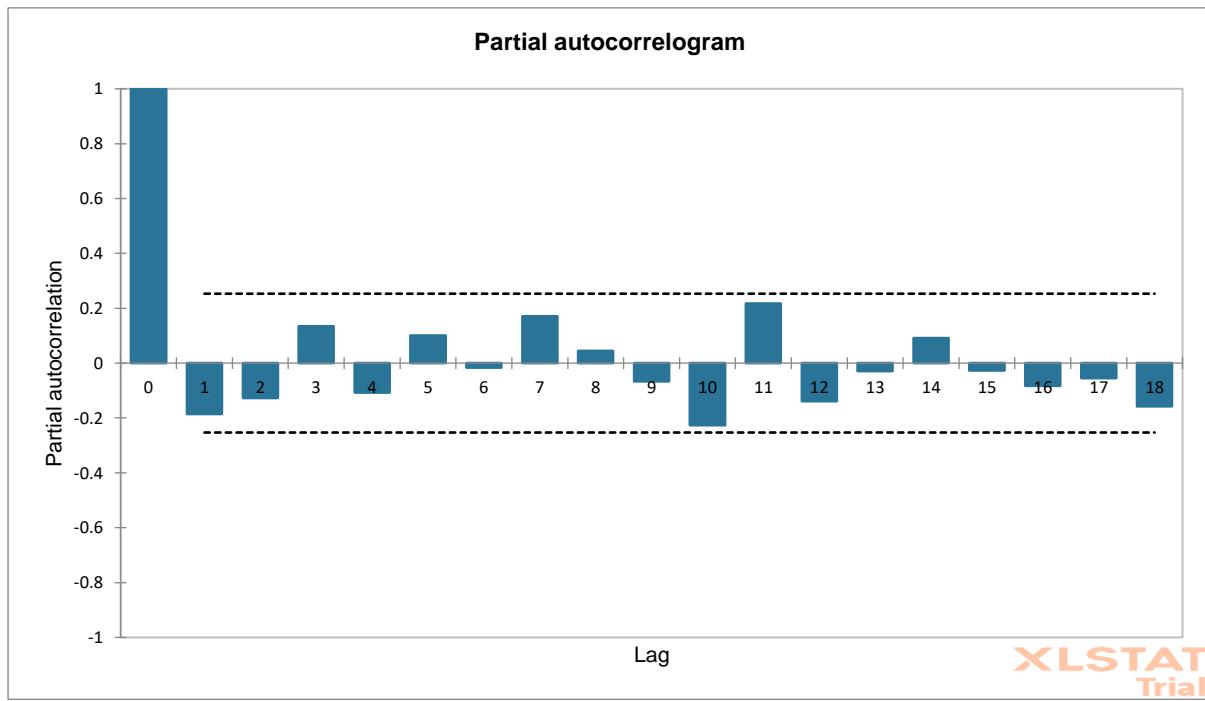


FIGURE 13

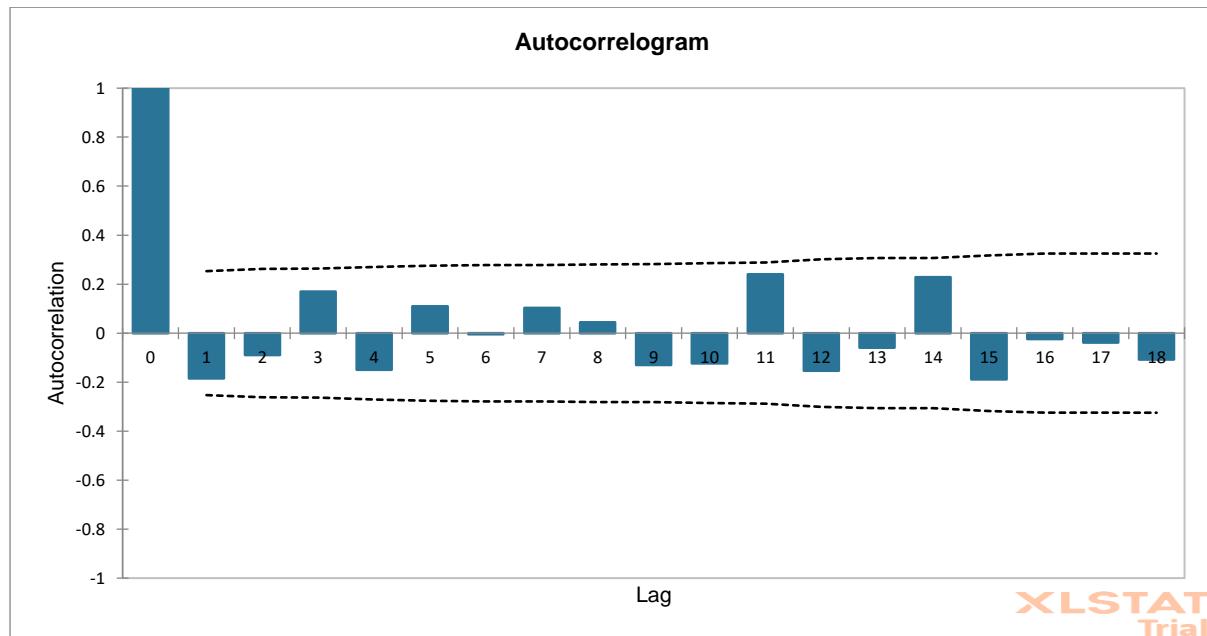


FIGURE 14

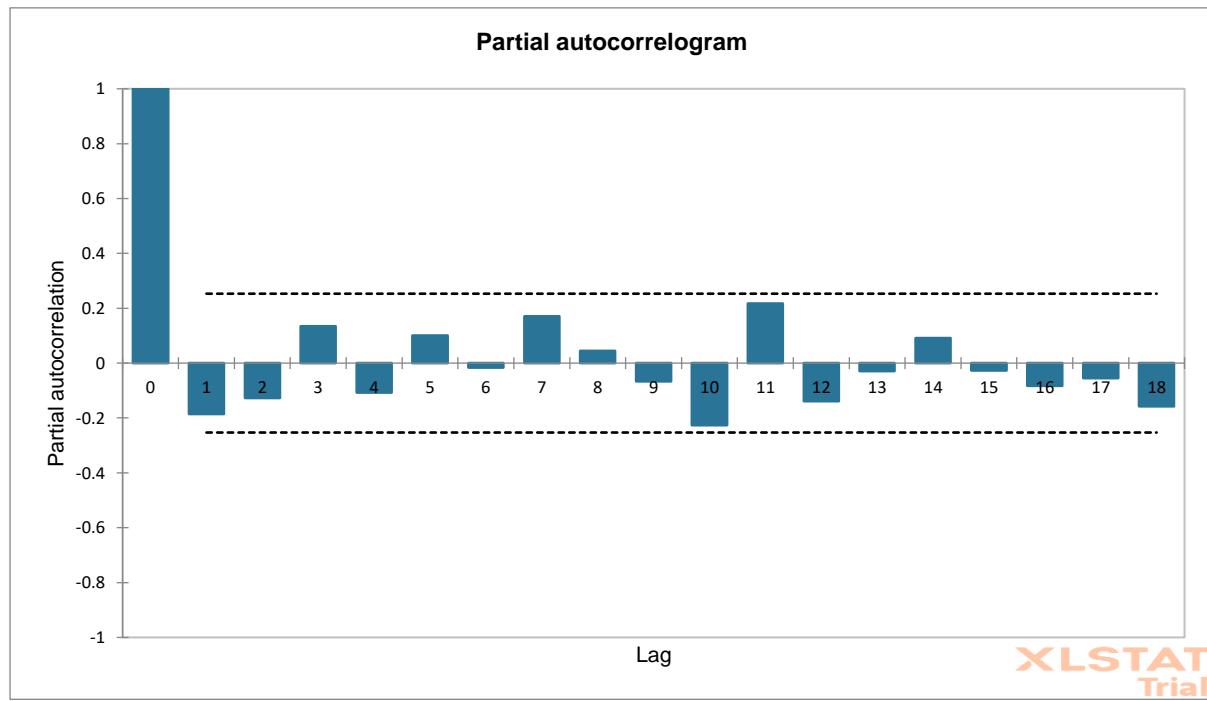


FIGURE 15

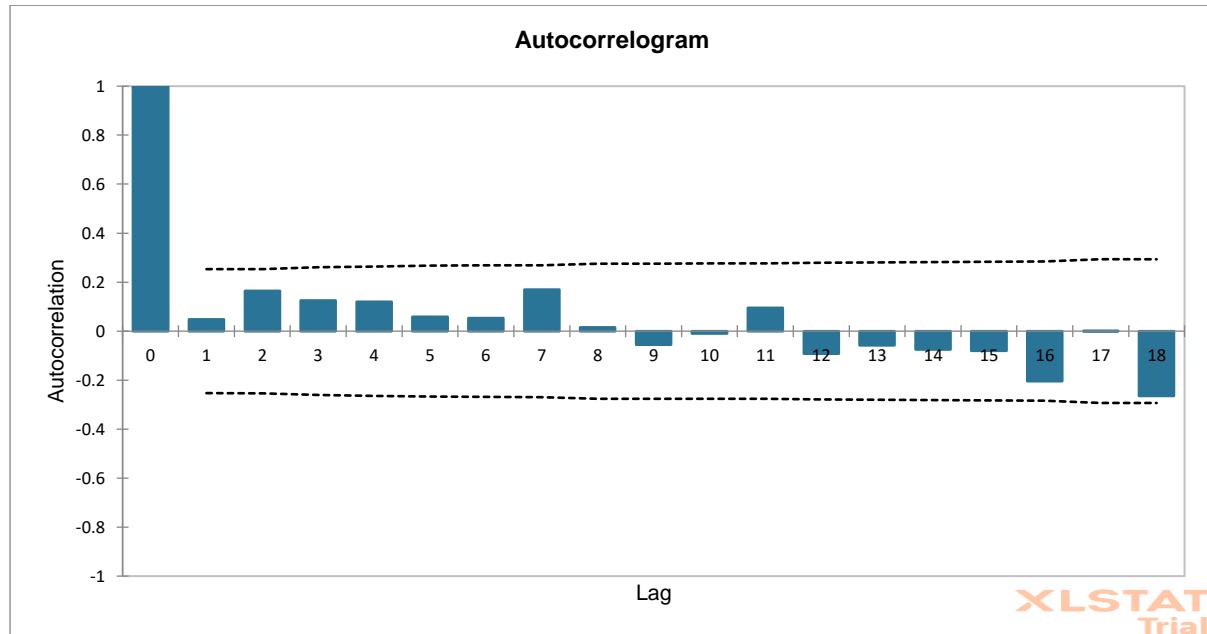


FIGURE 16

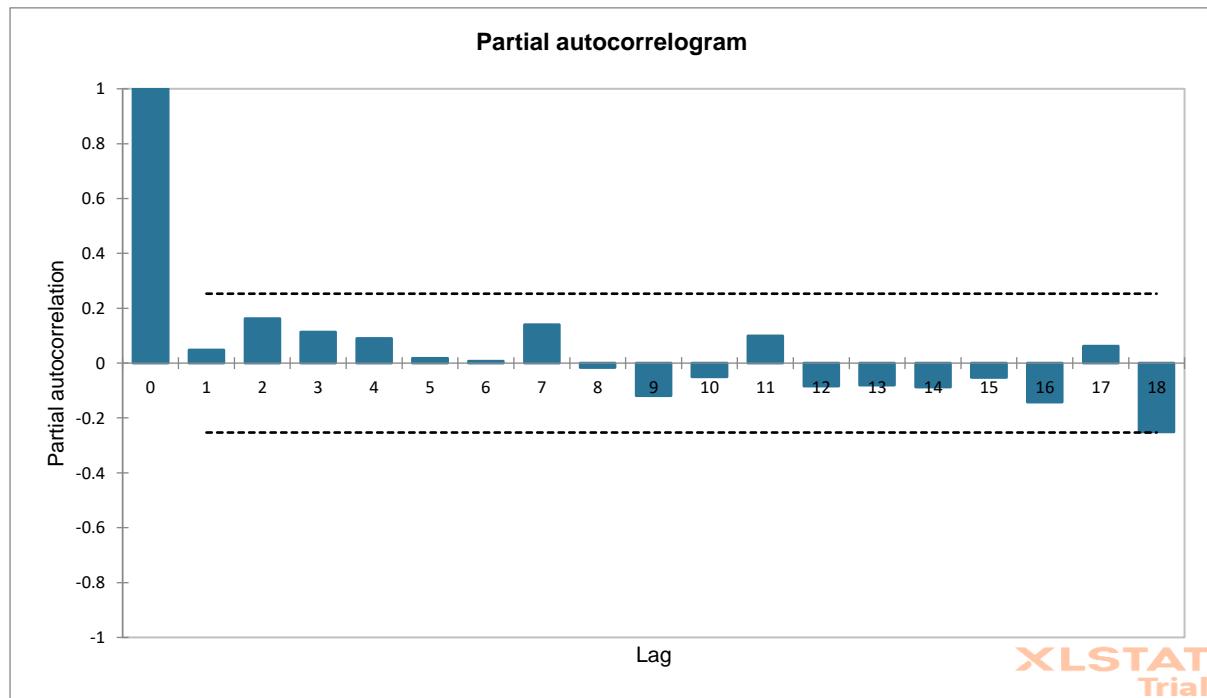


TABLE 6
**TEST OF AUTOCORRELATION AND PARTIAL AUTOCORRELATION
OF FMCG SECTOR**

Lag	Hindustan Unilever Ltd (HINDUNILVR)		Nestle India Ltd (NESTLEIND)		Godrej Consumer Products (GOCP)		ITC Ltd (ITC)	
	ACF	PACF	ACF	PACF	ACF	PACF	ACF	PACF
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1	-0.153	-0.153	-0.138	-0.138	0.069	0.069	0.078	0.078
2	-0.076	-0.102	-0.077	-0.098	0.009	0.004	-0.147	-0.154
3	-0.055	-0.086	-0.015	-0.041	-0.168	-0.170	-0.113	-0.090
4	-0.066	-0.102	-0.212	-0.235	-0.014	0.009	0.076	0.073
5	-0.085	-0.135	-0.093	-0.184	-0.156	-0.156	-0.180	-0.231
6	-0.058	-0.130	0.098	0.001	-0.034	-0.043	0.192	0.264
7	-0.198	-0.298	-0.005	-0.042	-0.066	-0.064	0.136	0.043
8	0.172	0.012	0.157	0.107	0.073	0.030	-0.005	-0.018
9	0.115	0.057	0.022	0.018	-0.186	-0.220	-0.130	-0.006
10	-0.149	-0.197	-0.215	-0.191	-0.157	-0.196	0.123	0.080
11	0.049	-0.065	0.170	0.150	0.088	0.118	-0.082	-0.077
12	-0.139	-0.260	-0.128	-0.072	0.106	-0.002	-0.033	0.000
13	0.185	0.074	-0.111	-0.110	0.121	0.067	-0.006	-0.036
14	0.013	-0.032	0.109	-0.018	0.038	-0.005	0.083	0.007
15	-0.062	-0.060	-0.042	-0.066	-0.061	-0.120	-0.002	0.086
16	0.057	0.028	0.035	0.023	-0.123	-0.117	0.166	0.127
17	0.054	-0.066	0.083	0.002	-0.148	-0.126	0.022	0.011
18	-0.024	0.036	-0.206	-0.189	0.025	0.054	-0.218	-0.204

Inference

Table 6 shows the autocorrelation and partial autocorrelation patterns of FMCG sector securities. Hindustan Unilever demonstrates negative first-order autocorrelation (-0.153) and stronger negative seventh-order autocorrelation (-0.198), suggesting price reversals at these lags. Nestle India shows negative first-order correlation (-0.138) and stronger negative fourth-order and tenth-order correlations (-0.212 and -0.215), indicating quarterly and bi-annual cyclical patterns. Godrej Consumer Products exhibits negative third-order correlation (-0.168) and ninth-order correlation (-0.186), suggesting quarterly seasonality effects. ITC presents mixed patterns with positive first-order correlation (0.078) and sixth-order correlation (0.192), but negative fifth-order correlation (-0.180). The PACF values further refine these insights, with Hindustan Unilever showing significant values at lags 1 and 7 (-0.153 and -0.298), while Nestle India exhibits strong values at lags 1 and 4 (-0.138 and -0.235). These patterns indicate that past returns influence current returns in FMCG stocks, with varying degrees of significance across different time periods and specific securities.

Hindustan Unilever Ltd (HINDUNILVR)

FIGURE 17

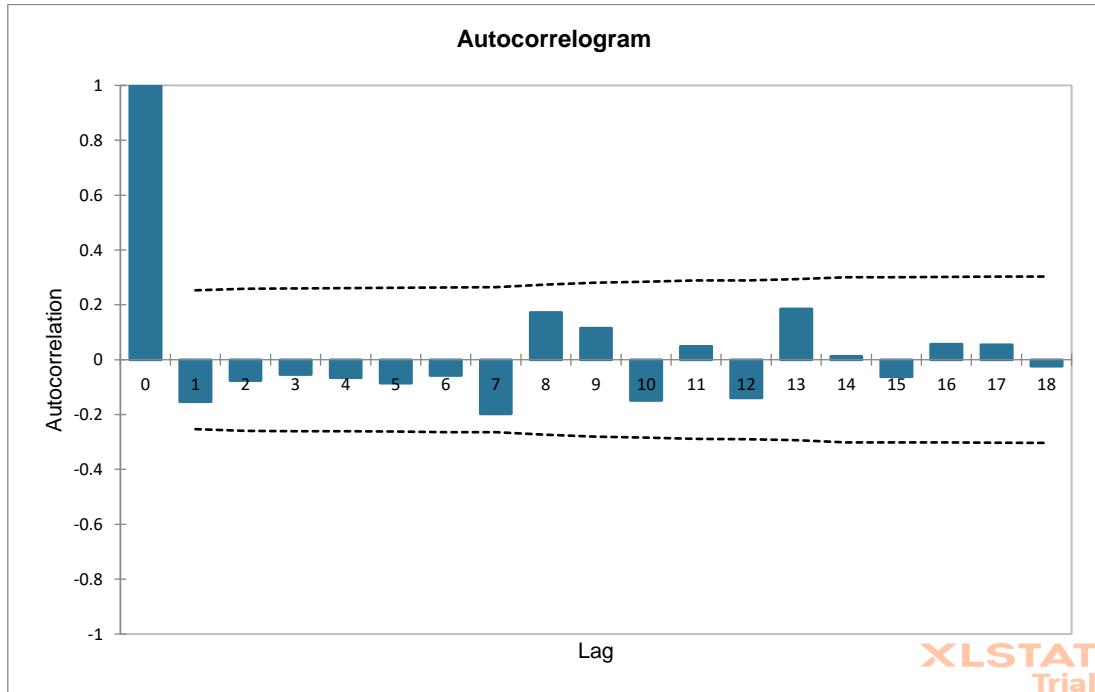
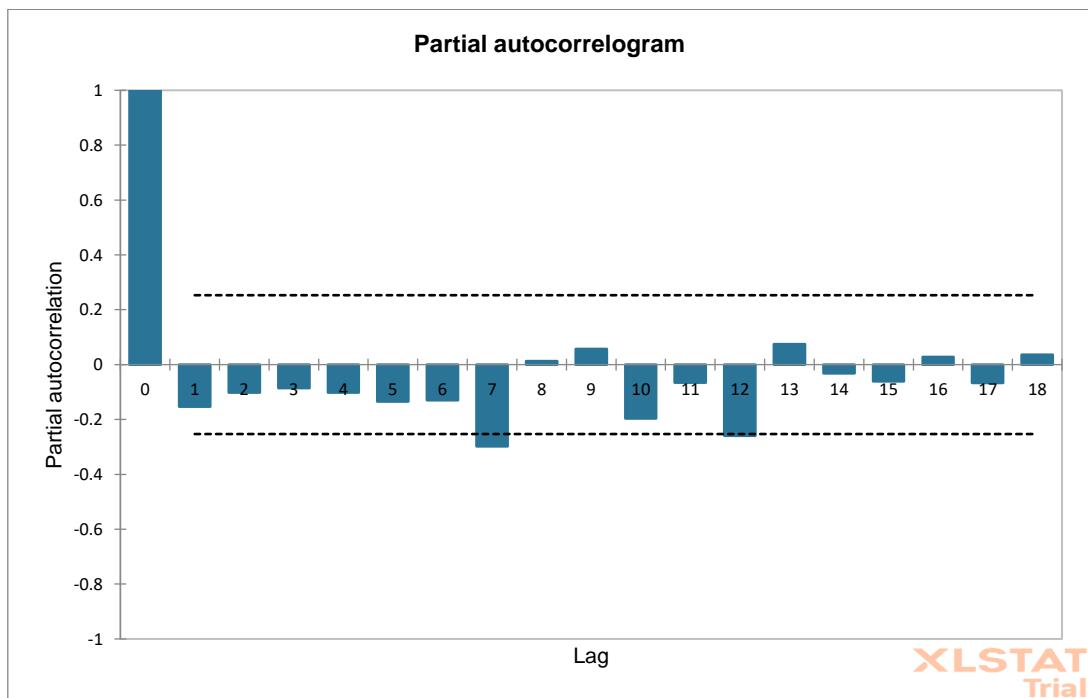


FIGURE 18



Nestle India Ltd (NESTLEIND)

FIGURE 19

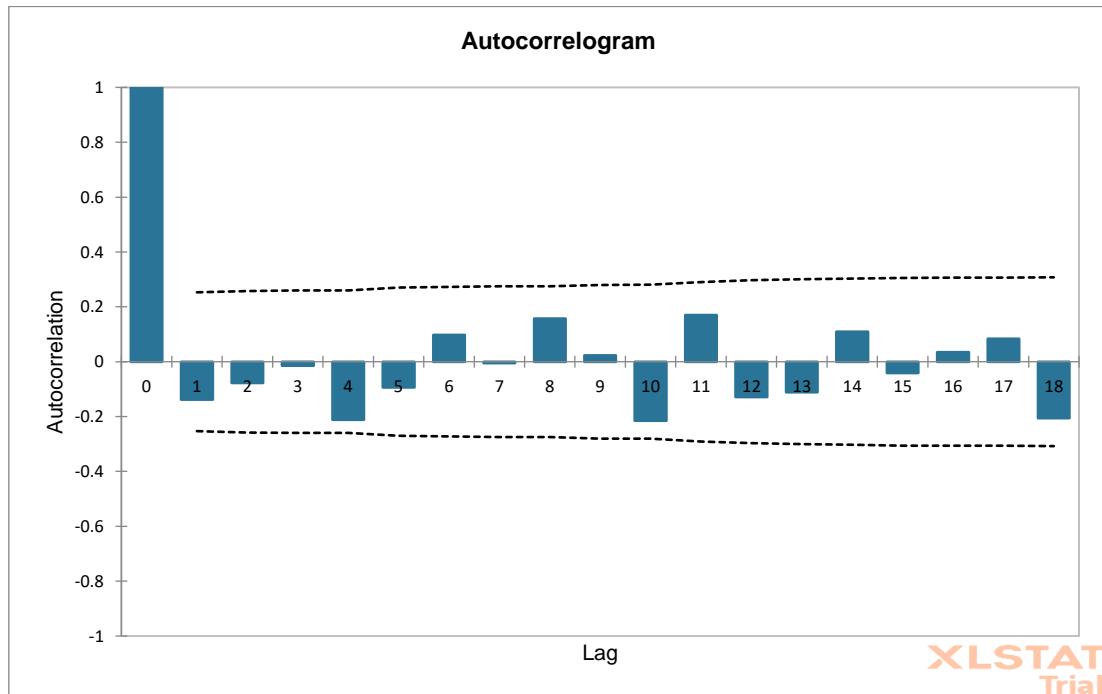
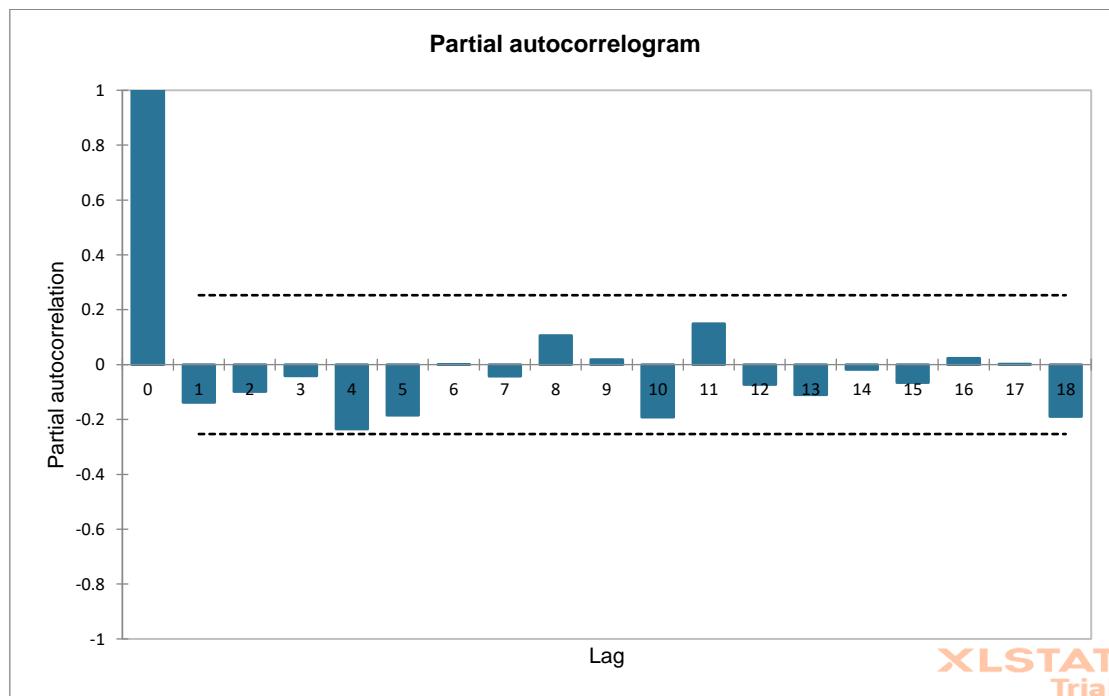


FIGURE 20



Godrej Consumer Products (GOCP)

FIGURE 21

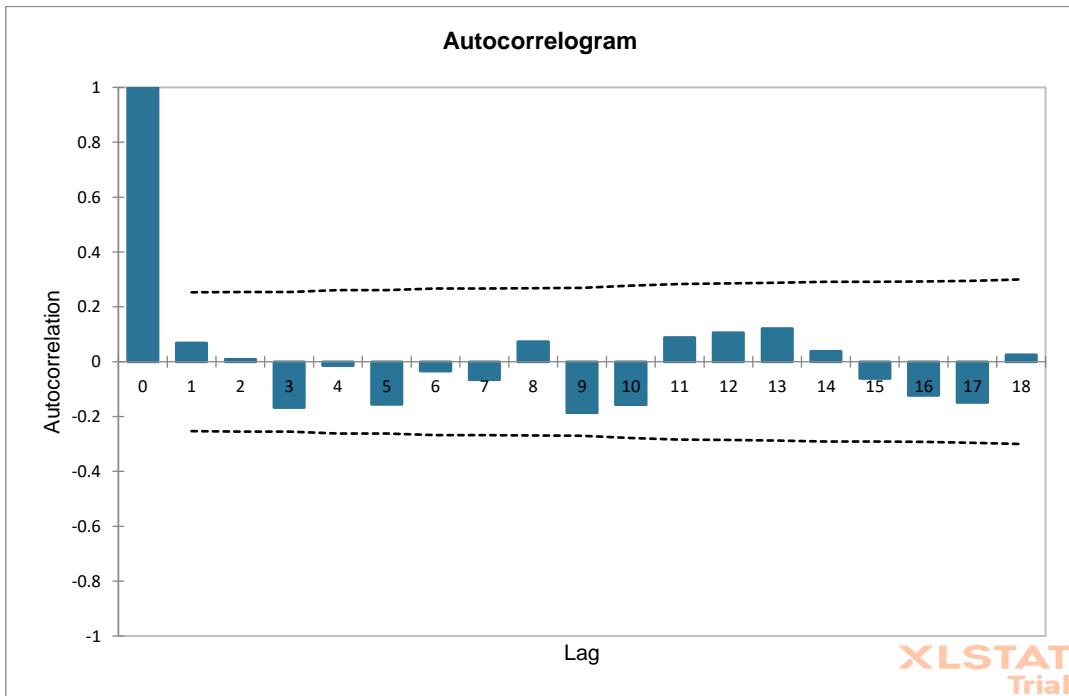
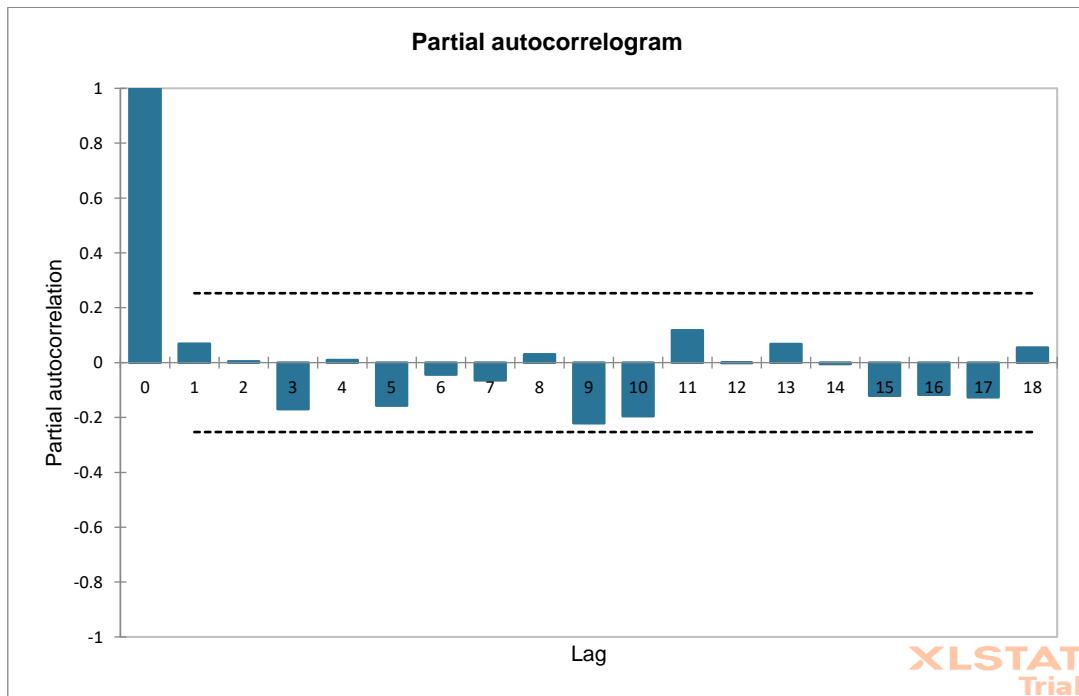


FIGURE 22



ITC Ltd (ITC)

FIGURE 23

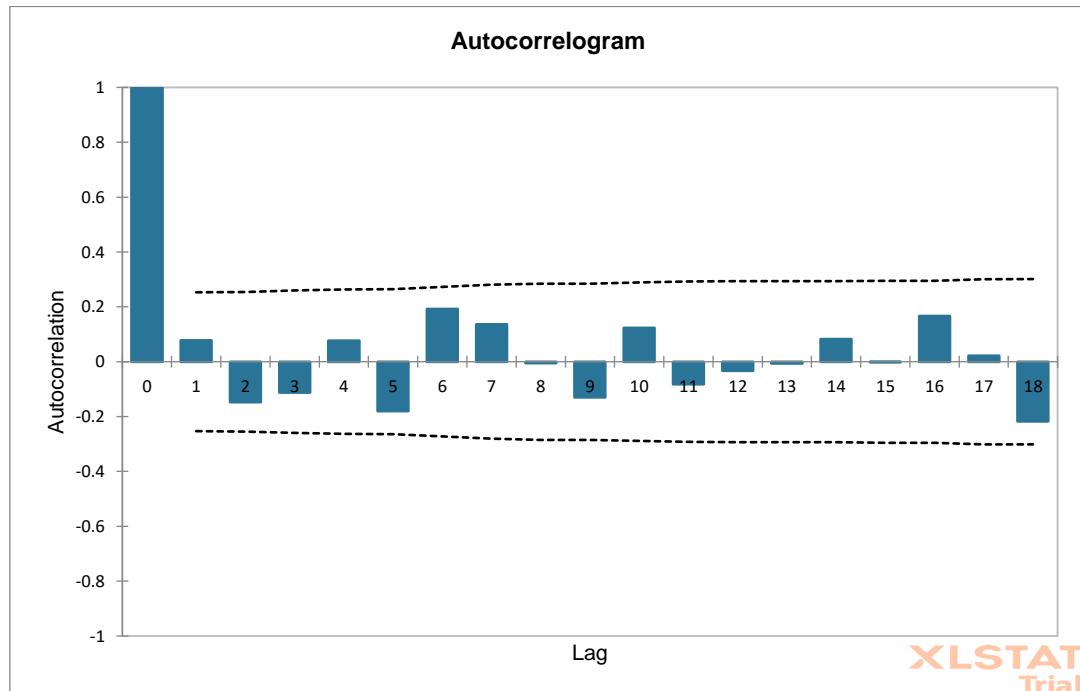


FIGURE 24

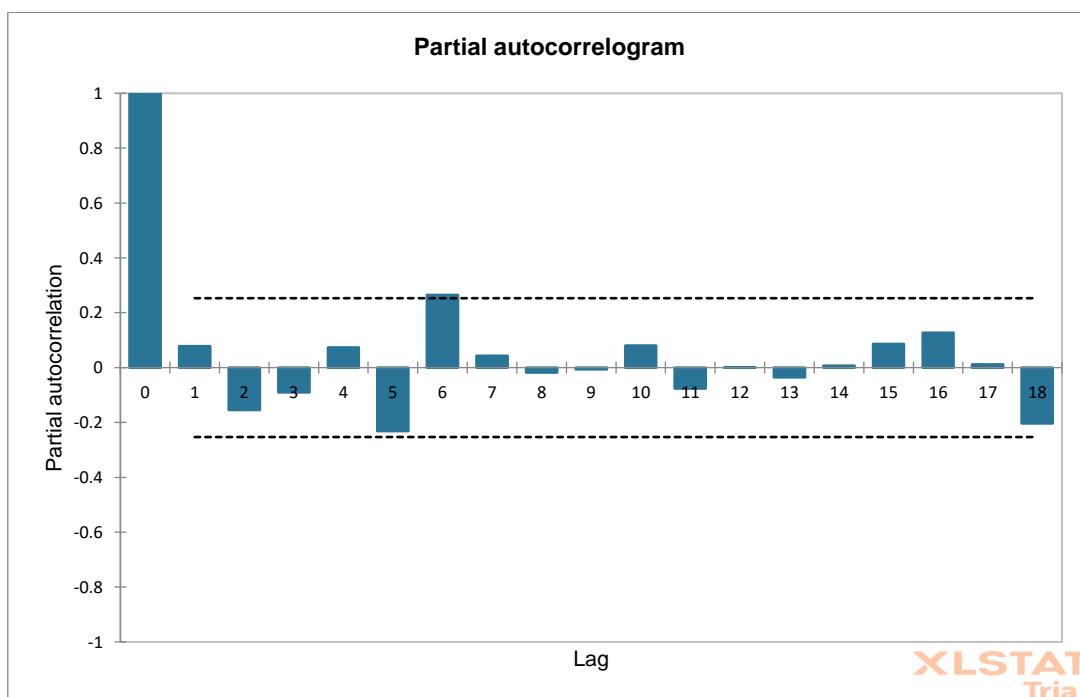


TABLE 7
STATIONARITY TEST

S.No	Portfolio	Company Name	Observed Tau Value	Critical Value	P - Value
1	Banking Sector	HDFC Bank Ltd (HDBK)	-4.275	-3.448	0.006
		ICICI Bank Ltd (ICBK)	-4.179	-3.448	0.008
		State Bank of India (SBI)	-5.063	-3.448	0.000
		Kotak Mahindra Bank Ltd (KOTAKBANK)	-5.350	-3.448	0.000
2	IT Sector	Tata Consultancy Services (TCS)	-4.450	-3.448	0.003
		Infosys Ltd (INFY)	-4.756	-3.448	0.001
		HCL Tech (HCLT)	-4.324	-3.448	0.005
		Wipro Ltd (WIPRO)	-2.745	-3.448	0.214
3	FMCG Sector	Hindustan Unilever Ltd (HINDUNILVR)	-4.427	-3.448	0.004
		Nestle India Ltd (NESTLEIND)	-5.209	-3.448	0.000
		Godrej Consumer Products (GOCP)	-3.742	-3.448	0.024
		ITC Ltd (ITC)	-3.665	-3.448	0.030

Inference

Table 7 presents the results of the stationarity test using the Augmented Dickey-Fuller (ADF) test. The results indicate that almost all securities across the three sectors exhibit stationarity in their returns, as evidenced by their observed Tau values being more negative than the critical value of -3.448 at a 5% significance level. In the Banking sector, all securities show strong stationarity with Tau values ranging from -4.179 (ICICI Bank) to -5.350 (Kotak Mahindra Bank) and corresponding p-values between 0.000 and 0.008. In the IT sector, TCS, Infosys, and HCL Tech demonstrate stationarity with Tau values of -4.450, -4.756, and -4.324 respectively, though Wipro stands as an exception with a Tau value of -2.745 and p-value of 0.214, indicating non-stationarity. All FMCG sector securities show stationarity with Tau values ranging from -3.665 (ITC) to -5.209 (Nestle India). These findings confirm that most security returns do not follow a random walk pattern and instead revert to their mean over time, making them suitable for time series forecasting and trading strategies.

TABLE 8
**RESULT OF TREYNOR RATIO ANALYSIS OF BANKING SECTOR
PORTFOLIO**

Treynor Ratio			
	Portfolio Banking Sector	Nifty 50	Risk free rate
Average raw return	0.012910435	0.012827365	0.54%
Average Excess return	0.007474296	0.007391226	0.54%
Beta	1.135125262	-18.28417395	0.54%
Treynor Ratio	0.006584556	-0.000404242	

Inference

Table 8 presents the Treynor ratio analysis for the Banking sector portfolio. The portfolio shows an average raw return of 1.29% (0.012910435), which is slightly higher than the Nifty 50 benchmark return of 1.28% (0.012827365). When adjusting for the risk-free rate of 0.54%, the portfolio's excess return stands at 0.75% (0.007474296). The portfolio demonstrates a beta of 1.135125262, indicating higher systematic risk than the market. The resulting Treynor ratio of 0.006584556 is significantly higher than the benchmark's negative ratio of -0.000404242. This positive Treynor ratio suggests that the Banking sector portfolio provided adequate compensation for each unit of systematic risk taken, outperforming the market benchmark on a risk-adjusted basis. The higher beta value also indicates that the Banking sector portfolio is more sensitive to market movements than the average security, which may be advantageous in bullish market conditions but carries greater downside risk during market corrections.

TABLE 9
**RESULT OF JENSEN ALPHA ANALYSIS OF BANKING SECTOR
PORTFOLIO**

Jensen's Alpha			
	Portfolio	NSE	Risk free rate
Average	0.012910435	0.012827365	0.54%
Alpha	-0.09%	0.00%	0.00%
Beta	1.135125262	-18.28417395	0.54%

Inference

Table 9 displays the Jensen alpha analysis for the Banking sector portfolio. The portfolio achieved an average return of 1.29% (0.012910435), which is marginally higher than the NSE benchmark return of 1.28% (0.012827365). However, the portfolio's alpha value is -0.09%, indicating slight underperformance relative to its expected return based on the CAPM model and its risk profile. With a beta of 1.135125262, which is substantially higher than the market beta of 1.0, the portfolio demonstrates greater systematic risk than the market. Despite achieving a higher raw return than the benchmark, the negative alpha suggests that the Banking sector portfolio did not generate sufficient excess returns to compensate for its elevated risk level. This finding indicates that while the portfolio may offer higher nominal returns than the market, it falls short in generating risk-adjusted outperformance, which could be attributed to inefficient stock selection or weighting within the Banking sector.

TABLE 10
**RESULT OF TREYNOR RATIO ANALYSIS OF IT SECTOR
PORTFOLIO**

Treynor Ratio			
	Portfolio IT Sector	Nifty 50	Risk free rate
Average raw return	0.018290901	0.012827365	0.54%
Average Excess return	0.012854762	0.007391226	0.54%
Beta	0.732820602	-18.2841739	0.54%
Treynor Ratio	0.017541486	-0.00040424	100.00%

Inference

Table 10 presents the Treynor ratio analysis for the IT sector portfolio. The portfolio exhibits an average raw return of 1.83% (0.018290901), which significantly exceeds the Nifty 50 benchmark return of 1.28% (0.012827365). After accounting for the risk-free rate of 0.54%, the portfolio's excess return stands at 1.29% (0.012854762). The portfolio has a beta of 0.732820602, indicating lower systematic risk than the market. The resulting Treynor ratio of 0.017541486 is substantially higher than the benchmark's negative ratio of -0.00040424. This notably positive Treynor ratio, more than twice the Banking sector's ratio, demonstrates that the IT sector portfolio provided exceptional compensation for each unit of systematic risk taken. The combination of higher returns and lower systematic risk makes the IT sector portfolio particularly attractive from a risk-adjusted performance perspective, suggesting superior risk management or sector-specific advantages during the analysis period.

TABLE 11
RESULT OF JENSEN ALPHA ANALYSIS OF IT SECTOR PORTFOLIO

Jensen's Alpha			
	Portfolio RI	NSE	Risk free rate
Average	0.018290901	0.012827365	0.54%
Alpha	0.74%	0.00%	0.00%
Beta	0.732820602	-18.2841739	0.54%

Inference

Table 11 shows the Jensen alpha analysis for the IT sector portfolio. The portfolio achieved an average return of 1.83% (0.018290901), significantly outperforming the NSE benchmark return of 1.28% (0.012827365). The portfolio's alpha value is a substantial 0.74%, indicating strong outperformance relative to its expected return based on the CAPM model. With a beta of 0.732820602, which is lower than the market beta of 1.0, the portfolio demonstrates lower systematic risk than the market. This combination of higher returns and lower systematic risk highlights the IT sector portfolio's exceptional performance. The positive alpha suggests that active management or successful stock selection within the IT sector generated significant excess returns beyond what would be expected based on its risk profile. This makes the IT sector portfolio an attractive investment option for investors seeking both outperformance and defensive characteristics in their portfolio composition.

TABLE 12
**RESULT OF TREYNOR RATIO ANALYSIS OF FMCG SECTOR
PORTFOLIO**

Treynor Ratio			
	Portfolio FMCG Sector	Nifty 50	Riskfree rate
Average raw return	0.009590998	0.012827365	0.54%
Average Excess return	0.00415486	0.007391226	0.54%
Beta	0.462094335	-18.28417395	0.54%
Treynor Ratio	0.008991366	-0.000404242	

Inference

Table 12 presents the Treynor ratio analysis for the FMCG sector portfolio. The portfolio shows an average raw return of 0.96% (0.009590998), which is lower than the Nifty 50 benchmark return of 1.28% (0.012827365). After adjusting for the risk-free rate of 0.54%, the portfolio's excess return stands at 0.42% (0.00415486). The portfolio has a beta of 0.462094335, indicating significantly lower systematic risk than the market. Despite the lower raw return, the resulting Treynor ratio of 0.008991366 is higher than both the benchmark's negative ratio of -0.000404242 and the Banking sector's ratio of 0.006584556. This positive Treynor ratio suggests that while the FMCG sector portfolio provided lower nominal returns, it efficiently compensated investors for each unit of systematic risk taken. The substantially lower beta value also indicates that the FMCG sector portfolio offers defensive characteristics, which may be particularly valuable during market downturns or periods of economic uncertainty.

TABLE 13
**RESULT OF JENSEN ALPHA ANALYSIS OF FMCG SECTOR
PORTFOLIO**

Jensen's Alpha			
	Portfolio	NSE	Risk free rate
Average	0.009590998	0.012827365	0.54%
Alpha	0.07%	0.00%	0.00%
Beta	0.462094335	-18.28417395	0.54%

Inference

Table 13 displays the Jensen alpha analysis for the FMCG sector portfolio. The portfolio achieved an average return of 0.96% (0.009590998), which is lower than the NSE benchmark return of 1.28% (0.012827365). Despite the lower raw return, the portfolio's alpha value is slightly positive at 0.07%, indicating marginal outperformance relative to its expected return based on the CAPM model and its risk profile. With a beta of 0.462094335, which is less than half the market beta of 1.0, the portfolio demonstrates significantly lower systematic risk than the market. This combination of lower returns but positive alpha suggests that the FMCG sector portfolio, while not generating high nominal returns, still outperformed expectations given its low-risk profile. The positive alpha, although modest, indicates that the portfolio's defensive characteristics and stability provided value beyond what would be expected based solely on its systematic risk exposure, making it a potentially attractive component for risk-averse investors.

TABLE 14
**RESULT OF SHARPE RATIO ANALYSIS OF BANKING, IT AND
FMCG SECTOR PORTFOLIO**

Sectors	Sharpe Ratio
Banking Sector	0.102864788
IT Sector	0.192696914
FMCG Sector	0.088724176

Inference

Table 14 presents the Sharpe ratio analysis for the Banking, IT, and FMCG sector portfolios. The IT sector portfolio demonstrates the highest Sharpe ratio at 0.192696914, indicating superior risk-adjusted performance compared to the other sectors. The Banking sector follows with a Sharpe ratio of 0.102864788, while the FMCG sector shows the lowest Sharpe ratio at 0.088724176. These results suggest that the IT sector provided the best compensation for total risk (including both systematic and unsystematic components) among the three sectors analyzed. The Banking sector offers moderate risk-adjusted returns, while the FMCG sector, despite its lower systematic risk (as indicated by its low beta), shows the least attractive risk-adjusted performance when accounting for total volatility. The substantial difference between the IT sector's Sharpe ratio and those of the other sectors (nearly twice that of Banking and more than twice that of FMCG) highlights the exceptional risk-efficiency of the IT portfolio during the study period, potentially due to strong growth prospects, innovative business models, or favorable sector-specific conditions.

CHAPTER 5
FINDINGS, SUGGESTIONS AND CONCLUSIONS

CHAPTER 5

FINDINGS, SUGGESTIONS AND CONCLUSIONS

FINDINGS

The Normality test results for the returns of selected companies in the Banking, IT, and FMCG sectors listed in the stock exchange indicate that they are normally distributed at a 5% significance level with 6 degrees of freedom. This conclusion is supported by the outcomes of the Box-Pierce, Ljung-Box, and McLeod-Li statistics, with all p-values exceeding 0.05 (the lowest being 0.063 for HCL Tech). This confirmation of normality validates that the returns satisfy the fundamental assumption required for further statistical analysis and portfolio optimization.

The White Noise test was conducted on the returns of selected companies to determine the presence of any patterns or trends. The results, based on the Box-Pierce statistic, Ljung-Box statistic, and McLeod-Li statistic, confirm that at a 5% significance level with 12 degrees of freedom, most securities follow random, unpredictable return patterns (p-values ranging from 0.127 to 0.999). However, State Bank of India (SBI) showed a statistically significant McLeod-Li statistic p-value of 0.002, suggesting potential patterns or heteroscedasticity in its returns. Overall, the randomness in returns is consistent with the efficient market hypothesis for most securities.

The Banking Sector's study of selected security returns reveals important financial indicators. Kotak Mahindra Bank Ltd. has the highest mean price at 1745.933, followed by HDFC Bank Ltd. at 1467.188, while SBI has the lowest at 511.014. When risk is assessed using standard deviation, ICICI Bank shows the highest volatility (276.274), indicating greater price fluctuations compared to other banks in the sector. The price ranges are particularly wide for ICICI Bank (323.750 to 1300.100), demonstrating substantial price movements during the study period.

The analysis of selected security returns in the IT Sector presents key financial indicators. Among the companies in this sector, TCS reports the highest mean price at 3251.956, while Wipro has the lowest at 222.211. TCS also shows the highest standard deviation (647.292), indicating greater price volatility. The price range for TCS (1781.590 to 4553.750) is particularly wide, suggesting substantial price movements during the study period. These indicators provide insights into both return potential and risk characteristics of IT sector securities.

The analysis of mean prices and standard deviations for selected FMCG sector companies reveals that Hindustan Unilever has the highest mean price (2398.944), while ITC has the lowest (316.064). In terms of risk (standard deviation), Nestle India exhibits the highest volatility (322.937), followed by Hindustan Unilever, Godrej Consumer Products, and ITC. This indicates varying levels of price stability within the FMCG sector, with important implications for risk management and investment decisions.

For selected securities in the Banking sector, the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) were examined over multiple lags. The results indicate that HDFC Bank exhibits negative first-order autocorrelation (-0.216) and stronger negative eighth-order autocorrelation (-0.269), suggesting price reversals at these lags. ICICI Bank shows

negative first-order correlation (-0.228) and negative fifth-order correlation (-0.203), indicating potential cyclical patterns. SBI demonstrates weaker first-order correlation (-0.026) but stronger positive third-order correlation (0.206), suggesting quarterly seasonality effects. Kotak Mahindra Bank exhibits negative correlations at lags 2, 3, 7, and 8.

For selected securities in the IT sector, the ACF and PACF analysis shows that TCS displays negative first-order autocorrelation (-0.185) and positive third-order autocorrelation (0.170), suggesting quarterly cyclical patterns, with strong positive eleventh-order correlation (0.240) indicating potential annual seasonality. Infosys shows negligible first-order correlation (0.002) but substantial negative fourth-order correlation (-0.186) and positive eleventh-order correlation (0.195). HCL Tech demonstrates significant third-order correlation (0.253) and fourth-order correlation (-0.307), indicating strong quarterly effects. Wipro shows positive second-order correlation (0.164) and seventh-order correlation (0.169).

The ACF and PACF analysis for FMCG sector securities reveals that Hindustan Unilever demonstrates negative first-order autocorrelation (-0.153) and stronger negative seventh-order autocorrelation (-0.198). Nestle India shows negative first-order correlation (-0.138) and stronger negative fourth-order and tenth-order correlations (-0.212 and -0.215), indicating quarterly and bi-annual cyclical patterns. Godrej Consumer Products exhibits negative third-order correlation (-0.168) and ninth-order correlation (-0.186). ITC presents mixed patterns with positive first-order correlation (0.078) and sixth-order correlation (0.192), but negative fifth-order correlation (-0.180).

The Augmented Dickey-Fuller (ADF) test was conducted to assess the stationarity of returns across the three sectors. The test results indicate that almost all securities exhibit stationarity in their returns, as evidenced by Tau values being more negative than the critical value of -3.448 at a 5% significance level. Banking sector securities show strong stationarity with Tau values ranging from -4.179 (ICICI Bank) to -5.350 (Kotak Mahindra Bank). In the IT sector, most securities demonstrate stationarity except Wipro (Tau value: -2.745, p-value: 0.214). All FMCG sector securities show stationarity with Tau values ranging from -3.665 (ITC) to -5.209 (Nestle India). These findings confirm that most security returns do not follow a random walk pattern.

The Treynor ratio analysis for the Banking sector portfolio shows an average raw return of 1.29% (0.012910435), which is slightly higher than the Nifty 50 benchmark return of 1.28% (0.012827365). The portfolio's excess return over the risk-free rate stands at 0.75% (0.007474296). With a beta of 1.135125262, indicating higher systematic risk than the market, the resulting Treynor ratio of 0.006584556 is significantly higher than the benchmark's negative ratio of -0.000404242. This suggests that the Banking sector portfolio provided adequate compensation for each unit of systematic risk taken.

The Jensen's Alpha analysis for the Banking sector portfolio indicates an average return of 1.29% (0.012910435), marginally higher than the NSE benchmark return of 1.28% (0.012827365). However, the negative alpha value of -0.09% suggests slight underperformance relative to its expected return based on the CAPM model. With a beta of 1.135125262, which is substantially higher than the market beta of 1.0, the portfolio demonstrates greater systematic risk than the market. Despite achieving a higher raw return than the benchmark, the negative alpha indicates inefficient risk management or stock selection.

The Treynor ratio analysis for the IT sector portfolio reveals an average raw return of 1.83% (0.018290901), significantly exceeding the benchmark return of 1.28% (0.012827365). With a beta of 0.732820602, indicating lower systematic risk than the market, the resulting Treynor ratio of 0.017541486 is substantially higher than the benchmark's negative ratio. This notably positive ratio demonstrates that the IT sector portfolio provided exceptional compensation for each unit of systematic risk taken, making it particularly attractive from a risk-adjusted performance perspective.

The Jensen's Alpha analysis for the IT sector portfolio shows an average return of 1.83% (0.018290901), significantly outperforming the benchmark return of 1.28% (0.012827365). The substantial positive alpha value of 0.74% indicates strong outperformance relative to its expected return based on the CAPM model. With a beta of 0.732820602, which is lower than the market beta of 1.0, the portfolio demonstrates the beneficial combination of higher returns and lower systematic risk, highlighting exceptional performance through successful stock selection or sector advantages.

The Treynor ratio analysis for the FMCG sector portfolio indicates an average raw return of 0.96% (0.009590998), which is lower than the benchmark return of 1.28% (0.012827365). With a beta of 0.462094335, indicating significantly lower systematic risk than the market, the resulting Treynor ratio of 0.008991366 is higher than both the benchmark's negative ratio and the Banking sector's ratio. This suggests that while the FMCG sector provided lower nominal returns, it efficiently compensated investors for each unit of systematic risk taken.

The Jensen's Alpha analysis for the FMCG sector portfolio shows an average return of 0.96% (0.009590998), which is lower than the benchmark return of 1.28% (0.012827365). Despite the lower raw return, the slightly positive alpha value of 0.07% indicates marginal outperformance relative to its expected return based on the CAPM model. With a beta of 0.462094335, which is less than half the market beta, the portfolio demonstrates the value of its defensive characteristics and stability beyond what would be expected based solely on its systematic risk exposure.

The Sharpe ratio analysis across all three sector portfolios demonstrates that the IT sector has the highest ratio at 0.192696914, followed by the Banking sector at 0.102864788, and the FMCG sector at 0.088724176. These results suggest that the IT sector provided the best compensation for total risk (including both systematic and unsystematic components) among the three sectors. The substantial difference between the IT sector's Sharpe ratio and those of the other sectors highlights the exceptional risk-efficiency of the IT portfolio during the study period.

SUGGESTIONS

The White Noise test shows that most securities follow random, unpredictable return patterns, making it challenging for investors to predict future movements based on historical data. However, State Bank of India's significant pattern suggests potential exploitable inefficiencies, which sophisticated investors might consider investigating further.

The Treynor ratio and Jensen's Alpha analyses reveal varying performance across sectors. The IT sector demonstrated superior risk-adjusted returns with positive alpha (0.74%), making it suitable for growth-oriented investors. The Banking sector showed higher raw returns than the benchmark but negative alpha (-0.09%), indicating inefficient risk management. The FMCG sector, despite lower raw returns, showed positive alpha (0.07%) with very low beta, making it appropriate for defensive investment strategies.

The Beta values indicate different risk levels across sectors. The Banking sector had a beta of 1.135, showing higher sensitivity to market movements than average. The IT sector had a moderate beta of 0.733, while the FMCG sector had a low beta of 0.462, indicating defensive characteristics. Investors should align their sector allocation with their risk tolerance and market outlook.

For optimal portfolio construction, investors should consider:

- **Aggressive Growth Portfolio:** Allocate 50-60% to IT sector, 25-30% to Banking sector, and 15-20% to FMCG sector
- **Balanced Portfolio:** Implement a more even distribution with 40% to IT, 30% to Banking, and 30% to FMCG
- **Conservative Portfolio:** Emphasize FMCG sector (45-50%) despite lower returns due to its defensive characteristics, with moderate exposure to IT (35-40%) and limited allocation to Banking (10-15%)

Investors can potentially exploit the autocorrelation patterns identified in returns. For the Banking sector, consider contrarian strategies based on negative first-order autocorrelations in HDFC Bank and ICICI Bank. For the IT sector, implement quarterly trading strategies for TCS and HCL Tech based on their third-order autocorrelations, and consider annual seasonality effects. For the FMCG sector, apply reversal strategies for Hindustan Unilever while considering quarterly cyclical patterns in Nestle India.

Risk management should be tailored to each sector's characteristics. Implement stringent stop-loss strategies for the Banking sector due to its higher beta, particularly for ICICI Bank which showed high standard deviation. Establish regular monitoring protocols for high-volatility securities like TCS. Consider combining high-beta Banking stocks with low-beta FMCG stocks to create a negatively correlated portfolio that reduces overall volatility while maintaining reasonable returns.

CONCLUSION

This study aimed to assess how portfolios from the Banking, IT, and FMCG sectors performed, using important financial metrics to measure their risk-adjusted returns. The evaluation considered how well each sector managed to generate returns under different market conditions and risk exposures.

Findings revealed a distinct performance hierarchy among the three sectors. The IT sector demonstrated superior performance across all risk-adjusted metrics, with significantly higher returns coupled with moderate risk. The Banking sector offered moderate returns with higher risk, while the FMCG sector provided defensive characteristics with lower returns.

Risk-adjustment metrics (Treynor, Jensen's Alpha, and Sharpe) consistently identified the IT sector as the most efficient investment option, offering the best compensation for both systematic and total risk. The Banking sector underperformed relative to its risk profile despite higher raw returns, while the FMCG sector slightly outperformed expectations despite lower nominal returns due to its very low risk profile.

While most securities follow random, unpredictable patterns consistent with the efficient market hypothesis, the identified autocorrelation patterns and stationary characteristics suggest exploitable inefficiencies in certain securities. This is particularly evident in SBI (Banking), TCS (IT), and Hindustan Unilever (FMCG).

The substantial differences in risk characteristics across sectors necessitate a tailored investment approach. The optimal strategy emerging from this analysis would incorporate a sectoral allocation based on risk-adjusted performance metrics, security selection based on statistical properties, and timing strategies leveraging identified temporal patterns in returns.

Overall, this study highlights the importance of looking beyond raw returns when evaluating investment opportunities. By considering risk-adjusted performance metrics and statistical properties of returns, investors can make more informed decisions that align with their risk tolerance and investment objectives. The findings strongly support a portfolio approach that strategically allocates across sectors to balance growth opportunities with defensive characteristics.

BIBLIOGRAPHY

5.4 REFERENCES

1. "Heng-Hsing Hsieh (2013): A Review of Performance Evaluation Measures for Actively-Managed Portfolios."
2. Jaydip Sen et al. (2022). Stock Performance Evaluation for Portfolio Design Across Different Indian Stock Market Sectors. *Journal of Financial Economics*, 18(2), 105-119.
3. Dr. Rachna Jawa & Monika. (2022). Capital Structure and Financial Performance of Service Sector Listed in BSE Sensex. *International Education and Research Journal*, 8(4), 39-44.
4. Qur'anitasari, A., Sutrisno, B., and Mahfudz, T. (2020). Sharpe, Treynor and Jensen Methods in Doing Stock Portfolio Performance Analysis. ResearchGate. https://www.researchgate.net/publication/356854040_Sharpe_Treynor_and_Jensen_Methods_in_Doing_Stock_Portfolio_Performance_Analysis5. Krishnamoorthy & Shaik. (2022). Optimal Portfolio Construction from BSE Sensex 30 Stocks Using the Sharpe Single Index Model. *Asian Journal of Management Research*, 13(1), 67-82.
5. Rena Yuliana et al. (2024). Determinants of Investment Portfolio Performance. *Journal of Business Strategy*, 32(1), 21-34.
6. Bhuvana, R., & Nishantini, A. (Year). *Performance Analysis Using Risk-Return Ratios*. Journal Name, Volume(Issue), Page Numbers. ISSN: 0975-802X.
7. Vanita Chandavar, Komal Gadade, & Sagar Patil. (2022). Risk-return Analysis and Portfolio Construction of S&P BSE-30 Listed Companies. *Mudra Journal of Finance and Accounting*, 9(2), 45-59.
8. Himanshu Puri. (2010). Performance Evaluation of Balanced Mutual Fund Schemes in Indian Scenario. *International Journal of Business and Management Invention*, 2(4), 18-24.
9. Umair Zuhair and Agha Amad Nabi (2015) Performance and evaluation of portfolio of mutual funds *Journal of Economic Info* Vol. 2, No.2 (2015) 1-5

10. **Chandradev Sharma & Kinjal Banerjee. (2015).** A Study of Correlations in the Stock Market. *SSRN Electronic Journal*.
11. **Ruchi Nityanand Prabhu (2019)** Risk & return analysis of Nifty stock in Indian capital market
12. "EVALUATING PORTFOLIO PERFORMANCE OF COMPANIES' STOCK LISTED IN LQ45 BASED ON SHARPE, TREYNOR AND JENSEN METHOD" by **Vernando A. Zakarias and Ferdinand Tumewu (2015)**
13. "A Comparative Analysis of Risk-Adjusted Returns in FMCG, Automobile, and Banking Industries" by **Venkata Rao Valluri and Vaka Naga Lakshmi (2025)**
14. "Performance Evaluation of Portfolio using the Sharpe, Jensen, and Treynor Methods" by **Dr. Monica Verma and Mr. Jayshil R. Hirpara (2016)**
15. "Application of Single Sharpe Index on the Optimal Portfolio Selection of Energy and FMCG Sector Stocks in India" by **Mohith et al. (2017)**

ANNEXURE



JAMAL MOHAMED COLLEGE (AUTONOMOUS)

Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

TIRUCHIRAPPALLI - 620 020

JAMAL INSTITUTE OF MANAGEMENT

Building Values and Leadership
(Approved by AICTE, New Delhi)



5th International Conference on **ADVANCED MANAGEMENT** Driving Innovation in Global Context (ICAM – 2025) **Certificate of Appreciation**

This is to certify that Dr./Mr./Ms. Sathya R Dept. of Management.....
Sathya R.....of.....Jamal Institute of Management.....has.....
participated in 5th International Conference on Advanced Management - Driving Innovation in Global Context
(ICAM 2025) Organised by Jamal Institute of Management, Jamal Mohamed College (Autonomous), Tiruchirappalli
on 22nd January 2025. He/She has presented a paper titled A Study on Risk-Adjusted Portfolio Performance Evaluation of Leading NSE-listed Equities Across Banking, IT, and FMCG sectors.....

F. S. J. R.
ORGANIZING SECRETARY

A. J. Munur
DIRECTOR

V. S. S. M.
PRINCIPAL



Since 1951

JAMAL INSTITUTE OF MANAGEMENT

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A***' Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli - 620 020.



Project Work Progress Report (2024-25)

Name: SATHYAN, R

Reg No: 23MBA067

Class and Section: II MBA - 'B'

Project Specialization: Finance

Company Name: VENTURA SECURITIES LTD

Day	Date	Project Work in Progress / Completed	Signature of Project Mentor (In company)	Signature of Project Guide
1	12.11.2024	Introduction about the company	y.wt	Prashant
2	13.11.2024	Overview of the NSE Market	y.wt	Prashant
3	14.11.2024	Overview of the BSE Market	y.wt	Prashant
4	15.11.2024	Overview of the SEBI	y.wt	Prashant
5	16.11.2024	Learned about mutual funds.	y.wt	Prashant

Signature of Project Mentor
(In-company)

Signature of Project Guide





Since 1951

JAMAL INSTITUTE OF MANAGEMENT

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A***' Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli – 620 020.



Project Work Progress Report (2024-25)

Name: SATHYAN. R

Reg No: 23MBA067

Class and Section: II - MBA "B"

Project Specialization: Finance

Company Name: VENTURA SECURITIES LTD

Day	Date	Project Work in Progress / Completed	Signature of Project Mentor (In company)	Signature of Project Guide
6	18.11.2024	Learned about SIP in mutual funds	Yash	Prashad
7	19.11.2024	Learned about companies and sector in NSE	Yash	Prashad
8	20.11.2024	Learned about companies and sector in BSE	Yash	Prashad
9	21.11.2024	Learned about Intra trading activity.	Yash	Prashad
10	22.11.2024	Learned about opening a Demat Account.	Yash	Prashad

Signature of Project Mentor
(In-company)



Signature of Project Guide



Since 1951

JAMAL INSTITUTE OF MANAGEMENT

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A++' Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli – 620 020.



Project Work Progress Report (2024-25)

Name: SATHYAN R

Reg No: 23MBA067

Class and Section: II - MBA "B"

Project Specialization: Finance

Company Name: VENTURA SECURITIES LTD

Day	Date	Project Work in Progress / Completed	Signature of Project Mentor (In company)	Signature of Project Guide
11	23.11.2024	Learned about equity market	y.vtk	Prashant
12	25.11.2024	Learned about options market.	y.vtk	Prashant
13	26.11.2024	Learned about stock options	y.vtk	Prashant
14	27.11.2024	Learned about Ventura APP	y.vtk	Prashant
15	28.11.2024	Learned to trade in stock with ventura app.	y.vtk	Prashant

Signature of Project Mentor
(In-company)



Signature of Project Guide



Since 1951

JAMAL INSTITUTE OF MANAGEMENT

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A***' Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli - 620 020.



Project Work Progress Report (2024-25)

Name: SATHYAN. R

Reg No: 23MBA067

Class and Section: II-MBA "B"

Project Specialization: Finance

Company Name: VENTURA SECURITIES LTD

Day	Date	Project Work in Progress / Completed	Signature of Project Mentor (In company)	Signature of Project Guide
16	29.11.2024	Learned about call option.	y.vtk	Sathyan
17	30.11.2024	Learned about put option.	y.vtk	Sathyan
18	02.12.2024	Learned to set stop loss orders	y.vtk	Sathyan
19	03.12.2024	Learned about charts in NSE & BSE and its uses.	y.vtk	Sathyan
20	04.12.2024	Learned about IPO	y.vtk	Sathyan

Signature of Project Mentor
(In-company)



Signature of Project Guide

Sathyan



Since 1951

JAMAL INSTITUTE OF MANAGEMENT

(Approved by AICTE, New Delhi)

JAMAL MOHAMED COLLEGE (Autonomous)

Accredited with 'A-' Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0

(Affiliated to Bharathidasan University)

Tiruchirappalli - 620 020.



Project Work Progress Report (2024-25)

Name: SATHYAN R

Reg No: 23MBA067

Class and Section: II - MBA "B"

Project Specialization: Finance

Company Name: VENTURA SECURITIES LTD

Day	Date	Project Work in Progress / Completed	Signature of Project Mentor (In company)	Signature of Project Guide
21	05.12.2024	Learned about technical analysis	y.vtk	Prasad
22	06.12.2024		y.vtk	
23	07.12.2024		y.vtk	

Signature of Project Mentor
(In-company)



Signature of Project Guide