A Study of Performance and Volatility of selected Indian Equity Mutual Funds

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by

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CONTENTS

Particulars	Page No.
Acknowledgement	i-ii
List of Tables	v-viii
List of Figures	ix
Glossary of Acronyms	x
Chapter 1: Introduction to the Study	**1-44**
1.1 Background of the study	1
1.2 Significance of the study	5
1.3 Literature Review	6
1.4 Research Gap	32
1.5 Objective of the Study	32
1.6 Research Methodology	32
1.7 Limitations of the study	42
1.8 Plan of Presentation of the Study	43
Chapter 2: Growth and Development of Mutual fund Industry of India: An overview	**45-73**
2.1 Introduction	45
2.2 Concept of Mutual Funds	45
2.3 History of Mutual funds in India	47
2.4 Types of Mutual Funds	49
2.5 Key Components of Mutual Funds	52

2.6 Working Mechanism of Mutual Funds	55
2.7 Mutual Funds: Some Positive Aspects	56
2.8 Mutual Funds: Some Concerns	58
2.9 Legal Structure of Indian Mutual Funds	58
2.10 Growth aspects of Indian Mutual fund Industry	59
2.11 Summary of Findings	71
Chapter 3: Performance Analysis of selected Indian Mutual Fund Schemes	**74-148**
3.1 Understanding of Risk Return Analysis	74
3.2 Research Methodology	75
3.3 Analysis of the risk return analysis of selected mutual fund schemes.	82
3.4 Analysis the performance of the selected equity Mutual Fund Schemes with respect to BSE Sensex and Nifty 50.	122
3.5 Summary of Findings	145
Chapter 4: Analysis of Volatility of Selected Indian Mutual Fund Schemes	**149-198**
4.1 Understanding of Volatility	149
4.2 Research Methodology	150
4.3 Analysis of Data	152
4.4 Summary of Findings	196
Chapter 5: Conclusion and Recommendations	**199-206**
5.1 Summarised Findings and Conclusion	199
5.2 Recommendations	204
Bibliography	**207-213**

LIST OF TABLES

Table No.	Particulars	Page No.
1.1	Summary of the selected existing literatures from both foreign and Indian researchers.	17
1.2	Summary of the research tools used in the study.	37
2.1	The name and Asset under Management of all Asset Management Companies operational in India as in March, 2023	53
2.2	Scheme-wise Resource Mobilisation and Assets under Management by Mutual Funds (Rs crore)	61
2.3	Scheme-wise Resource Mobilisation and Assets under Management by Mutual Funds (Rs crore)	61
2.4	Category wise Mutual Funds in terms of number of schemes (Old Format)	63
2.5	Category wise Mutual Funds in terms of number of schemes (New format)	63
2.6	Growth in the number of schemes of Mutual Fund Industry	64
2.7	Growth and Volume year wise trend of Mutual Fund Industry	67
2.8	Assets under Management at the End of Period	68
2.9	Asset under Management of Open ended and Closed ended Schemes (in Crs.)	69
3.1	Criterion to mark mutual fund as Outperformed, Underperformed and Neutral in the present chapter (on the basis of the literature surveyed).	81
3.2	Criterion for Range and Degree of correlation used in the present study (on the basis of the literature surveyed).	81
3.3	DSP Black Rock Small Cap Fund : Risk Return Analysis	82
3.4	HDFC Mid-Cap Opportunity Fund : Risk Return Analysis	84

3.5	ICICI Prudential Value Discovery Fund: Risk Return Analysis	86
3.6	Franklin India Smaller Companies Fund: Risk Return Analysis	88
3.7	Sundaram Mid Cap Fund: Risk Return Analysis	90
3.8	DSP BlackRock Mid Cap Fund: Risk Return Analysis	92
3.9	IDFC Multi Cap Fund: Risk Return Analysis	94
3.10	L&T Mid Cap Fund: Risk Return Analysis	96
3.11	UTI Mid Cap Fund: Risk Return Analysis	98
3.12	Sundaram Small Cap Fund: Risk Return Analysis	100
3.13	Invesco India Contra Fund: Risk Return Analysis	102
3.14	Reliance Tax Saver (ELSS) Fund: Risk Return Analysis	104
3.15	Aditya Birla Sun Life Small Cap Fund: Risk Return Analysis	106
3.16	Franklin India Prima Fund: Risk Return Analysis	108
3.17	Invesco India Midcap Fund: Risk Return Analysis	110
3.18	Reliance Multi Cap Fund: Risk Return Analysis	112
3.19	Invesco India Tax Plan: Risk Return Analysis	114
3.20	Tata Equity PE Fund: Risk Return Analysis	116
3.21	L&T Tax Advantage Fund: Risk Return Analysis	118
3.22	Franklin India Focused Equity Fund: Risk Return Analysis	120
3.23	DSP Small Cap Fund: Correlation Analysis with Benchmark Indices	124
3.24	HDFC Mid-Cap Opportunity Fund: Correlation Analysis with Benchmark Indices	125
3.25	ICICI Prudential Value Discovery Fund: Correlation Analysis with Benchmark Indices	126

3.26	Franklin India Smaller Companies Fund: Correlation Analysis with Benchmark Indices	127
3.27	Sundaram Mid Cap Fund: Correlation Analysis with Benchmark Indices	128
3.28	DSP Mid Cap Fund: Correlation Analysis with Benchmark Indices	129
3.29	IDFC Multi Cap Fund: Correlation Analysis with Benchmark Indices	130
3.30	L&T Mid Cap Fund: Correlation Analysis with Benchmark Indices	131
3.31	UTI Mid Cap Fund: Correlation Analysis with Benchmark Indices	132
3.32	Sundaram Small Cap Fund: Correlation Analysis with Benchmark Indices	133
3.33	Invesco India Contra Fund: Correlation Analysis with Benchmark Indices127	134
3.34	Reliance Tax Saver Fund: Correlation Analysis with Benchmark Indices	135
3.35	Aditya Birla Sun Life Small Cap Fund: Correlation Analysis with Benchmark Indices	136
3.36	Franklin India Prima Fund: Correlation Analysis with Benchmark Indices	137
3.37	Invesco India Midcap Fund: Correlation Analysis with Benchmark Indices	138
3.38	Reliance Multi Cap Fund: Correlation Analysis with Benchmark Indices	139
3.39	Invesco India Tax Plan: Correlation Analysis with Benchmark Indices	140
3.40	Tata Equity PE Fund: Correlation Analysis with Benchmark Indices	141

3.41	L&T Tax Advantage Fund: Correlation Analysis with Benchmark Indices	142
3.42	Franklin India Focused Equity Fund: Correlation Analysis with Benchmark Indices	143
3.43	Overall Correlation between all the selected mutual fund scheme returns and Benchmark indices (BSE Sensex and Nifty 50) returns	144
3.44	Snapshots of Risk-Return Profile of all the selected mutual fund schemes	146
4.1	Results of Ordinary Least Squares (OLS)	153
4.2	Results of ARCH LM test of the Residuals of OLS"	163
4.3	Results of Augmented Dickey Fuller (ADF) Test at first difference	168
4.4	Results of the Normality Test of the monthly returns of the Mutual fund schemes	173
4.5	Details of the GARCH (1,1) model	178
4.6	Results of the GARCH (1,1) model	179
4.7	Results of Augmented Dickey Fuller Test of the residuals in the GARCH(1,1) model	188
4.8	Results of Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) Test of the residuals in the GARCH(1,1) model	190
4.9	Results of GARCH (2,1) model for Franklin India Smaller Companies Fund	195
4.10	Snapshots of the Best fitted Models	198

LIST OF FIGURES

Figure No.	Particulars	Page No.
2.1	Working Mechanism of Mutual Funds	56
2.2	Category wise Net Resources Mobilisation	62
2.3	Category wise Number of funds	64
2.4	Growth in the number of schemes of Mutual Fund Industry	65
2.5	Growth and Volume year wise trend of Mutual Fund Industry	65
2.6	Net resources mobilized by Mutual Funds (Ownership)	67
2.7	Assets under Management at the End of Period	69
2.8	Assets under Management of Open Ended and Closed Ended Schemes	70
2.9	Year wise trend of Assets under Management of Open Ended and Closed Ended Schemes (in crores)	70

GLOSSARY OF ACRONYMS

ADF	Augmented Dickey Fuller test
AMC	Asset Management Company
AMFI	Association of Mutual Funds in India
AMFI	Association of Mutual funds in India
ARCH	Autoregressive Conditional Heteroskedastic
ARCH LM	Autoregressive Conditional Heteroskedastic Lagrange Multiplier
AUM	Asset under Management
BSE	Bombay Stock Exchange
CME	Chicago Mercantile Exchange
CRISIL	Credit Rating Information Services of India Limited.
ECM	Error Correction Model
EGARCH	Exponential Generalized Autoregressive Conditional Heteroskedastic
ELSS	Equity Linked Saving Scheme
ETF	Excahnge Traded Funds
FMCG	Fast Moving Consumer Goods
GARCH	Generalised Autoregressive Conditional Heteroskedasticity
GJR-GARCH	Glosten-Jagannathan-Runkle GARCH
HNI	High Net Worth Investors
NAV	Net Asset Value
NFO	New Fund Offer
NRI	Non Resident Indians
NSE	National Stock Exchange
OLS	Ordinary Least Square
RBI	Reserve Bank of India
RMSE	Root Mean Square Error
RTA	Registrar & Transfer Agent
SBIC	Schwarz Bayesian Information Criterion
SD	Standard Deviation
SEBI	Securites Exchange Board of India
SIP	Systematic Investment Plans
SR	Sharpe Ratio
TER	Total Expense Ratio
TGARCH	Threshold Generalized Autoregressive Conditional Heteroskedastic
TR	Treynor Ratio
US 64	Unit Scheme 1964
UTI	Unit Trust of India

Chapter 1:

Introduction to the Study

Chapter 1

Introduction to the Study

1.1 Background of the study

1.1.1 Understanding Mutual Funds

A mutual fund is a popular investment avenue. It pools in money from multiple investors in a corpus. This corpus is then invested in a diversified portfolio comprising stocks, bonds, debt instruments and many other types of financial instruments. The investors get units of the mutual fund scheme that they are investing in. The units are allotted as per the proportion of their investment in the total corpus. The value of the units is calculated based on the Net Asset Value of the Mutual Fund Scheme. Over the years Mutual Funds have become a popular investment avenue. It attracts all types of investors both retail and institutional. It provides some specific advantages to its investors. Mutual Funds invest in a plethora of assets. This diversification helps in reducing the overall risk associated with the Mutual Fund Scheme. All Mutual Fund Schemes are professionally managed by experienced fund managers. They constantly monitor the portfolio of the Mutual Fund Schemes to improve the performance and thereby generate better returns. An investor may not have the expertise or the time to monitor the portfolio of the Mutual Fund Schemes on their own. Thus a fund manager's expertise comes in handy. The units of most Mutual Fund Scheme can bought and redeemed on any business day. This makes investment in Mutual Fund Schemes quite liquid. The minimum investment required to buy a units of a Mutual Fund Scheme is very low. Thus middle class salaried individuals find this investment avenue very attractive. The investment in Mutual Funds can be done online in a hassle free manner. This has made the investment mechanism very easy and convenient for all types of investors. However investing in mutual funds are not completely risk free. Over diversification may lead to dilution which in turn may reduce the overall return generated by the mutual fund scheme. The fund managers may not manage the portfolio actively thereby affecting its performance. There are many more advantages and disadvantages of investing in mutual fund schemes, which have been discussed in later chapters. The mutual fund industry is rapidly and considerably aiding in the growth of the country's financial sector. The mutual fund industry is actively promoting habit of savings amongst the investors. Over the years the developments in the financial markets have given a wide access to investors on a variety of investment options.

The investors should make a proper risk and return analysis of various investments alternatives at the time of making an investment decision. The investors may consult with experts, consultants and agents for guidance *(Avadhani, 2005).*

In India more individuals now have access to savings and investment services as a consequence of ongoing advancements in financial inclusion. There are currently many different Asset Management Companies operating in the market and the range of available products is growing. Assets managers will eventually have the access to the rapidly expanding middle class investors with more disposable money and investment potential due to the rise in investor education *(Sathiya, 2021)*

1.1.2 Impact of Mutual Fund on the Indian Economy

Mutual funds have a role in shaping the Indian economy. The journey of the mutual fund industry in India began when the Unit Trust of India (UTI) was launched by the Government of India and the Reserve Bank of India in 1963. During the following two decades, there was a surge of public and private sector participants in the then expanded mutual fund industry. The two major turning points that increased the attraction of these mutual funds to the general public were the exclusion of the mutual fund income from Income Tax and the establishments of the Securities and Exchange Board of India (SEBI) Regulations in 1996 *(Kaur, 2012).* Mutual funds have advanced to a stage of continuous growth and consolidation during the past 15 years. The expansion of the mutual funds industry in India is largely attributed to investor knowledge of the benefits of investing in mutual funds as well as mergers of renowned private sector organizations. Many changes that occurred in the mutual fund industry have had an impact on the shareholders' investing choices. The mutual fund industry has had a vital part in shaping the Indian economy.

The steady expansion in mutual fund investment is a sign of the development of the Indian economy. Investments in mutual funds help to enhance the four key components of the financial system- stability, efficiency, transparency and inclusion. This in turn assists the advancement of the country's financial sector. Therefore, financial intermediation serves as the economic purpose of the mutual funds. Their ability to mobilize extra savings and direct them into the growth sector is considered as a key indicator of their economic efficiency.

1.1.3 Significance of Mutual Funds

Mutual funds are regarded as financial intermediaries because they aggregate the savings of investors and channelize the savings to markets where there is a demand. By using the resources effectively through diversification and skilled management, the fund managers of these mutual funds give collective benefits of diversified risk, steady return, high liquidity and capital growth to the investors.

In underdeveloped countries, simple small savers often avoid investing in corporate assets because they are unfamiliar with complicated financial issues. Their investment in the securities market is also less as a result of their limited savings. The fate of their savings and the prospect of earning from them also relies on the success of the limited investment. Investment in Mutual funds can help in addressing both of these problems. The portfolio of a mutual fund scheme is diversified in terms of securities, units, industries and geographical locations. Diversification and well researched investment make sure that the investment will usually turn a profit and contribute to the growth of the economy. Thus, mutual fund investment has comparatively less risk, has comparatively steady return, higher liquidity and considerable capital appreciation. Mutual funds encourage thrift and mobilise the savings of the general public by addressing the issues small savers experience when it comes to managing and investing their savings *(Gupta, 2001).*

The savings pooled by the mutual funds are mostly invested in a diversified pool of securities. They often use direct subscription to the share capital of an enterprise to finance long term business requirements. Mutual funds collect money from a substantial number of small savers and make them available to industrial enterprises in relatively larger amounts. This reduces the burden of the industrial concern to raise the money directly from general public. By serving as a financial intermediary, mutual funds operate as a quick and effective link between savings and investing. Well managed mutual funds may be an attractive agreement for both the investor as well as the enterprise. They help the investing community by allowing them to participate in the shares of the industrial corporate. They also help the stock markets to grow. By striking a balance between caution and proper research, analysis and intuition, the mutual funds are able to convert market opportunities into big returns for the investors.

The recent developments have accelerated the growth in the mutual fund industry both in terms of volume and value. Mutual funds in India have continually increased the amount of

assets they are managing. As per Securities and Exchange Board of India (SEBI) Annual Report, 2023, the Indian mutual fund industry's total Asset under Management (AUM) was around 46,57,755 lakh crore as of September 2023. This expansion may be ascribed to a number of causes, including greater disposable income, more investor knowledge, and a switch from conventional investing channels to mutual funds.

The number of investors in the mutual fund industry has grown significantly over time. Retail investors have been attracted to the industry with success, including regular investors, High Net Worth Investors (HNIs) and Non-Resident Indians (NRIs). The diversity of mutual fund schemes, accessibility of investment, and usefulness of online platforms have all greatly assisted the growth of the investor base *(Khinchi, 2022).* Indian mutual fund industry has been coming up with creative products to satisfy the diverse investing needs of customers. The market now offers a wide variety of mutual fund schemes, including equity funds, debt funds, hybrid funds, index funds, sectoral funds and thematic funds. A large variety of options and specific solutions are readily available, which has attracted investors and facilitated the industry's growth.

Systematic investment plans (SIPs) have gained popularity in India as a means of investing, which has helped the mutual fund industry grow. Systematic Investment Plans give investors the benefits of rupee-cost averaging and investing discipline by allowing them to invest a fixed amount at regular intervals. The culture of routine investing through Systematic Investment Plans results in a continuous inflow of capital into mutual funds.

The industry has seen a significant transformation, switching from traditional physical investment techniques to digital platforms. Online investing platforms and mobile investing applications have made it simpler for investors to do research, make informed investments, and monitor mutual fund portfolios. The firm has grown as a result of how simple investing in mutual funds has become owing to the digitalalisation.

The Securities and Exchange Board of India (SEBI), which oversees the Indian securities market, has put in place a number of changes to improve investor safety and foster the expansion of the mutual fund sector. These changes include categorising and rationalising mutual fund schemes, bringing in transparency standards and lowering Total Expense Ratios (TER). Investor confidence has increased as a result of these measures, which have also helped the sector expand.

1.2 Significance of the study

The Indian mutual fund sector has experienced tremendous quantitative expansion during the last ten years. With several new schemes introduced and increase in Asset under Management (AUM), the Indian mutual fund industry has grown both in volume and value terms and has experienced a significant boost over the last one decade. However all mutual fund schemes perform well during favorable times. Most people agree that the mutual fund industry acts as a cushion at the fluctuating times and if it doesn't, it becomes indistinguishable from other sorts of investments.

The consequence of the global economic crisis, which had started in the latter part of 2007, started to be felt in the Indian financial markets around the middle of 2008. By the end of 2008 and the start of 2009, the global financial crisis had a significant impact on the Indian financial markets. The financial crisis had a significant effect on the mutual fund industry, which caused many funds to perform poorly. Investors then generally dread loosing losing money as a result of this. The Indian mutual fund industry has gone through a fluctuating phase and then stabilized gradually.

In this study the selected study period starts from January, 2008 to December, 2021 capturing the journey of selected mutual fund schemes through the ups and downs of Indian and Global markets. The study may be an addition to learning about the volatility of the financial markets and its impact on the performance of the mutual fund schemes. The findings of this study may benefit the investors by enlightening them about the aspects to take into account while investing in mutual fund schemes. Well researched decisions may help the investors to increase their wealth. This will motivate the investors and attract them to participate more exuberantly in the mutual funds. Both the Indian capital market and the economy may gain from this in a symbiotic way.

It will be easier for the advisory team to adapt to both the new and the traditional performance evaluation models as a result of the research's increased knowledge and expertise. It is certain that this study will reduce the range of variables available for selection and increase our understanding of the methods for evaluating the performance of mutual funds. Researchers, scholars and fund managers who are seeking for new ideas to improve the performance of mutual fund investments may also find the study to be helpful.

1.3 Literature Review

The literature review contributes newer perspectives to many already existing investigative studies. These new perspectives have the potential to unearth new dimensions into the further investigations conducted in this field. Most importantly, it posits methodological questions and provides new parameters of investigation. It also strengthens the theoretical foundation of the study. The new investigation had the prerogative to be simpler so that the limitations faced by the past researchers were taken into consideration.

Sehgal & Sherry (2021): The study examined the performance of 25 Tax savings mutual fund schemes between 2011 and 2021. The study found that AXIS Long Term Equity Fund has demonstrated superior performance when evaluated according to three key measures: average return, beta and Sharpe ratio. Nippon India Tax Saver (ELSS) Fund and Principal Personal Tax Saver Fund are the worst performers because they are the riskiest and produce lowest returns of all the selected mutual fund schemes. According to the study's findings, tax savings mutual fund scheme offer better avenues to obtain higher returns and tax relaxations under Income Tax laws.

Sharma & Joshi (2021): The study examined the performance of 15 Debt, Equity and Hybrid mutual fund schemes between 2016 and 2020. The researcher employed secondary data for the study. The study reported that most of the funds chosen perform averagely or worse, according to CRISIL rankings. The debt schemes performed better among the selected categories based on CRISIL rank. Treynor ratio, Sharpe ratio and Jensen's alpha indicate that most of the selected funds performed well.

Jacob & Joseph (2021): The study looked at the performance of 18 hybrid mutual fund schemes' performance from 2000 to 2020. The study made use of primary and secondary data. Comparing the Kotak Asset Allocator Direct Plan Scheme to other plans, it has taken the top rank. The study found out that by choosing to invest in mutual fund schemes, investors are demonstrating that mutual funds are better avenue than other investment options and that they provide a competitive return with lower risk.

Manoj & Avinash (2020): The study examined the performance of 12 large cap growth oriented Equity diversified schemes, before and during the outbreak of Covid-19. The study revealed that the NAVs of all selected schemes from different mutual fund houses have steadily declined as a result of the Covid 19 pandemic. The returns of the selected mutual

fund schemes may be negatively impacted by the decline in investor income, insufficient savings and unfavourable market movements.

Godfrey & Ismail (2020): The study employed GARCH family model. For the purpose of forecasting the Shanghai and New York stock composite indices, they compared the GARCH family models. According to the Schwarz Bayesian Information Criterion (SBIC), the GJR-GARCH model performed better than the other models of the GARCH type. GJR-GARCH, the best fitting model, was used to anticipate the stock market volatility of the two composite indices, according to the study, which was based on the Root Mean Square Error (RMSE).

Livingston, Zhao & Yao (2019): The objective of the study, "The volatility of mutual fund performance." was to demonstrate heteroskedasticity in US Equity Mutual funds' risk adjusted performance between 1991 to 2012. Secondary data was used for the research. Panel data regression, Fama Macbeth regression, quantile regression and conditional regression was used to test the results. The research findings indicate that actively managed funds have greater average performance. The study also discovered that a higher expenditure ratio led to higher performance volatility.

Mehul & Nisarg (2019): The purpose of the study was to characterize the level of volatility in each individual IT sector stock listed on the BSE Sensex. Open to open and close to close intraday volatility are also measured in the study. The BSE Sensex had the most volatility, according to the statistical measurements such as standard deviation with a constant of 1.06. The equities that were traded intraday showed more volatility than BSE Sensex index and lower volatility than BSE Sensex. The equities in the IT sectors were much more volatile over the study period, but they were usually safer and less risky than the index.

Zryan, Paresh & Gautam (2019): The paper examined that the GARCH family model is the popular model for predicting asset price volatility using return time series data. They considered that the quantifiable news sentiments serves as the foundation for the change in asset prices. The enhanced GARCH model was employed by them. The empirical study examines the volatility of 12 different stocks across two distinct stock markets. The outcome showed that compared to GARCH and EGARCH models, enhanced GARCH offers a better volatility forecast. They discovered that the variables that predict volatility include historical asset price returns, good and negative news, and present and past news sentiments.

Vishnani & Gupta (2018): The research explores the expansion and advancements of the mutual fund industry in India. Secondary data was utilized. According to the study, the amount of equity capital has increased significantly over time. Additionally, it emphasizes how the mutual fund industry's investor base is growing.

Mohanti & Priyan (2018): The study, "Style-exposure analysis of large cap equity mutual funds." used Sharpe's (1992) style exposure analysis to investigate the investing style of large cap equities mutual funds in India. Secondary data is used for the paper. The RSBA technique and the Sharpe ratio were used to test the results. The study found that the fund manager has demonstrated proficiency in stock stacking.

Chisti & Rahman (2018): The study examined the ten-year performance of the top 10 Tax-saving mutual funds that were active in India from 2007 to 2017. The performance was assessed using average risk, average return, Treynor's ratio, sharpe ratio and Jensen's alpha. With a few exceptions, every ELSS scheme has surpassed the volatile benchmark index in terms of returns. All funds, with the exception of Aditya Birla Sun Life Tax Relief 96, have consistently outperformed the benchmark index, according to the analysis.

Kaur (2018): The impact of past performance and other fund attributes on the current mutual fund performance was investigated in this study. The RSBA technique and the Sharpe ratio were used to test the findings. Ordinary Least Square regression modeling and four-factor Carhart alpha were used to test the results. The research showed that the main factors influencing the performance are cash holdings, expense ratios, portfolio turnover ratios, corpus size, prior performance of the fund, and flow to funds.

Babbar & Sehgal (2018): The study, "Mutual fund characteristics and investment performances in India" examined how mutual funds attributes effects mutual fund performance in India. The outcomes were examined using panel data regression, conditional Carhart four component model, and time series regression. The study discovered that the mutual fund size has been seen to have a detrimental impact on the performance. It was discovered that the portfolio turnover and spending trends had little bearing on performance assessment.

Gusni, Silviana & Hamdani (2018): The study used the investment manager's skill to examine the performance of equity mutual funds and the factors influencing mutual fund performance. The researcher used secondary data. The Chow, Hausan, and Lagrange

multiplier tests as well as panel regression were used to test the results. According to the findings, fund size and off-market timing abilities had no discernible impact on the performance of the fund, whereas inflation and stock selection expertise had an impact.

Thakur, Aramvalarthan & Radhakrishnan (2018): The study examined how stock market volatility affected the Indian capital market from 1965 to 2015 during the financial crisis. For this objective, the fundamental GARCH model and its two asymmetric extensions, EGARCH and TGARCH, were used to examine the outcomes in three distinct scenarios. Based on the AIC criteria, EGARCH is determined to be the best fit model; nevertheless, the GARCH(1,1) model is determined to be the most appropriate model for the forecasting approach.

Michal, Karel & Mansoor (2017): The study used conditional heteroskedasticity to predict and estimate the volatility of the daily closing price of wheat on the Chicago Mercantile Exchange (CME). Leptokurtic distribution, or the GARCH (1,1) model, and volatility clustering were used to identify the key components of the commodities market. The empirical findings indicated that the best-fitting model for futures price volatility was the GARCH (1,1) model was therefore more appropriate. The other models are evaluated to forecast the volatility with more statistical significance, just like nonlinear models. They recommended utilizing hedging strategies by the farmers. To guarantee wheat prices, wheat producers might specifically offer agreements with longer maturity period. Granger Causality test was also used in the study.

Ashwin (2017): The research looked at how Indian mutual funds have changed since their founding in 1963. The goal of the article was to examine how the sample mutual funds' asset under management changed over time. The researcher employed secondary data. Only five big Indian cities—Delhi, Mumbai, Chennai, Kolkata, and Bangalore—accounted for more than 74% of the mutual fund scheme's participants, according to the report. Additionally, it demonstrates the ample space for the mutual fund industry to expand. Mutual funds are freely available to investors and are renowned for their ability to diversify an investor's asset holdings while preserving a risk-to-reward ratio.

Bhagyashre and Kishori (2016): The study analysed the market volatility and risk-return relationship of the selected mutual funds and examined the performance of thirty open-ended mutual fund schemes. The secondary data served as the study's basis. The data were analysed using risk-adjusted metrics such as Jensen alpha, Treynor ratio, and Sharpe ratio. Out of thirty sample mutual fund schemes, the research revealed that fourteen had beaten the

benchmark return. Due to issues with diversification, three schemes were shown to perform poorly.

Poddar (2016): The study assessed private sector mutual fund performance and compared it with the BSE 100. Descriptive analysis, coefficient of determination, and risk-adjusted measures (Sharpe, Treynor's ratio, and Jensen's alpha) were used to test the results. Three of UTI Mutual Funds' five open ended equity plans have beaten the benchmark index (BSE 100). UTI Midcap Fund Growth has outperformed the market based on risk-adjusted criteria.

Solanki (2016): The paper, "A study of performance evaluation of mutual funds and Reliance mutual fund" compared the risk and return characteristics of six open-ended equity mutual fund schemes to a benchmark (BSE Sensex). To test the findings, descriptive statistics were applied. With regard to average returns, five mutual fund schemes have beaten the benchmark index.

Rathore & Singh (2016): The study made an effort to assess how well equity mutual funds performed in India over the various stages of the business cycle. Results were examined using parameters for risk-adjusted returns. The study discovered that, both pre and post period, the foreign sector outperformed the public and private sectors.

Vasudevan & Vetrivel (2016): The objective of the study was to predict and estimate the returns of the Indian stock market's stock price volatility, as measured by BSE Sensex index. GARCH family models were employed as forecasting models in the study. The asymmetric GARCH models were best suited for forecasting conditional variance and validating the existence of leverage in the Indian stock market based on the sample estimates.

Bhutada (2015): The study compared the performance of the mutual fund schemes offered by Kotak and HDFC. The elements influencing the mutual fund performance were considered in the paper. Descriptive analysis, coefficient of determination, and risk-adjusted metrics (Sharpe, Treynor's ratio, and Jensen's alpha) were used to test the results. The election outcome, crises, inflation, budget, and government policies were shown to be the elements influencing the performance of mutual funds.

Ramanujan & Bhuneshwari (2015): The study offers a summary of the development and achievements of the Indian mutual fund sector during the last ten years. Based on the study's secondary data, descriptive analysis was employed. According to the study, asset under

management has significantly increased in all sectors. The private sector has seen the most growth in its asset base. The Private sector is recognized to be the major contributor on the basis of the net resources mobilized.

Goyal (2015): The study looked at the top 10 Indian mutual funds' performance from August 1, 2014, to November 9, 2014, according to rankings provided by Credit Rating Information Services of India Limited (CRISIL). The researcher employed secondary data for the purpose of the research. The data were analysed using risk-adjusted metrics such as Jensen alpha, Treynor ratio, and Sharpe ratio. The top fund among the top ten was the Franklin India Opportunity Fund. It is discovered to have a higher Jensen alpha, Treynor ratio, Sharpe ratio, and smaller coefficient of variance.

Sahi & Pahuja (2015): The study looked at the selected public and private sector growth funds' performance. The time period chosen was from 2009 to 2012. The findings were analysed using risk-adjusted metrics such as Jensen alpha, Treynor ratio, and Sharpe ratio. The majority of the sampled funds had higher and more positive Sharpe and Treynor's ratios. When looking at risk-adjusted metrics, the funds did better than the market (BSE Sensex).

Mahajan & Sharma (2015): The study explored the effectiveness of ten selected Equity Linked Savings Plans (ELSS). It was mostly concerned with the schemes' risk-return analyses. The mutual fund schemes' performance was evaluated using risk-adjusted metrics, such as Jensen's alpha, Treynor ratio, and Sharpe ratio. According to the Sharpe and Treynor ratio, the analysis finds that Franklin India Tax Shield was the top performing mutual fund schemes. The scheme came in second place according to Jensen's alpha. As a result, the plan was judged to be the best among the top 10 mutual fund firms for risk-adjusted measure based on Assets under Management (AUM) throughout the study period.

Chawala (2014): The purpose of the study was to compare the performance of a benchmark index to the selected Indian Equity diversified mutual fund schemes. The researcher employed secondary data. For the study, the coefficient of determination, beta ratio, and descriptive analysis were employed. In terms of risk-adjusted performance, maximum of the selected mutual fund schemes have outperformed the benchmark index.

Ashraf & Sharma (2014): The study compared the performance of ten Indian growth oriented open-ended equity mutual fund schemes to the benchmark index. The benchmark index chosen in this study was the BSE Sensex, and both public and private sector sample

mutual fund schemes were chosen. Descriptive analysis and risk-adjusted measures (Sharpe, Treynor's ratio, and Jensen's alpha) were used to test the results. Based on past monthly returns, the findings indicated that most mutual fund schemes had outperformed market benchmark indexes in terms of Treynor and Sharpe ratio. The enhanced performance of the funds was a result of the fund managers' stock selecting skills. They were putting their money into other stocks, some of which were doing better financially.

Singh & Priyanka (2014): The study finds that the size of fund mobilization benefits private sector mutual funds more than public sector mutual funds. It was shown that the private sector of mutual funds is making more profits from the amount of money raised compared to the public sector. The disparity finally shrank to 54% in 2009-10, from 31% in 1998-99 to 81% in 2003-04.

Ghose (2013): The purpose of the study was to evaluate selected mutual fund schemes' performance against the BSE Sensex. Using Karl Pearson's Product Moment correlation approach, the efficacy of the fund manager is evaluated. According to the analysis, many mutual fund scheme' returns have fluctuated more than BSE Sensex. Furthermore, the significant return variability was discovered to have negatively impacted the fund manager's success in selecting stocks.

Santhiyavalli & Usharani (2012): The study titled "A study on investment avenues with particular reference to mutual funds." intends to look at respondents' preferred savings channel and investors' savings goals. The research employed primary data. The research employed stratified convenience sampling. The analysis was conducted using descriptive statistics. The findings were reported using tables, bars, and line charts. The majority of respondents stated that their main goals while investing in mutual funds were to increase their wealth and receive regular income. The respondents prefer risk-free capital growth. The majority of respondents prefer growth and income funds.

Jain (2012): The study, "Performance of Equity Mutual Funds in India." examined 45 mutual fund schemes that were available in India between 1997 and 2012 and were provided by two public and private sector organisations. The researcher employed secondary data. Descriptive statistics and risk-adjusted measures, such as Sharpe and Treynor's ratio, were used to test the results. According to the analysis, mutual funds in the private sector have outperformed those in the public sector. The top performers were determined to be ICICI and HDFC, the moderate performers to be UTI, and the poorest performers to be LIC.

Yagil (2012): The study's purpose is to determine if Exchange-traded funds' (ETFs') tracking accuracy is lower during periods of extreme volatility and to investigate the elements that influence this phenomenon. Out of the 42 ETFs that the study chose, 23 were issued on or after 2006. The study was conducted from January 3, 2006, to December 31, 2008. To determine the relationship between the benchmark index and ETFs, the findings were tested using unit root and co-integration tests in addition to the error correction model (ECM). The research determined how well ETFs track during volatile times and also identified the variables influencing how well ETFs perform in comparison to benchmark indexes.

Purnima, Dhune & Ramesh (2011): In the study "Performance of Indian Mutual Funds with Special Reference to Sector Funds.", 60 funds from the banking, FMCG, pharmaceutical, and technology sectors were examined. Secondary data was utilised. Risk-adjusted measures (Sharpe and Treynor's ratio) and descriptive analysis were used to test the results. Except for the funds in the infrastructure sector, the analysis indicated that all of the sample funds outperformed the benchmark index in terms of risk-adjusted measure. Furthermore, the banking and infrastructure sectors have the most volatility, while the FMCG industry exhibits the lowest volatility.

Rastogi & Srivastava (2011): The study monitors fluctuations in volatility and looks at how the Indian stock market is impacted by them. Additionally, a comparative analysis was conducted, comparing the volatility of the US and Indian stock markets at different points throughout the turbulence in the Indian market. The study was based on secondary data. GARCH modelling was utilised by the researchers. There were no co-movements in the conditional volatility, according to the results.

Srinivasan (2011): The study examined conditional variance modeling and forecasting of stock price volatility using S&P 500 index returns from the American stock market. The volatility and returns are predicted using a variety of GARCH family models, which range in complexity from quite basic to relatively complicated, such as the EGARCH and TGARCH models outperform the asymmetric GARCH models in estimating the conditional variance of the S&P 500 index return due to out-of-sample forecasts and a significant portion of evaluation measures.

Reddy (2010): The study assessed 87 open-ended mutual funds that were selected from the public and private sectors. Secondary data was utilized for the study. Both risk-adjusted

metrics (Sharpe and Treynor's ratio) and descriptive analysis were used to test the results. The analysis showed that funds with higher risk levels produced larger returns.

Sinha et. al. (2010): The paper noted a rise in the integration of the Indian securities market with the global financial system following the end of the 2008 global financial crisis. Another explanation for the recent expansion and global stock market integration of India is the resurgence of interest among foreign institutional investors (FIIs) in the emerging market economies such as India.

Joshi (2010): The objective of the study was to examine the volatility of China's growing stock market and the Indian securities market between 2005 and 2009. The researcher employed secondary data. Research tools like BDSL, GARCH (1,1), and ARCH LM were used to evaluate the results. The study showed that volatility clustering and nonlinearity were well-represented by the GARCH (1,1) model. The study concluded that the Chinese stock market had more volatility than the Indian stock market.

Afza et. al (2009): The performance of 43 open-ended mutual funds was examined in the paper "Performance of the Pakistani Mutual Funds.", which looked at the correlations between returns and fund characteristics such age, size, expenditures, portfolio turnover, and cash holdings. Secondary data was used in the study. Regression analysis was used to test the results. According to the analysis, investors consider the mutual funds' track record of success as well as their cash holdings when selecting which ones to buy.

Swaroop & Debashish (2009): The study examined 23 Indian equity mutual fund schemes' performance between 1996 and 2009. Secondary data was used for the study. Descriptive analysis, coefficient of determination, and risk-adjusted measures (Sharpe, Treynor's ratio, and Jensen's alpha) were used to test the results. The study found that the Franklin Templeton Scheme and UTI Mutual Fund performed better in the public and private sectors, respectively.

Srivastava (2008): The study investigated into the Nifty 50 and BSE Sensex's volatility. The study's time frame is from 2000 to 2008. Secondary data was used in the study. In order to investigate the volatility of the Indian stock market, the findings were tested using ARCH, GARCH, and TGARCH. The best models for capturing and predicting volatility in the Indian securities market were determined to be ARCH and GARCH.

Malabika et. al (2008): The study examined the empirical relationship between volatility, trading volume, and stock return for a particular Asia Pacific stock market from 2004 to 2008. There are seven national stock exchanges included in the study. Secondary data was used in the study. The Granger Causality test and the EGARCH (1,1) model were used to test the results. The study's findings demonstrated a significant correlation between trading volume and the total magnitude of price fluctuations. Market returns and trade volume are correlated, according to the Granger Causality test. To investigate the "contemporaneous and lagged volume effect", some trading volume information is given to the return and volatility after inclusion.

Joshi and Pandya (2008): The research studied how the Indian securities market was affected by the BSE Sensex and Nifty 50. The study was based on secondary data. The outcomes were examined using the GARCH and ARCH models. The substantial impact of market volatility on stock prices was discovered using the GARCH (1,1) model. The GARCH(1,1) model is determined to be best appropriate for the model.

Yan (2008): The objective of the study was to determine how investing strategy and liquidity affected the relationship between fund performance and size. Secondary data was utilized in the study. Panel data regression was used to test the results. According to the analysis, one of the main reasons fund size reduces performance is liquidity.

Bhadur (2008): The study used daily returns from 2003 to 2009 to assess the volatility of the Nepalese stock market. The study was based on secondary data. GARCH methods were used to test the results. The GARCH (4,1) model's conditional volatility of returns does not exhibit any notable asymmetry, according to the findings.

Desai (2007): An analysis of the investment policies of the selected mutual funds in the public and private sectors was done in this study. For the study, secondary data was employed. Using risk-adjusted measures (Sharpe & Treynor's ratio) and descriptive analysis, the results were examined. In comparison to the relevant benchmark indexes, the majority of the sample funds have not outperformed them by significantly. Public sector banks have not performed as well as private sector banks because of their great diversity.

Sibani & Uma (2007): The paper attempted to describe how the Nifty index spot market's volatility changes over time. It was done with secondary data. The outcomes were examined using GARCH and OLS methods. The analysis discovered that the Nifty index spot market's

volatility has not changed much. It was also revealed by this study that markets are absorbing new information faster than they used to, and that volatility has persisted since the start of future trading.

Athanasios & Nicholas (2006): The study looked at the correlation between volatility and stock market returns in industrialised nations including Australia, Canada, France, Japan, the US, the UK, Germany, Italy, and others. Secondary data was used for the study. The GARCH-M and EGARCH models were used to test the findings. The study discovered that, at least for the particular stock markets of industrialised nations, there is no correlation between market volatility and stock price returns.

Sarangi & Patnaik (2006): The study used both closing and starting price returns to assess how futures and options affected the S&P CNX Nifty. The researcher employed secondary data. Using the family of GARCH approaches, the results were examined. While the volatility of the S&P CNX Nifty Index's spot market has not altered much, the empirical data did indicate some changes in the volatility's structure.

Qi et. al (2005): The study examined the correlation between the 12 biggest international stock markets' predicted stock returns and volatility. The study considered data from 1980 through 2021. Secondary data was used for the study. On EGARCH models, the outcomes were examined. For the model, conditional variance with flexible semi parametric parameters is employed. The study discovered a strong negative relationship in six of the twelve markets between volatility and projected returns.

Chen, Hong, Huang & Kubik (2004): The study looked into how performance in the active fund management was affected by size of the corpus. For the research, secondary data is used. Time series regression, cross sectional regression, and panel data regression tests were conducted on the results. According to the study, the combination of organisational diseconomies and liquidity erodes fund performance as size increases.

Babatunde (2003): The purpose of the study was to assess how much Nigeria's stock market volatility contributed to the country's economic expansion between 1980 and 2010. Secondary data was used for the study. The findings were examined using Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) analysis. The research discovered that stock market volatility persists and might be detrimental to Nigeria's economic growth.

Jayasuriya (2002): The paper used an asymmetric GARCH model to model stock return volatility. The objective of study was to examine how stock market liberalization affected the volatility of 15 different stock markets between December 1984 and March 2000. It found that there was no volatility clustering in the instance of Nigeria. In terms of volatility, positive changes were succeeded by negative changes, and negative changes by positive changes.

Table 1.1: Summary of the selected existing literatures from both foreign and Indian researchers.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
Livingston, Zhao & Yao (2019)	The paper titled, "The volatility of mutual fund performance.", attempted to show heteroskedasticity in the risk adjusted performance of US Equity Mutual Funds from 1991 to 2012. Data used: Secondary data.	Results were tested on panel data regression, Fama Macbeth Regression, Quantile regression and conditional regression.	The findings of the research revealed superior average performance by actively managed funds. Additionally, the paper found out that expense ratio increased the performance volatility.
Vishnani & Gupta (2018)	The research paper discusses about the growth and developments of Indian mutual fund industry. Data used: Secondary data.	Descriptive analysis was used for the research.	The study finds out that there is a notable increase of equity funds over the years. Moreover, it focuses on the increase in investor base in the mutual fund industry.
Mohanti & Priyan (2018)	The paper titled, "Style –exposure analysis of large cap equity mutual funds.", examined	Results were tested using Sharpe ratio and RSBA approach.	The research revealed that the fund manager has shown good stock piling capabilities.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	the investment style of the large-cap equity mutual funds in India using style exposure analysis as proposed by Sharpe (1992). Data used: Secondary data.		
Kaur (2018)	The paper examined the effect of past performance and other fund characteristics on the present performance of funds. Data used: Secondary data.	The results were tested on four-factor Carhart alpha, Ordinary least square and regression model.	The paper revealed past year's performance, flow to funds, size of the corpus, expense ratio, portfolio turnover ratio and cash holding were the key aspects that influence performance.
Babbar & Sehgal (2018)	The paper titled, " Mutual fund characteristics and Investment performance in India.", explored the role of fund characteristics in determining the mutual fund performance in India. Data used: Secondary data.	Results were tested on time series regression, conditional Carhart four factor model and Panel daya regression.	The paper found out that fund size has seen to be negatively affecting performance. Portfolio turnover and expenses trend were found to be insignificant to performance evaluation.
Gusni, Silviana & Hamdani (2018)	The paper investigated the performance of	Results were tested on Chow, Hausan and	The results found that stock selection skill and inflation affected

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	Equity mutual funds and the factors affecting mutual fund performance by using the ability of investment manager. Data used: Secondary data.	Lagrange Multiplier test and panel regression.	the performance, as off, market timing skills and fund size has no significant effect on the fund performance.
Thakur, Aramvalarthan & Radhakrishnan (2018)	The paper studied the effect of stock market volatility in Indian capital market during the financial crisis from 1965 to 2015. Data used: Secondary data.	The results were tested on basic GARCH model along with two asymmetric extension EGARCH and TGARCH for this purpose under three different situations.	EGARCH is found to be the best fit model on the basis of AIC criteria, but when it comes to forcasting technique GARCH(1,1) model is found to be the best suited model.
Ashwin (2017)	The paper examined the developments of Indian mutual funds since its inception in 1963. The paper attempted to study the trend in changes in Asset under Management for the sample mutual funds. Data used: Secondary data.	Results were tested on descriptive analysis and correlation analysis.	The study found out that over 74% of the mutual fund scheme's participation are from only five major Indian cities: Delhi, Mumbai, Chennai, Kolkata and Bangalore. It also shows how much room there is for the growth of the mutual fund sector. Investors have unfettered access to mutual funds, which are well known for

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
			their capacity to diversify an investor's asset holdings while maintaining a risk to reward ratio.
Bhagyasre & Kishori (2016)	The paper studied the performance of 30 open ended mutual fund schemes and measured the risk return relationship and market volatility of the selected mutual funds. Data used: Secondary data.	Risk adjusted measures (Sharpe ratio, Treynor ratio and Jensen alpha) were used to analyse the results.	The research found out that out of 30, 14 sample mutual fund schemes had outperformed the benchmark return. 3 schemes were identified to underperform due to diversification problems.
Poddar (2016)	The paper evaluated the performance of private sector mutual funds and compared them against BSE 100. Data used: Secondary data.	Results were tested by using descriptive analysis, coefficient of determination and risk adjusted measures (Sharpe, Treynor's ratio and Jensen's alpha)	Out of 5 open ended equity schemes of UTI Mutual funds, 3 schemes have outperformed the benchmark index (BSE 100). According to risk adjusted measures, UTI Midcap Fund Growth has outperformed the market.
Solanki (2016)	The paper titled, "A study of performance evaluation of Mutual fund and Reliance Mutual fund", focused on	Results were tested on mean and standard deviation.	5 mutual fund schemes have outperformed the benchmark index in terms of average returns.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	comparison of six open ended equity mutual fund schemes return and risk with benchmark. BSE Sensex are considered as benchmark index. Data used: Secondary data.		
Rathore & Singh (2016)	The study attempted to evaluate the performance of equity mutual fund during the different phases of business cycle in India. Data used: Secondary data.	Results were tested on risk adjusted returns parameters.	The paper found that the foreign sector performed well compared to public and private sector in pre and post period.
Bhutada (2015)	The paper made a comparative analysis of Kotak and HDFC mutual fund. The paper took into account the factors that effects on the performance of the mutual funds. Data used: Secondary data.	Results were tested by using descriptive analysis, coefficient of determination and risk adjusted measures (Sharpe, Treynor's ratio and Jensen's alpha).	The factors affecting the mutual fund performance, identified were election result, crisis, inflation, budget and Government policies.
Ramanujan & Bhuneshwari (2015)	The research provides an overview of the growth and performance of Indian Mutual fund	Descriptive analysis was used for the study.	The research concludes that there is significant rise in Asset under Management across all sectors. The asset base

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	industry in the past decade. Data used: Secondary data.		has grown majorly in the private sector. Even the private sector has contributed the most in terms of net resources mobilized.
Goyal (2015)	The paper examined the performance of top 10 Indian mutual funds on the basis of Credit Rating Information Services of India Limited rankings for the period 1st August, 2014 to 9th November, 2014. Data used: Secondary data.	Risk adjusted measures (Sharpe ratio, Treynor ratio and Jensen alpha) were used to analyse the results.	Franklin India Opportunity fund was ranked first among the top 10 funds. It is found to have lower coefficient of variation and higher Sharpe ratio, Treynor ratio and Jensen alpha.
Sahi & Pahuja (2015)	The paper studied the performance of selected public and private sector growth funds for the period 2009 to 2012. Data used: Secondary data.	Risk adjusted measures (Sharpe ratio, Treynor ratio and Jensen alpha) were used to analyse the results.	Most of the funds in the sample have been found to have positive and better Sharpe and Treynor's ratio. The funds outperformed the market in terms of risk adjusted measures.
Mahajan & Sharma (2015)	The study investigated into the performance of 10 selected Equity Linked Savings schemes (ELSS). It mainly focused on the risk return	Risk adjusted measures (Sharpe ratio, Treynor ratio and Jensen's alpha) were used to check the performance of the mutual fund	The study concludes that Franklin India Tax Shield was the best performing scheme as per Sharpe and Treynor ratio. According to Jensen's alpha the scheme was ranked

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	analysis of the schemes. Data used: Secondary data.	schemes.	second. Hence the scheme was found to be the best in terms of risk adjusted measures among top 10 mutual fund companies on the basis of asset under management for the study period.
Chawala (2014)	The paper intended to study the performance of selected equity diversified Indian mutual funds against the benchmark index. Data used: Secondary data.	Descriptive analysis, Beta ratio and coefficient of determination is used for the study.	Majority of the sample funds have outperformed under risk adjusted measures.
Ashraf & Sharma (2014)	The paper evaluated the performance of 10 Indian growth oriented open ended equity mutual fund schemes against the benchmark index. BSE Sensex was used as the benchmark index and the sample schemes selected were both from public and private sector. Data used: Secondary data.	Results were tested using descriptive analysis and risk adjusted measures (Sharpe, Treynor's ratio and Jensen's alpha).	The results showed that the majority of mutual fund schemes have outperformed the market benchmark indices in terms of Treynor and Sharpe ratio based on historical monthly returns. The success of the fund managers contributed to the funds' improved performance. They were investing money in other stocks, several of which were yielding greater profits.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
Ghose (2013)	The research intended to understand the performance of selected mutual fund schemes in comparison to BSE Sensex. Data used: Secondary data.	In order to check the fund managers effectiveness, Karl Pearson's Product Moment correlation method is used.	The research concluded that return on selected mutual fund schemes have been more volatile than BSE Sensex. Moreover, it founds out that the performance of the fund manager was not so effective in selection of stocks due to high variability of returns.
Santhiyavalli & Usharani (2012)	The paper titled, "A study on investment avenues with particular reference to mutual funds.", plans to investigate the savings objectives of the investors and their prefeered savings avenue of their respondents. Data used: Primary data. Stratified convenience sampling is used in the research.	Descriptive statistics is used for the analysis. Tables, bars and line charts are used to illustrate the results.	Majority of the respondents have invested in the mutual funds with the primary objective of steady income and capital appreciation. The respondents are inclined to risk free growth of their capital invested. Growth and income funds are mostly preferred by the respondents.
Jain (2012)	The study titled, "Performance of Equity mutual funds in India", studied 45 mutual fund schemes	Results were tested by descriptive statistics and risk adjusted measures	The study found that private sector mutual funds have performed better than the public sector mutual funds.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	offered by 2 public sector and private sector companies in India for the study period 1997 to 2012. Data used: Secondary data.	(Sharpe and Treynor's ratio).	ICICI and HDFC was found to be the best performer, UTI was found to be a moderate performer and LIC was found to be the worst performer.
Yagil (2012)	The purpose of the study is to check whether the tracking ability of Exchange traded funds (ETFs) is lower in highly volatile periods and attempted to analyse the factors affecting the tracking error. The study selected 42 ETFs out of which 23 ETFs were issued on and after 2006. The study period taken was from 3rd January, 2006 to 31st December, 2008.	The results were tested on Unit root, Co-Integration tests along with the Error correction model (ECM) to find the relation between benchmark index and ETFs.	The study found out the tracking ability of ETFs in volatility periods and also highlighted the factors responsible for the differences between the performance of ETFs and the benchmark indices.
Purnima, Dhune & Ramesh (2011)	The paper titled, "Performance of Indian mutual funds with special reference to sector funds.", studied 60 funds from banking sector, FMCG sector,	Results were tested by using descriptive analysis and risk adjusted measures (Sharpe and Treynor's ratio).	The study found that all the sample funds have outperformed the market in terms of risk adjusted measure, except the infrastructure sector funds. Moreover, in

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	Pharma sector and technology sector. Data used: Secondary data.		terms of volatility FMCG sector reflects lowest volatility whereas, banking and infrastructure sector shows highest volatility.
Rastogi & Srivastava (2011)	The study tracks volatility swings and examines how they affect the Indian stock market. Comparative study was also made were the stock market volatility in the US and volatility in the Indian stock market are tested at various times when the Indian market was turbulent. Data used: Secondary data.	The researchers employed GARCH modeling.	The results revealed no co-movements in terms of conditional volatility.
Reddy (2010)	The paper evaluated the performance of 87 open ended mutual funds chosen from both public and private sectors. Data used: Secondary data.	Results were tested using descriptive analysis and risk adjusted measures (Sharpe and Treynor's ratio).	The study revealed that the funds having higher level of risk delivered higher returns.
Joshi (2010)	The paper attempted to study the volatility in the Indian	Results were tested on BDSL test, GARCH	The paper revealed that the GARCH (1,1) model captured

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	securities market and China's emerging stock market for the study period 2005 to 2009. Data used: Secondary data.	(1,1) and ARCH LM test.	nonlinearity and volatility clustering effectively. As per the study, the persistence of volatility in the Chinese stock market was greater than in the Indian stock market.
Afza et. Al (2009)	The paper title, " Performance of the Pakistani Mutual funds.", explored into performance of open ended forty three mutual funds was evaluated by looking at the relationships between returns and details such the fund's age, size, expenses, portfolio turnover, and cash holdings. Data used: Secondary data.	Results were tested by using regression model.	The study found that when deciding which mutual funds to invest in, investors take into account both the cash holdings and the history of performance of the mutual funds.
Swaroop & Debashish (2009)	The paper studied the performance of 23 Indian equity mutual fund schemes for the study period 1996-2009. Data used: Secondary data.	Results were tested using descriptive analysis, coefficient of determination and risk adjusted measures (Sharpe, Treynor's ratio	The UTI Mutual Fund and Franklin Templeton Scheme outperformed the public and private sectors, respectively, according to the research.

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
		and Jensen's alpha).	
Srivastava (2008)	The research examined the volatility of BSE Sensex and Nifty 50. The period of the study is 2000 to 2008. Data used: Secondary data.	The results were tested on ARCH, GARCH and TGARCH to examine the volatility of Indian stock market.	ARCH and GARCH were found to be best fitted model to capture and forecast volatility in Indian securities market.
Malabika et. Al (2008)	The paper investigated into the empirical relationship between stock return, trading volume and volatility for selected Asia Pacific Stock market for the time period 2004 to 2008. The data consists of seven national stock exchange. Data used: Secondary data.	Results were tested on Granger Causality test and EGARCH(1,1) model.	The results of the investigation showed a strong relationship between trading volume and the overall size of price changes. The Granger Causality test shows a correlation between trading volume and market returns. The return and volatility are provided some information about the trading volume after inclusion in order to examine the contemporaneous and lagged volume effect.
Joshi & Pandya (2008)	The study examined the effect of BSE Sensex and Nifty 50 on Indian securities market. Data used:	The results were tested on ARCH and GARCH models.	GARCH (1,1) model found out the significant effect of market volatility in the stock prices. The model is found to be

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	Secondary data.		best suited for the time series data.
Yan (2008)	The research attempted to find out the effect of liquidity and investment style on the relation between fund size and fund performance. Data used: Secondary data.	Results were tested on panel data regression.	The paper revealed that liquidity is a crucial reason why fund size erodes performance.
Bhadur (2008)	The paper evaluated the volatility of Nepalese stock market using daily return from 2003 to 2009. Data used: Secondary data.	Results were tested using family of GARCH techniques.	The paper found that there is no significant asymmetry in the conditional volatility of returns in GARCH(4,1) model.
Desai (2007)	The paper made comparative study of the investment policy of selected private and public sector mutual funds. Data used: Secondary data.	Results were tested using descriptive analysis and risk adjusted measures (Sharpe & Treynor's ratio)	Most of the sample funds haven't performed much better than the relevant benchmark indices. Additionally, due to their extensive diversity, private sector banks have surpassed public sector banks in terms of performance.
Sibani and Uma (2007)	The paper attempted to capture the time varying nature of volatility of the spot	Results were tested on OLS and GARCH techniques.	The study found that there are no significant changes in the volatility of the spot

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	market of the Nifty 50 index. Data used: Secondary data.		market of the Nifty 50 index. This study also brought to light the fact that volatility has remained since the beginning of future trading and that prices are taking in new information more quickly than they did in the past.
Athanasios & Nicholas (2006)	The study examined the relationship between stock market returns and volatility in industrialised countries such as Australia, Canada, France, Japan, the United States, the United Kingdom, Germany, and Italy, as well as other countries. Data used: Secondary data.	The results were tested on GARCH-M and EGARCH models.	The study found that the relationship between stock prices returns and market volatility is weak for the specific stock markets of industrialized countries.
Sarangi & Patnaik (2006)	The paper evaluated the impact of futures and options on the S&P CNX Nifty using both closing and opening price returns. Data used:	Results were tested using family of GARCH techniques.	The empirical evidences suggested that there have been no significant changes in the volatility of the spot market of the S&P CNX Nifty Index, but the structure of

Author(s), Year	Theory used, Variable used	Research Methodology	Major Findings
	Secondary data.		volatility has changed to some extent.
Qi et. Al (2005)	The study examined the relationship between volatility and anticipated stock returns in the 12 largest international stock markets. The research will cover the period from 1980 to 2021. Data used: Secondary data.	The results were tested on EGARCH models. Flexible semi parametric specifications of conditional variance is used for the model.	The paper found significant negative relationship between expected returns and volatility in 6 out of 12 markets.
Chen, Hong, Huang & Kubik (2004)	The paper investigated the effect of scale on performance in active money management industry. Data used: Secondary data.	Results were tested on time series regression, cross sectional regression and panel data regression.	The paper found out that scale erodes fund performance because of the interaction of liquidity and organizational diseconomies.
Babatunde (2003)	The paper attempted to evaluate the relative contributions of stock market volatility to economic growth in Nigeria for the study period 1980 to 2010. Data used: Secondary data.	Results were tested on Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH).	The paper found that there is persistence of volatility in stock market which might be harmful to the Nigerian economic development.

1.4 Research Gap

A research gap is the knowledge gap, which is an area of study that is unexplored or undeveloped. It signifies that further research is necessary to fill a gap or shortage in the body of current knowledge. Finding research gaps helps to define the scope and objective of the work being done, making it a crucial step in the research process. Since it enhances our understanding and provides researchers and academicians with clear explanation for their work, identifying and filling research gaps is an essential part of academic research.

Prior studies have attempted to concurrently assess the performance of various financial instruments including mutual fund schemes, using a variety of risk adjusted performance measures, such as Sharpe ratio, Treynor ratio and Jensen's alpha, etc. The research conducted during 2008 to 2021 period was characterized by the global financial crisis, its recovery and other significant national and international economic and political events. Some studies have been conducted on the volatile and shifting economic situations, which include the three stages of the global financial crisis, recovery and growth phase. Some studies have been undertaken to check the volatility of the benchmark indices and its impact on the performance mutual fund schemes. Thus in this study an attempt has been made to capture the aspects of the performance of the mutual fund schemes, their interaction with the benchmark indices (BSE Sensex and Nifty 50) and the volatility. All these aspects have not been analysed together in any research encompassing my study period and the sample.

1.5 Objective of the Study

1. To study the growth and development of mutual fund industry in India. (Chapter 2)
2. To explore the risk return analysis of selected mutual fund schemes. (Chapter 3)
3. To analyse the performance of the selected equity Mutual Fund Schemes with respect to BSE Sensex and Nifty 50. (Chapter 3)
4. To analyse the effect of market fluctuations (i.e, volatility) with the selected Equity Mutual Fund Schemes. (Chapter 4)

1.6 Research Methodology

Research methodology refers to the systematic process and techniques used by researchers to conduct their studies, gather data, and analyze information in a structured and organized

manner. It is a crucial aspect of the research process because it provides a framework for conducting research and ensures that the results are reliable, valid, and may be replicated by others.

1.6.1 Research Sample

The Top 20 Open Ended Equity diversified mutual fund schemes, have been selected on the basis of monthly returns generated by the mutual fund schemes as on 1st January, 2008 from the website valueresearchonline.com. 1st January, 2008 has been selected as the basis as one can say that the effects of the global financial meltdown started impacting the Indian Mutual Fund Industry at around the same time. The mutual fund schemes stated below are arranged according their rankings as graded by valuereaschonline.com.

1. DSP BlackRock Small Cap Fund
2. HDFC Mid-Cap Opportunities Fund
3. ICICI Prudential Value Discovery Fund
4. Franklin India Smaller Companies Fund
5. Sundaram Mid Cap Fund
6. DSP BlackRock Midcap Fund
7. IDFC Multi Cap Fund
8. L&T Midcap Fund
9. UTI Mid Cap Fund
10. Sundaram Small Cap Fund
11. Invesco India Contra Fund
12. Reliance Tax Saver (ELSS) Fund
13. Aditya Birla Sun Life Small Cap Fund
14. Franklin India Prima Fund
15. Invesco India Mid Cap Fund

16. Reliance Multi Cap Fund
17. Invesco India Tax Plan
18. Tata Equity PE Fund
19. L&T Tax Advantage Fund
20. Franklin India Focused Equity Fund

1.6.2 Period of Study

The time period selected is 2008-2021 that covers the global meltdown, recovery, Covid – 19 pandemic and other important global and domestic economic and political events. The performance evaluation of selected mutual fund schemes covers the period from January 2008 to December 2021. Monthly data is used for the research. Since the global financial crisis began to have an impact on the Indian financial market around this time, the year 2008 was chosen as the study's beginning point.

1.6.3 Collection of Data

The study is both exploratory and empirical in nature. The study is based on secondary data. The exploratory portion of the study is grounded on the most recent body of work on the subject, which includes books, journal articles, research studies and websites. The conceptual, theoretical, historical and the legal facets of mutual funds in India are also covered in this section.

The data were gathered from a number of sources, including valueresearchonline.com, the official websites of the various mutual fund companies, the websites of Bombay Stock Exchange (BSE) and National Stock Exchange (NSE), Association of Mutual Funds in India (AMFI), Securities and Exchange Board of India (SEBI) and Reserve Bank of India Handbook of Statistics on Indian Economy and various reports and articles that were published in finance related magazines and periodicals. The Closing value of the Net Asset Value (NAV) of the sample mutual fund schemes and the closing value of the benchmark indices (BSE Sensex and Nifty 50) are collected on a monthly basis. The work of the academicians and scholars on this area has also been consulted for the purpose of analysis.

1.6.4 Research tools

Research tools are the techniques employed by the researchers to collect, examine, and evaluate data or information in order to advance knowledge, solve issues, or draw well informed conclusions. They make it easier for researchers to collect and organize data, conduct analysis and provide appropriate results by assisting the methodological investigation and analysis of certain research problems and objectives. The employment of research instruments is essential for the creation of new theories, the investigation of several fields of study, and the expansion of research. They make it possible for researchers to carry out research and deepen our understanding of the results.

NAV Returns: Net Asset Value is equal to the market value of the scheme's assets less their liabilities. By dividing the scheme's net asset value on the valuation date by the total number of outstanding units, the per unit NAV is determined. To estimate the mean returns of the scheme, the monthly returns for the sample period are computed, and the yearly average is determined.

Market returns: To determine the market's mean returns and obtain the annual average, the monthly returns for the sample period are computed. The closing value of the benchmark indices (BSE Sensex and Nifty 50) is obtained.

Standard Deviation is a risk indicator which quantifies the degree of divergence from the expected return.

Beta is a measure of the systematic risk in a mutual fund scheme. It determines how volatile a mutual fund scheme is in comparison to its benchmark indices.

Sharpe Ratio: The Sharpe ratio is the risk-adjusted performance measure that is employed. It represents the amount of money earned for every unit of total risk taken. The Sharpe Ratio may be calculated by deducting the risk-free rate of return from the average monthly return of the mutual fund scheme and dividing the resulting amount by the standard deviation of the mutual fund scheme.

Treynor Ratio: The Treynor Ratio is the additional return obtained per unit of systematic risk. The Treynor ratio is computed by dividing the outcome by beta after subtracting the average monthly return of the mutual fund scheme from the risk-free rate of return.

Jensen's alpha: The ratio's objective is to quantify the discrepancy between predicted and actual returns in relation to a mutual fund scheme's degree of risk. It facilitates the assessment of the fund manager's likelihood of selecting undervalued assets and producing returns that exceed the benchmark expectations.

Correlation: A correlation analysis determines how closely two or more variables are related. The mutual fund scheme returns and the benchmark returns, such as BSE Sensex returns and Nifty 50 returns, are the variable in this case.

OLS: Using the Ordinary Least Square (OLS) regression optimization approach, one can get a straight line in the linear regression model that is as close as possible to the data points. Here, OLS is used to analyse the linear relationship between the monthly mutual fund scheme returns and BSE Sensex returns.

ARCH LM test of the Residuals of OLS: The test is undertaken to check the reliability and validity of the linear OLS model.

Augmented Dickey Fuller test (ADF Test): It is a popular statistical test that determines if the time series data is stationary or not. This test is undertaken to analyse whether the time series data relating to monthly mutual fund scheme returns and BSE Sensex monthly returns over 14 years (N= 12*14=168 per mutual fund scheme), is stationary with respect to time.

Normality test: Jarque Bera Test is undertaken to check whether the dependent variable (i.e, monthly mutual fund scheme return) follows normal distribution with zero variance over data points.

GARCH (1,1) test: GARCH test has been conducted to forecast the time series data with respect to conditional heteroskedasticity, which is a phenomenon where the variance of the time series data changes with respect to the data points. There can be two situations under GARCH forecasting which may be classified as:

a) Data may cluster during certain time periods, when there is high volatility.

b) Data may stabilize during the time period when volatility is low.

Now it was observed certain mutual fund schemes during the phase of high volatility followed a non-normal distribution. In case, the mutual fund schemes followed a normal distribution, we adopted Gaussian distribution fit to validate the effect of clustering. In other

cases, where it was found to be non-normal distribution, the student t-distribution fit has been run to check the clustering.

Stationarity test of the Residuals of the GARCH test: Augmented Dickey Fuller test (ADF Test) is undertaken to check the presence of ARCH effects within the residuals of GARCH (1,1). It assesses if there is any volatility clustering in the squared residuals after fitting the GARCH (1,1) model. A significant GARCH (1,1) along with an insignificant ARCH LM test validates a better model fit for the mutual fund scheme volatility and clustering.

ARCH LM test of the residuals of the GARCH (1,1) model: The ARCH-LM test (Autoregressive Conditional Heteroskedasticity Lagrange Multiplier test) is a diagnostic test used to check for the presence of ARCH effects in the residuals of a GARCH(1,1) model. A significant GARCH (1,1) along with an insignificant ARCH LM test of the residuals of GARCH (1,1) suggests that the model effectively captures the conditional variance patterns without the need for further modifications to account for additional conditional heteroskedasticity in the residuals. A significant ARCH LM test suggests that there may be additional volatility dynamics not accounted for by the GARCH (1,1) model. In such case, we have considered the next order GARCH (2, 1) model to improve the model's performance.

Table 1.2: Summary of the tools used in the study.

Tools used	Abbreviation	Generic Purpose	Specific Purpose
Net Asset Value	NAV	The market value of the assets less the liabilities of the schemes equals the NAV. The per unit NAV is calculated by dividing the scheme's net asset value on the valuation date by the total number of outstanding units.	Objective 2 Objective 3 Objective 4
NAV Returns	R_p	The monthly returns for the sample time period are computed, and the annual average is calculated, in order to estimate the mean returns of the mutual fund schemes.	Objective 2 Objective 3 Objective 4

Tools used	Abbreviation	Generic Purpose	Specific Purpose
Market Returns	R_m	The monthly returns for the sample time period are computed in order to get the annual average and calculate the market's mean returns. The market's closing value is employed. Nifty 50 and BSE Sensex is considered as Market indices.	Objective 2 Objective 3 Objective 4
Standard Deviation	SD	The standard deviation, a risk indicator, quantifies the degree of divergence from the expected return or mean.	Objective 2
Beta	β	Beta measures the portfolio's systematic risk. It establishes a fund's volatility in relation to that of its benchmark.	Objective 2
Sharpe Ratio	SR	The risk adjusted performance metric that is used is called Sharpe ratio. It stands for the amount of money received for each unit of total risk assumed. The Sharpe ratio is computed by subtracting the risk free rate of return from the portfolio's average monthly return and dividing the result by the portfolio return's standard deviation.	Objective 2
Treynor Ratio	TR	Treynor ratio is used to determine the extra return earned per unit of systematic risk. Treynor ratio is calculated by deducting the portfolio's average monthly return from the risk free rate of return and dividing the	Objective 2

Tools used	Abbreviation	Generic Purpose	Specific Purpose
		result by beta.	
Jensen's Alpha	α	This aims to measure the difference between expected and the actual returns with respect to the level of risk in a portfolio. It aids in determining the fund manager's propensity for identifying undervalued assets and generating excess returns over the benchmark.	Objective 2
Correlation	r	Correlation measures the degree of association between two or more variables. Here the variables are the mutual fund scheme returns and benchmark returns i.e, BSE Sensex returns and Nifty 50 returns.	Objective 3
Ordinary Least Squares Regression	OLS	The primary goal of OLS is to find the best-fitting line that minimizes the sum of squared differences between the observed dependent variable (response variable) and the values predicted by the linear model.	Objective 4
Jarque-Bera test (Normality Test)		The Jarque-Bera test is a statistical test used to check whether a given dataset follows a normal distribution.	Objective 4
Generalised Autoregressive Conditional Heteroskedasticity	GARCH	GARCH processes being autoregressive depend on past squared observations and past variances to model for current variances.	Objective 4

Tools used	Abbreviation	Generic Purpose	Specific Purpose
		GARCH aims to minimize errors in forecasting by accounting for errors in prior forecasting, enhancing the accuracy of prediction.	
Augmented Dickey Fuller Test	ADF	It is a statistical test used to determine whether a time series has a unit root, which indicates the presence of a non-stationary process. The test is commonly used in econometrics and time series analysis to assess the stationarity of a series and to determine whether differencing is necessary to make the series stationary.	Objective 4
Autoregressive Conditional Heteroskedasticity Lagrange Multiplier Test	ARCH LM	The ARCH-LM test (Autoregressive Conditional Heteroskedasticity Lagrange Multiplier test) is a diagnostic test used to check for the presence of ARCH effects in the residuals of a GARCH (1,1) model.	Objective 4

1.6.5 Formulation of Hypothesis

For Objective 3

For Pearson's Correlation Coefficient Test

Null Hypothesis

H_0: There is no correlation between returns of the Benchmark Indices (BSE Sensex and Nifty 50) and Mutual Fund Schemes.

Alternative Hypothesis

$H_{1:}$ There is correlation between returns of the Benchmark Indices (BSE Sensex and Nifty 50) and Mutual Fund Schemes.

For Objective 4

For OLS Regression Testing

Null Hypothesis

H_0: The monthly returns of the BSE Sensex does not have significant linear relationship with monthly returns of the Mutual Fund Schemes.

Alternate Hypothesis

H_1: The monthly returns of the BSE Sensex have significant linear relationship with monthly returns of the Mutual Fund Schemes.

For testing ARCH effect in the residuals of OLS Regression

Null Hypothsis

H_0: There is no conditional heteroskedasticity in the model's residuals.

Alternate Hypothesis

H_1: There is conditional heteroskedasticity in the model's residuals. The variance of the residuals is not constant and depends on the values of the independent variables or the lagged residuals.

For testing Stationarity of the time series data

Null Hypothesis

H_{10}: The monthly returns of the BSE Sensex and selected mutual fund schemes are non-stationary.

Alternative Hypothesis

$H_{11:}$ The monthly returns of the BSE Sensex and selected fund schemes are stationary.

For testing effect of market fluctuations with the selected Equity Mutual Fund Schemes by GARCH effect.

Null Hypothsis

H_0: There is no conditional heteroskedasticity in the model's residuals.

Alternate Hypothesis

H_1: There is conditional heteroskedasticity in the model's residuals. The variance of the residuals is not constant and depends on the values of the independent variables or the lagged residuals.

For testing stationarity of the residuals.

Null Hypothesis

H_0: There is no conditional heteroskedasticity in the model's residuals.

Alternate Hypothesis

H_1: There is conditional heteroskedasticity in the model's residuals. The variance of the residuals is not constant and depends on the values of the independent variables or the lagged residuals.

For testing ARCH effect in the residuals of GARCH model

Null Hypothesis:

H_0: There is no ARCH effect, and the squared residuals are homoscedastic (no remaining autocorrelation).

Alternative Hypothesis

H_1: There is an ARCH effect, and the squared residuals are heteroskedastic (exhibit autocorrelation or volatility clustering).

1.7 Limitations of the study

a) The study is based on secondary data. In future as a further scope of research primary data may be incorporated.

b) The comparative performance of mutual funds has been studied in relation to BSE SENSEX return and NIFTY return; the other indices like NSE, S&P, etc. may be taken into consideration for future scope of research.

c) The investors' perception may be studied as a future scope of research.

d) Other types of Mutual Fund Schemes may be studied in future.

1.8 Plan of Presentation of the Study

In accordance with the aforementioned objectives and research methodology, the proposed study has been divided into five chapters.

Chapter 1: Introduction to the study.

This chapter introduces and gives a background of the mutual fund industry in India. This chapter covers the research objectives, significance, sample selection, data collection, time frame, research methods and limitations of the study. The chapter conducts a detailed literature review on the related area and points out the gaps and tries to fill them in the context of India.

Chapter 2: Growth and Development of Mutual fund Industry of India: An overview

The concept of mutual funds, their history, the various types of mutual funds, and the advantages of investing in mutual funds while taking the challenges into account are all covered in this chapter. This chapter also discusses the growth and development traits of mutual funds in India as well as the regulatory environment for mutual funds. The chapter covers the study's first objective.

Chapter 3: Performance Analysis of selected Indian mutual fund schemes.

The risk-return analysis of the sample open ended equity mutual fund schemes are covered in this chapter. This chapter also evaluates the risk adjusted performance of the sample mutual fund schemes using the accepted traditional theoretical models of Sharpe, Treynor ratio and Jensen's alpha. The performance of the selected mutual fund schemes is also measured against the benchmark indices (BSE Sensex and Nifty 50). This chapter discusses the second and third objectives of the study,

Chapter 4: Analysis of volatility of selected Indian Mutual funds schemes

The chapter discusses the volatility of the benchmark indices and its impact on the performance mutual fund industry. This chapter discusses the last objective of the study.

Chapter 5: Conclusion and Recommendations.

The chapter summarises the results of the other preceeding chapters and offers conclusion and recommendations based on the findings.

Chapter 2:

Growth and Development of Mutual fund Industry of India: An overview

Chapter 2

Growth and Development of Mutual fund Industry of India: An overview.

2.1 Introduction

In the current financial market situation, investors have several options for potential investments. Mutual funds are one such avenue for investing that gives investors a good investment opportunity. Much like the majority of other investing instruments, mutual funds carry some risk. Investors should always consider the risks associated with a given investment when making investment decisions. Investors may also speak with financial consultants for advice before making an investment decision.

2.2 Concept of Mutual Funds

Association of Mutual funds in India (AMFI) defines a mutual fund as "a trust that collects money from a number of investors who share a common investment objective and invests the same in equities, bonds, money market instruments and other securities. The incomes/gains generated from this collective investment is distributed proportionately amongst the investors after deducting applicable expenses and levies, by calculating a scheme's 'Net Asset Value' or NAV."

As per the definition laid by Securities and Exchange Board of India (Mutual Fund) Regulations, 1996 defines the concept of 'mutual funds' as, " a fund established in the form of a trust to raise money through the sale of units to the public or a section of the public under one or more schemes for investing in securities including money market instruments or gold or gold-related instruments or real estate assets."

In simple words, a mutual fund is a trust that pools the funds of common people with a common objective and then invests that corpus in various financial market instruments *(Bhalla, 2005).* The fund manager used his knowledge of the market to time it appropriately and invest the money in plans that would help the fund achieve its objective. The corpus has been invested in a way that diversifies investment risk without diluting it *(Jaydev, 1996).* Mutual funds must first register with the Securities and Exchange Board of India (SEBI). Securities and Exchange Board of India (SEBI) is the nation's primary securities industry regulator, to invest in these markets.

Investors in a mutual fund are referred to as unit holders. They receive units in proportion to their contributions. Each unit owner received a proportionate share of the profits or losses *(Dey, 2005).* A mutual fund invests in a variety of securities from various companies, whether they operate in the same industry or other ones. Mutual funds accomplish investment diversification and risk reduction. The corpus is invested in different industries of different sectors. Investing in different industries diversifies the risk *(Jensen, 1968, Sharpe, 1966).*

Mutual funds achieve multiple objectives at once. It has different functions depending on the parties involved. The main goal of mutual funds is to assist investors in taking advantage of the opportunities offered in a variety of assets across financial markets to produce income or build wealth *(Bansal, 1977).* Mutual funds carry out this responsibility by developing several schemes with a variety of investment objectives in line with the preferences of potential participants *(Bhalla, 2005).*

The mutual fund industry is able to gather a big corpus from a sizable group of investors with a variety of objectives because of its vast range of schemes. The assets amassed by investor investments, whether directly or indirectly, eventually assist the government, business, industry, and all other actors in the economy. Profits generated by the mutual fund houses that operate in the economy are subsequently available for investment in various initiatives. This promotes the growth of the economy *(Sadhak, 1997).*

As vast sums of money accumulate, the mutual fund houses become big investors in the company in which the funds are invested. Being a sizable investor, it ensures that the company where the funds are placed is being watched over in terms of its business operations. In contrast, the mutual fund industry, as a part of the economy, contributes significantly. It plays a big role by creating jobs for many people who are connected to it either directly or indirectly and encouraging economic expansion *(Bansal,1996).*

Additionally, it stabilises the financial market, maintaining its stability. By balancing disproportionate capital inflows and outflows from institutional and retail international investors, it exerts a stabilising influence *(Kundu, 2009).* Mutual funds work to satisfy the investing preferences of all potential members by providing a number of different types of mutual fund schemes. These schemes have predetermined investment objectives. The investors participate in the financial sector investing by their investment preferences.

The specific objective of each of the many mutual fund schemes is to attract potential investors' attention and persuade them to invest in the scheme in line with their investment goals. A scheme may be either a close-ended or an open-ended scheme, depending on the structure. This relates to whether investors may join the scheme by acquiring the scheme's units at any time during the scheme's lifetime, or whether it may only allow for investments for a brief, pre-fixed period.

When funds are invested in a scheme, they are viewed as having "Units" and are handled accordingly. The investors are known as scheme unit holders. The unit holders receive different numbers of units, depending on how much money was invested in the scheme. The funds received from investors in a scheme are invested in a diverse portfolio of securities. They are invested in accordance with the previously specified scheme objectives *(Tripathy, 1996).* A scheme's surpluses or deficits are distributed proportionately among unit holders based on the number of units they own *(Dey, 2005).*

According to the Securities and Exchange Board of India (Mutual Fund) Regulations, 1996, a "New Fund Offer" (NFO) is the name of the offer made when a new scheme is initially made available to investors for investment. The New Fund Offer has a start and end date that designates the length of time it will be in effect, valid, or open. Investors might choose to purchase units in the fund at face value during the New Fund Offer. On the other hand, if investors decide to buy units of a scheme after its New Fund Offer term has ended, they must pay a purchase price that is equal to the scheme's NAV (Net Asset Value).

2.3 History of Mutual funds in India

The ‘take off’ stage of the Mutual Funds in India that we find in the recent past had its initial journey during the 1960s. More specifically, its earliest developments may be traced to the middle of the 1960s. The growth and development of the Indian mutual fund sector can be summarised below:

1. Introduction Phase (1964-1987):

The introductory phase of Mutual Funds in India begins with the emergence of the Unit Trust of India.

Unit Trust of India (UTI): The Unit Trust of India, the nation's first mutual fund, was established in 1963 according to the UTI Act. Its inaugural program, Unit Scheme 1964 (US-

64), was implemented in 1964. During this time, UTI dominated the sector. The Asset under Management (AUM) in March, 1965 was 25 crores which was increased to 4564 crores in March,1987.

2. Controlled or Regulated Phase (1987-1993):

The regulatory phase of the Indian Mutual Fund sector began with the establishment of some regulatory institutions.

Establishment of Securities and Exchange Board of India (SEBI): The Securities and Exchange Board of India (SEBI), which is in charge of regulating the nation's securities industry, was founded in 1988. The task of monitoring India's mutual fund regulation was handed to SEBI. To safeguard the interests of investors and advance transparency, it created several guidelines. The Asset under Management (AUM) in March, 1988 was 6700 crores which was increased to 47,004 crores in March,1993.

3. Liberalization Phase (1993-2003)

The gradual shift of the Indian financial sector from a regulated environment to a liberalized environment since the early 1990s marked the beginning of the liberalization phase of the Mutual Funds.

Entry of Private Players: In the 1990s, private companies offering mutual funds began to emerge. Around this time, several private companies entered the market, including ICICI Prudential Mutual Fund, HDFC Mutual Fund, and SBI Mutual Fund, signaling the end of UTI's monopoly. The industry's significant AUM growth over this decade was facilitated by improved investor education, new mutual fund schemes, and economic deregulation. The Asset under Management (AUM) in March, 1993 was 47,004 crores which was increased to 79,464 crores in March, 2003.

4. Growth and Diversification Phase (2003-2009)

The liberalization phase paved the way for the growth and diversification in the Indian Mutual Fund sector.

Increase in the AMCs and introduction of Systematic Investment Plans (SIPs): During this time, the number of Asset Management Companies (AMCs) increased significantly as a result of the entry of new rivals into the market. New products were launched as a result of

increased competition. The popularity of SIPs as a method of disciplined investing has led to an increase in the proportion of retail investors in mutual funds. The Asset under Management (AUM) in March, 2003 was 79464 crores which was increased to 8,25,240 crores in March,2014.

5. Expansion Phase (2009- Present)

Categorisation and Rationalisation: The SEBI developed mutual fund categorisation and rationalisation criteria in 2017 to encourage uniformity and clarity among mutual fund schemes and make it simpler for investors to select the appropriate schemes.

Reduction in the Expense Ratio: SEBI has started taking steps to reduce the total expense ratios (TER) that mutual funds charge. As a result, investors pay less overall for their investments.

Digitalisation: Digital platforms and online investing portals have been used by the industry to make it simple for investors to research, transact, and keep track of their mutual fund holdings.

In terms of AUM and investor participation, the Indian mutual fund industry has expanded tremendously, placing it among the biggest in the world. The AUM as on 30th September, 2023 is 4,657,755 crores.

The mutual fund industry provides a wide range of schemes to accommodate different investing goals, risk tolerances, and time horizons. The industry is constantly evolving as a result of new product development, regulatory changes, and a focus on investor education and awareness.

2.4 Types of Mutual Funds

A wide variety of mutual fund strategies are available to investors through mutual funds. The various types of funds that are available on the market include:

2.4.1 On the basis of Maturity Period:

1. Open-ended funds: Investors may join or withdraw from open-ended funds at any time, even after the original offer period or the New Fund Offer period has expired. An open-ended plan is permanent and has no fixed maturity date, therefore unit holders' entry and exit have no impact on it.

2. Close-ended funds: During the New Fund Offer period, only new investors may purchase units of a closed-ended fund. Buyers and sellers could trade units of the plan through an exchange after it was listed on the stock exchange. A closed-ended scheme has a predetermined maturity period and a specified number of unit holders after the offer period.

3. Interval funds: Both closed-ended and open-ended components can be found in interval funds. Based on their investment goal, these funds may switch from being open-ended to being closed-ended. Investors gain from having the option to buy and sell units of interval funds without fully relying on the stock market.

2.4.2 On the basis of the role of the Fund Manager

1. Active Funds: The definition of an active fund is one where the fund manager actively selects the investment sites. However, this money must be invested in a manner consistent with the scheme's goals. With the ultimate objective of maximising returns, the fund manager chooses the investment portfolio, keeps track of the fund's performance, and determines which assets to acquire and sell using his knowledge and in-depth analytical study.

2. Passive Funds: Passive funds are those funds where the fund manager's role is primarily passive because investments are typically based on a specific index. In their investing portfolio, ETFs, a type of passive fund, employ an index replication technique.

2.4.3 On the basis of the Investment Objective

1. Equity Funds: Equity funds invest mostly in equities or company shares. Long-term capital appreciation is the goal of these funds. Market capitalization-based subcategories for them include large-cap, mid-cap, and small-cap funds. Equity funds provide a higher potential return at a higher risk.

2. Debt Funds: Debt funds invest in money market instruments, corporate bonds, and other fixed-income securities including government bonds. These funds seek to preserve capital while generating a steady income. Debt funds are typically regarded as less risky than equity funds, but they are nonetheless susceptible to interest rate and credit risk.

3. Hybrid or Balanced Funds: Balanced funds and hybrid funds both invest in a combination of equity and debt securities. These funds provide a well-rounded method of investing that aims to provide both capital growth and income. Investors with a moderate risk tolerance may profit from the benefits of diversification offered by hybrid funds.

4. Index Funds: Index funds try to mimic the performance of a particular market index, like the BSE Sensex or Nifty 50. These funds follow the same investment strategy and proportions as the index they follow. In comparison to actively managed funds, index funds are passively managed and typically have lower expense ratios.

5. Exchange-Traded Funds (ETFs): ETFs are traded on stock exchanges like individual stocks but are similar to index funds. The ability to buy or sell units at any time during the trading day is provided by these funds. ETFs might follow a particular index, industry, commodity, or group of assets.

6. Sectoral and Thematic Funds: Sectoral funds concentrate on particular economic sectors, including banking, technology, or healthcare. Thematic funds make investments on particular themes or trends in the market, such as infrastructure or consumption. These funds offer focused exposure to particular industries or topics, but they can be riskier and more volatile.

7. Liquid Funds: Liquid funds offer high liquidity with low-risk exposure by investing in short-term money market securities. These funds are appropriate for investors wishing to lodge their excess cash in the near term because they are designed to offer predictable returns.

8. ELSS (Equity Linked Savings Scheme) Funds: Section 80C of the Income Tax Act provides tax advantages for ELSS funds. These equity-oriented funds have a three-year lock-in period and offer investors the chance for long-term capital growth as well as tax benefits.

These are only a few of the mutual fund categories that are available in India. Depending on the type of fund, different investing strategies, risk profiles, and potential returns exist. Investors may carefully consider their investment objectives, risk tolerance, and time horizon before selecting a mutual fund that supports their financial goals.

2.5 Key Components of Mutual Funds

1. Sponsor

A sponsor submits a SEBI registration application for the mutual fund. At least 40% of the Net Worth of the AMC must be provided by the Sponsor(s) as capital. A minimum initial investment of Rs. 100,000 must be made by the Sponsor(s) to create the Fund's corpus.

Example: Axis Bank Limited.

2. Trustee

Trustees are essential to the effective management of a mutual fund because they make sure that all rules are followed and that the interests of unit holders are continuously protected. A trustee or trustees may only be chosen with SEBI's prior agreement. A minimum of four individuals, or, in the case of a company, a minimum of four of the Board of Directors, must be appointed as trustees by the sponsor. There should be no conflict of interest between the directors and the sponsor in the case of a corporation, where at least two-thirds of the total number of directors must be independent.

Example: Axis Mutual Fund Trustee Limited.

3. Asset Management Company (AMC)

The sponsor or trustees must obtain SEBI clearance before deciding on a company to act as the fund's AMC. To be eligible for an AMC, a corporation's net worth must be at least 50 crores. The AMCs look after the functioning of the mutual funds. Additional protections and due diligence must be employed to guarantee that there are no conflicts of interest while investing money in compliance with any plan and the mutual fund regulations that SEBI is charged with enforcing.

Example: Axis Asset Management Company Limited.

An asset management company (AMC) is in charge of administering and monitoring the mutual fund trust's business activities. In India currently, 43 AMCs are in operation. The number of players in this industry has changed dramatically as new competitors have entered the market and some of the smaller AMCs have merged into larger ones over time. The list of the AMCs is ranked in terms of the value of Asset under management.

Table No- 2.1 The name and Asset under Management of all Asset Management Companies operational in India as in March, 2023

Srl No	Name of the AMCs	Rs (in crores)
1	SBI Funds Management Ltd	718337.91
2	ICICI Prudential Asset Management Company Limited	518435.45
3	HDFC Asset Management Company Limited	444230.86
4	Nippon Life India Asset Management Ltd	295235.17
5	Kotak Mahindra Asset Management Co Ltd	285383
6	Aditya Birla Sun Life AMC Ltd	275954.2
7	Axis Asset Management Company Limited	242168.32
8	UTI Asset Management Company Ltd	232953.1
9	Bandhan Asset Management Company Limited	117061.85
10	Mirae Asset Investment Managers (India) Private Limited	115615.8
11	DSP Investment Managers Private Limited	114509.29
12	Edelweiss Asset Management Limited	111965.57
13	Tata Asset Management Limited	98410.37
14	HSBC Asset Management(India)Private Ltd	82782.81
15	Franklin Templeton Asset Mgmt(IND) Pvt Ltd	64280.78
16	Canara Robeco Asset Management Co. Ltd.	62442.57
17	Invesco Asset Management (India) Private Ltd	46387.27
18	Sundaram Asset Management Company Ltd	44513.9
19	PPFAS Asset Management Pvt. Ltd	33705.75
20	Motilal Oswal Asset Management Co. Ltd	33020.73
21	Baroda BNP Paribas Asset Management India Pvt. Ltd.	24505.68

22	PGIM India Asset Management Private Limited	21427.77
23	Quant Money Managers Limited	18757.35
24	LIC Mutual Fund Asset Mgmt Co Ltd	17638.61
25	Union Asset Management Co. Pvt. Ltd.	10011.21
26	Mahindra Manulife Investment Management Pvt. Ltd.	9800.24
27	IIFL Asset Management Limited	4615.7
28	NJ Asset Management Private Limited	4299.6
29	IDBI Asset Management Limited	3733.09
30	ITI Asset Management Limited	3606.69
31	Bank of India Investment Managers Private Limited	3392.51
32	JM Financial Asset Management Limited	2967.47
33	WhiteOak Capital Asset Management Limited	2361.11
34	Navi AMC Limited	2209.37
35	Quantum Asset Management Co Pvt. Ltd.	1988.4
36	Trust Asset Management Private Limited	1188.97
37	Samco Asset Management Pvt Ltd	781.05
38	Taurus Asset Management Company Limited	513.31
39	Indiabulls Asset Management Company Ltd.	511.52
40	Shriram Assets Management Ltd	282.72
41	UTI Mutual Fund	24.51
42	IDFC Asset Management Company Limited	-
43	L&T Investment Management Ltd.	-

Source : SEBI Annual Report 2023

It can be observed from Table 2.1, we can see SBI Funds Management Ltd, ICICI Prudential Asset Management Company Limited, and HDFC Asset Management Company Limited have the largest share in the mutual fund industry in terms of Asset under Management holding 17.64% , 12.73%, and 10.91% shares respectively.

4. Custodian

The trustees select the custodian, who must register with Securities and Exchange Board of India (SEBI). The custodian is in charge of managing all financial transactions related to investments in various mutual fund schemes and maintaining the fund's assets in a secure manner.

Example: Deutsche Bank A.G. & The Bank of Nova Scotia (custodian for Axis Gold ETF)

5. Registrar and Transfer Agent (RTA)

The Registrar & Transfer Agent is chosen by the AMC and is required to register with SEBI. The records of the investors are monitored by the RTA. The main responsibility of an RTA is to react to unit holders' requests for purchase and redemption. The RTA keeps the investors informed about their status of investments.

Example: Karvy Fintech Private Limited

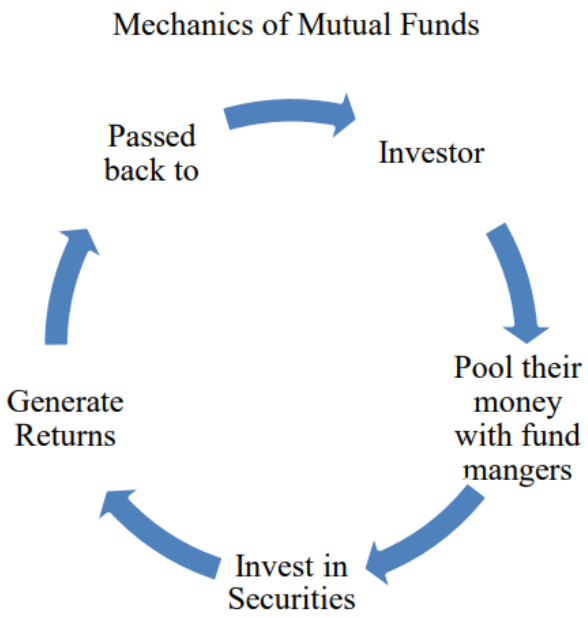
2.6 Working Mechanism of Mutual Funds

The mutual fund working mechanism is initiated when investors with common financial goals combine their resources to form a corpus. Investors obtain mutual fund units in exchange for money. Mutual fund units are distributed to investors according to the amount they have contributed to the pool. It is crucial to understand that, in contrast to most businesses, mutual fund houses issue new units in response to each new investment made rather than a set amount of units at a time. The fund manager uses investor funds to purchase securities like debentures, shares, and other financial instruments. The investing strategy is determined by the mutual fund's declared investment objective. The fund manager modifies the portfolio to maximise returns while keeping a careful eye on the financial markets. The fund manager makes the investing decisions. The research team provides the fund manager with detailed information on every available investment opportunity on the market. The decisions are executed by the traders. The fund manager is responsible for selecting, allocating, and supervising the stocks and bonds.

The securities that the mutual fund invests in and that yield interest, dividends, and sales profits are its primary assets. A mutual fund subtracts its expenditures, advertising charges, etc. from the market value of each security in its portfolio at the end of each trading day. A single mutual fund unit's Net Asset Value (NAV) is calculated by dividing the total value by

the number of units that each unit holder owns. The investors receive a portion of the profits. They receive a fair share of the gains and losses made by the fund.

Figure 2.1 : Working Mechanism of Mutual Funds



Source: Association of Mutual Funds in India (AMFI)

2.7 Mutual Funds: Some Positive Aspects

The Indian mutual fund industry offers several advantages to investors, making it a popular investment avenue. Here are some key advantages of the Indian mutual fund industry:

1. Professional Fund Management: Mutual funds are managed by qualified fund managers who have experience in analysing and selecting investment opportunities. These fund managers have access to research teams and resources, which help them, make informed investment decisions. This professional management relieves individual investors of the duty of actively managing and keeping track of their money.

2. Diversification: Mutual funds offer diversity by investing in a range of assets from different industries, asset classes, and geographical locations. By pooling the funds of numerous investors, mutual funds can invest in a varied portfolio, thereby reducing the risk associated with the transaction. Investors can lessen the impact of volatility on any one investment through diversification by spreading their investments across a variety of assets.

3. Liquidity: Mutual funds have high liquidity because investors can purchase or sell units at the current Net Asset Value (NAV) on any business day. As a result, investors have the freedom to enter or exit the market in accordance with their financial objectives and the current state of the market. Mutual funds are a sensible investment option because of their straightforward liquidity, especially when compared to alternative investment options like real estate or fixed deposits.

4. Flexibility and Variety of schemes: In order to accommodate the preferences and risk tolerance of various investors, the Indian mutual fund market provides a wide range of schemes. Investors can select from a variety of products, including equity funds, debt funds, hybrid funds, index funds, sectoral funds, theme funds, and more. Investors can modify their approach to investing based on their level of risk tolerance and financial goals due to the variety offered.

5. Systematic Investment Plans (SIPs): Mutual funds in India popularised the concept of systematic investment plans (SIPs). SIPs enable investors to make fixed monthly or quarterly investments in a mutual fund plan. Rupee-cost averaging is used in this technique, which promotes disciplined investing and helps investors deal with market volatility.

6. Regulations regarding Investor Protection: The Securities and Exchange Board of India (SEBI), which monitors the mutual fund industry in India, ensures transparency, investor protection, and moral business conduct. In an effort to increase investor confidence, SEBI has developed a variety of reforms and rules, including standards for categorising funds, disclosure requirements, and regular fund performance monitoring.

7. Tax Benefit: Under Section 80C of the Income Tax Act, several mutual fund schemes, including Equity Linked Savings Schemes (ELSS), offer tax advantages. Investors may perhaps save on taxes by making long-term investments in ELSS funds, which are deductible from income up to a certain amount.

8. Stress free investments: To make investments directly in the stock market, many investors find it challenging to manage and keep track of numerous accounts, such as a Demat account, a broker account, and various other accounts. Mutual funds, on the

other hand, provide defense against all of those difficulties. It streamlines the investment process for investors.

When selecting mutual funds, investors may carefully consider their investing goals, risk tolerance, and time horizon. Investors can maximise the benefits provided by the Indian mutual fund market by consulting with a financial advisor or doing extensive research.

2.8 Mutual Funds: Some Concerns

1. Lack of control of the investors: Purchasing a mutual fund restricts the investor from having any control over portfolio decisions because the pooled funds are managed by specialists. As a result, there is little room for portfolio customization when choosing to invest in one's chosen funds through a mutual fund.

2. Too many varieties of funds: More than 2,500 mutual fund schemes are available through the 43 approved Asset Management Companies in the country. Due to the enormous quantity of options accessible, investors find it more difficult to select the best alternative fund for investment.

3. Share of costs: Mutual funds are pooled investments, thus all contributions or investments made by participating investors are aggregated and then invested in line with the plan's rules. Each unit holder in that particular scheme receives a proportionate share of the various management fees and expenses. These costs are seen as being outside of an investor's control because they cannot be avoided.

2.9 Legal Structure of Indian Mutual Funds

The legal framework as laid down by Securities and Exchange Board of India (SEBI) for setting up a mutual fund safeguards the interests of the investors. The characteristics as highlighted by the SEBI are mentioned below:

1. The mutual funds being regarded as a trust, are to be regulated also by Indian Trusts Act, 1982.

2. The trust is created by a Sponsor(s) and they are responsible for the operations and functioning of the mutual fund business.

3. The Investors will be the Mutual Fund Trust's beneficiaries.

4. The trustee and the sponsor must sign a Trust Deed, which will be governing the operations of the Mutual Funds.

5. The trustees play the role of a guardian by defending the interests of investors who invest in mutual funds.

6. A trustee may be an individual or a company.

7. By signing a contract with the AMC to manage the investments, the trustees outline all of the AMC's responsibilities. The asset management company (AMC) is a company that the sponsors or trustees select to fully monitor and administer all aspects of the schemes' operations.

8. The Trustees are not permitted to serve in the capacity of custodian for the mutual fund company, even if they give the AMC complete control over all scheme operations.

9. The trustees state that any assets held in the name of the scheme are under the supervision of a separate entity appointed by the trustee.

10. Investors may select to invest in one or more of the active mutual fund schemes that are available at any given time. The AMC may also preserve a record of the unit holders, or investors who have contributed to the scheme, and their precise unit holdings. A Registrar & Transfer Agent (RTA) may be chosen for the same reason.

2.10 Growth aspects of Indian Mutual fund Industry

Over the past ten years, the mutual fund industry in India has grown and progressed tremendously. Private sector firms and foreign rivals have entered the mutual fund industry, leading to the creation of multiple mutual fund schemes that provide investors with a plethora of investment options. Furthermore, it has been observed that the mutual fund industry is expanding quickly in India's capital and financial sectors. Mutual fund investments are an excellent tool for the modern financial markets, which have demonstrated a high degree of sophistication and complexity. The mutual fund has provided a multitude of information regarding a range of investment possibilities, including bonds, equities, real estate, derivatives, and other fixed and variable income investment paths. In terms of investing in several alternatives, a layperson is not skilled, knowledgeable, or experienced. Conversely, investors stand to gain from certain mutual fund benefits. The advantages that mutual funds

provide to small investors were covered in great detail in the beginning of the chapter. As a result, mutual funds have gained popularity in India, the country with the fastest-growing economy in the world.

To understand the growth of mutual fund industry, we have looked into the growth aspect from different angles from the SEBI report:

i. Category wise growth in Mutual Funds Resource Mobilisation.

ii. Category wise growth in Mutual Funds in terms of Number of different schemes.

iii. Category wise growth in Number of Mutual Funds: Open ended schemes Vs Closed Ended Schemes.

iv. Category wise growth in Mutual Funds Net Inflow: Private Vs Public

v. Overall Growth in Assets under Management of the mutual fund industry.

vi. Category wise growth in Assets under Management: Open and Close ended Schemes.

2.10.1 Category wise Mutual Funds Resource Mobilisation

Based on *Table 2.2 and 2.3 and Figure 2.2*, the mutual funds here are categorised into Income funds, Arbitrage Funds, Infrastructure Debt Funds, Equity/ Growth Funds, Balanced Funds, Liquid/ Money Market Funds, GILT Funds, ELSS Funds, Gold ETFs, Other ETFs and Funds of Funds. Total resources mobilised by mutual funds increased from 5,05,152 crore in March 2008 to 23,79,584 crore in March 2019 registering an overall growth rate of 371 per cent. Other ETFs schemes had the highest growth rate (4986%) followed by balanced schemes (1009%), Gold ETFs (821%), ELSS (499%) Liq/MM fund (388%), Growth/ Equity schemes (375%), Income schemes (226%), Infrastructure Debt funds (201%) and GILT schemes (186%), whereas Funds of Funds showed a negative growth rate (30%) during the period. It is worth mentioning here that income schemes had the largest share till in March 2018 moved to second position in March 2019 with 30% share whereas Equity/ Growth scheme moves to the first position from second position with 31% share. This is to note that due to change in SEBI report format has changed from 2020 onwards. The classifications of the funds have been clubbed under other funds category.

Table -2.2: Scheme-wise Resource Mobilisation and Assets under Management by Mutual Funds (Rs crore)

YEAR	INCOME	INFRASTRUCTURE DEBT FUND	EQUITY/ GROWTH	ARBITRAGE FUNDS	BALANCED	LIQUID/ MONEY MARKET	GILT	ELSS	GOLD ETFs	OTHER ETFs	FUND OF FUNDS INVESTING IN OVERSEAS	TOTAL
2008	220762	0	156722	0	16283	89402	2833	16020	483	2647	0	505152
2009	1,97,343	0	95,817	0	10,629	90,594	6,413	12,427	736	660	2,681	417300
2010	3,11,715	0	1,74,054	0	17,246	78,094	3,395	24,066	1,590	957	2,862	613979
2011	2,91,975	0	1,69,754	0	18,445	73,666	3,409	25,569	4,400	2,516	2,516	592250
2012	2,90,844	0	1,58,432	0	16,261	80,354	3,659	23,644	9,886	1,607	2,530	587217
2013	3,95,985	0	1,49,777	0	16,307	93,392	8,074	22,731	11,648	1,476	2,053	701443
2014	4,60,671	879	1,65,560	0	16,793	1,33,280	6,115	25,547	8,676	4,528	3,191	825240
2015	5,15,773	1,178	3,05,669	0	26,368	1,62,562	14,614	39,470	6,655	8,060	2,408	1082757
2016	5,65,459	1,730	3,44,707	0	39,146	1,99,404	16,306	41,696	6,346	16,063	1,967	1232824
2017	7,43,783	1,908	4,82,138	0	84,763	3,14,086	14,875	61,403	5,480	44,436	1,747	1754619
2018	7,85,553	2,468	6,69,207	0	1,72,151	3,35,525	11,404	80,583	4,806	72,888	1,451	2136036
2019	7,18,919	2,649	7,44,020	52,062	1,80,648	4,36,224	8,099	96,019	4,447	1,34,626	1,871	2379584

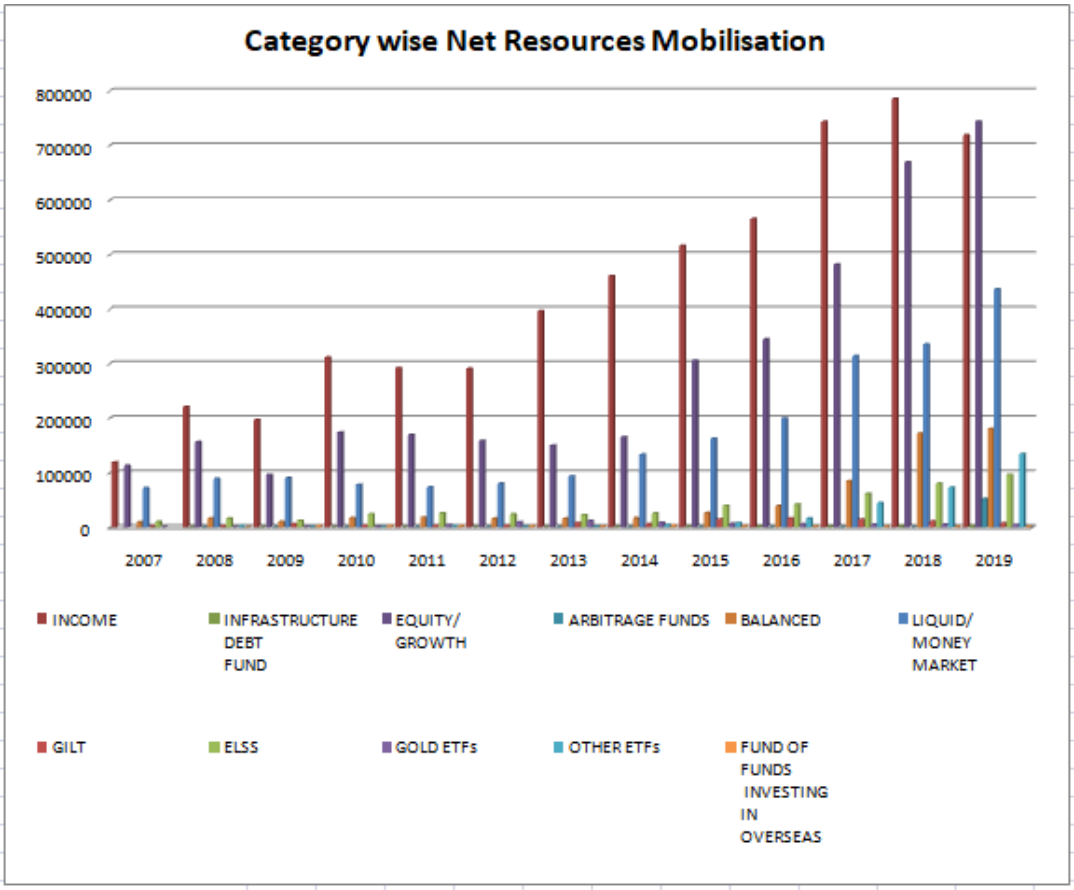
Source: SEBI Annual Reports 2008-2019 (old format)

Table 2.3: Scheme-wise Resource Mobilisation and Assets under Management by Mutual Funds (Rs crore)

Year	Income /Debt Oriented Schemes	Growth/ Equity Oriented Schemes	Hybrid Schemes	Solution Oriented Schemes	Other Schemes	Fund of Funds Scheme (Domestic)	Total
2020-21	1452684	1001121	342957	24377	321626	27325	3170090
2021-22	1351571	1373729	479918	29537	521928	48362	3805045

Source: SEBI Annual Reports 2021-22 (new format)

Figure 2.2: Category wise Net Resources Mobilisation



Source: SEBI Annual Reports 2008-2019 (old format)

2.10.2 Category wise Mutual Funds in terms of number of schemes.

The overall growth reported from 2008 to 2019 to be 113.50% i.e, from 956 schemes to 2042 schemes. Most importantly out of this the income fund schemes grew by 147.43% and growth funds by 70.37%. The share of income funds out of the total funds increased significantly from 2008 to 2019 i.e, from 52% to 61% whereas the share of all other funds out of the total proportion decreased with time. It is to be noted that the growth of balanced fund gradually became negative. There is a sluggish growth in liquid / money market funds i.e, 12.07%. The ELSS have grown up 64.28% over the years. The Gold ETFs maintained more or less constant status over the time period. The number of schemes have decreased by 23.36% in the period 2019 to 2021.

Table 2.4: Category wise Mutual Funds in terms of number of schemes (Old format)

	CATEGORY												
YEAR	INCOME	INFRASTRUCTURE DEBT FUND	Income/Debt Oriented Schemes	EQUITY/ GROWTH	ARBITRAGE FUNDS	BALANCED	LIQUID/ MONEY MARKET	GILT	ELSS	GOLD ETFs	OTHER ETFs	FUND OF FUNDS INVESTING IN OVERSEAS	TOTAL
2007	367	0		227	0	38	55	28	40	1	0	0	756
2008	506	0		270	0	37	58	30	42	5	8	0	956
2009	509	0		293	0	35	56	34	47	5	12	10	1001
2010	367	0		307	0	33	56	35	48	7	14	15	882
2011	591	0		328	0	32	51	37	48	10	18	16	1131
2012	775	0		303	0	30	55	42	49	14	21	20	1309
2013	760	0		298	0	32	55	42	49	14	23	21	1294
2014	1,077	4		311	0	30	53	44	52	14	26	27	1638
2015	1,245	4		379	0	25	52	45	55	14	34	31	1884
2016	1,730	7		413	0	28	53	41	60	13	45	30	2420
2017	1,575	4		420	0	30	52	41	64	12	51	29	2278
2018	1,258	9		442	0	31	52	38	72	12	56	28	1998
2019	1,252	10		460	25	27	65	27	69	12	66	29	2042

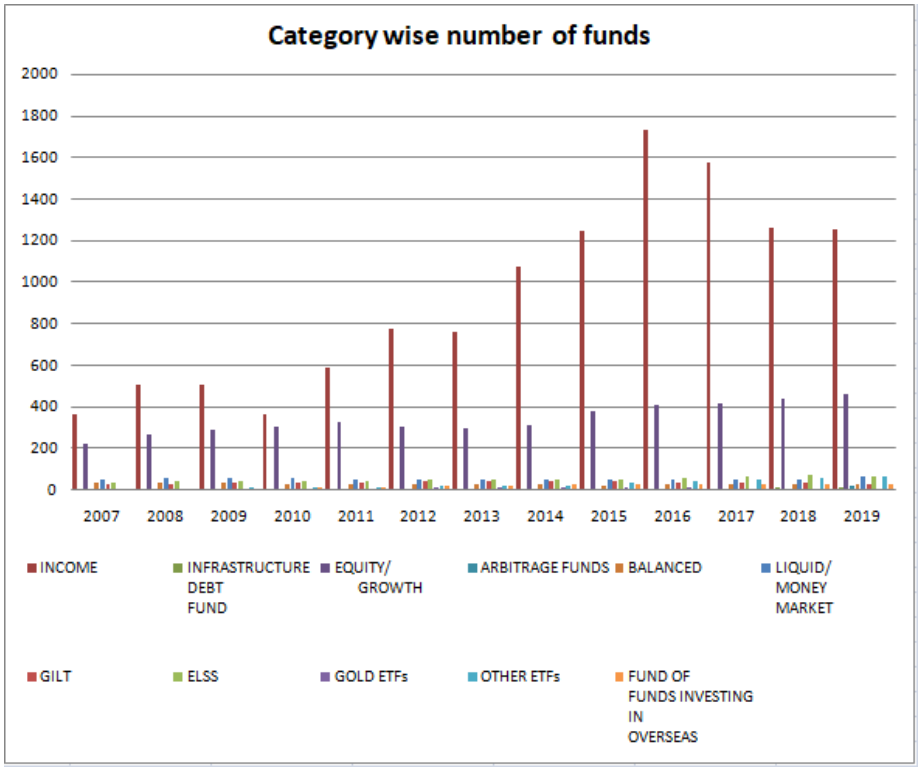
Source: SEBI Annual Reports 2008- 2019 (old format)

Table 2.5: Category wise Mutual Funds in terms of number of schemes (New format)

No. of Funds							
Year	Income /Debt Oriented Schemes	Growth/ Equity Oriented Schemes	Hybrid Schemes	Solution Oriented Schemes	Other Schemes	Fund of Funds Scheme (Domestic)	Total
2020-21	959	420	139	35	182	54	1789
2021-22	651	401	135	35	273	70	1565

Source: SEBI Annual Reports 2021-22 (new format)

Figure 2.3: Category wise Number of funds



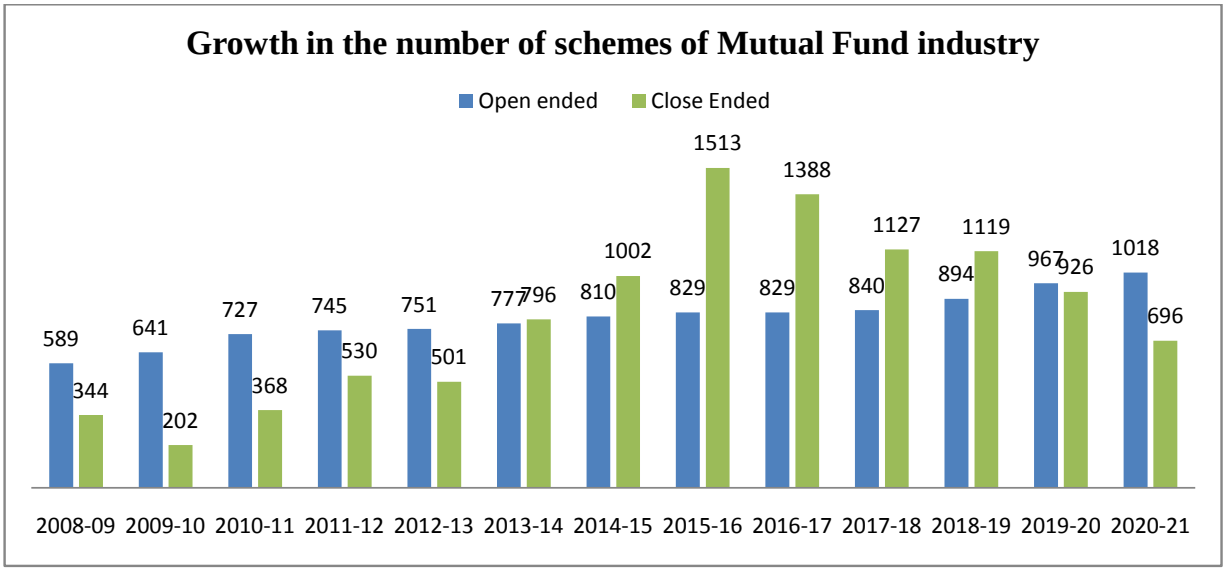
Source: SEBI Annual Reports 2008- 2019 Old report

Table 2.6: Growth in the number of schemes of Mutual Fund Industry

Year	Open ended	Year wise Trend- Open ended	Close Ended	Year wise Trend- Closed ended	Total	% Open Ended	% Close ended
2008-09	589	-1%	344	-5%	933	63%	37%
2009-10	641	9%	202	-41%	843	76%	24%
2010-11	727	13%	368	82%	1095	66%	34%
2011-12	745	2%	530	44%	1275	58%	42%
2012-13	751	1%	501	-5%	1252	60%	40%
2013-14	777	3%	796	59%	1573	49%	51%
2014-15	810	4%	1002	26%	1812	45%	55%
2015-16	829	2%	1513	51%	2342	35%	65%
2016-17	829	0%	1388	-8%	2217	37%	63%
2017-18	840	1%	1127	-19%	1967	43%	57%
2018-19	894	6%	1119	-1%	2013	44%	56%
2019-20	967	8%	926	-17%	1893	51%	49%
2020-21	1018	5%	696	-25%	1714	59%	41%
Total	10417		10512		20929	50%	50%

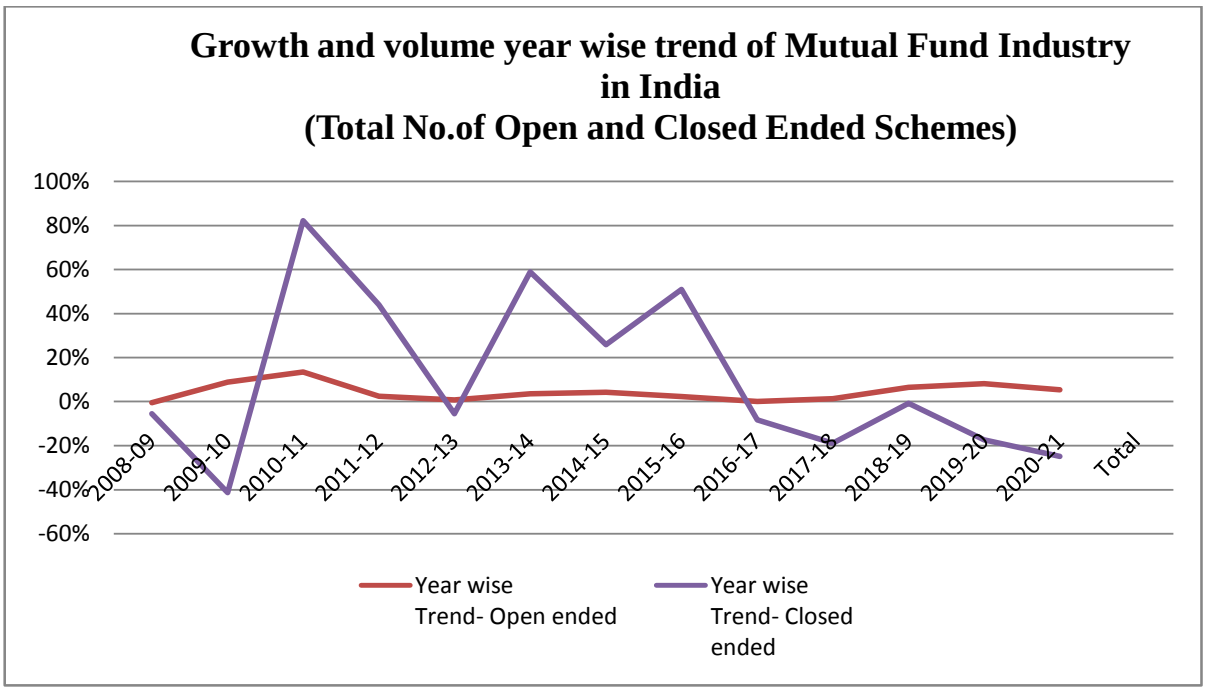
Source: SEBI Annual Reports 2008-2021

Figure 2.4: Growth in the number of schemes of Mutual Fund Industry



Source: SEBI Annual Reports 2008-2021

Figure 2.5: Growth and Volume year wise trend of Mutual Fund Industry



Source: Compiled by the researcher on basis of the data from SEBI Annual Reports 2008-2021

Interpretation based on ***Table 2.4, 2.5 and 2.6*** *and* ***Figure 2.3, 2.4 and 2.5****:*

Open-Ended Schemes:

There was a notable 73% increase in open-ended plans between 2008–09 and 2020–21, with a steady increase from 589 to 1,018. The open-ended scheme's annual trajectory is inconsistent, with some years exhibiting a notable increase and others exhibiting little to no growth or even slight negative. The majority of schemes have always been open-ended; this proportion has changed throughout time, ranging from 35% in 2015–16 to 76% in 2009–10.

Closed-Ended Schemes:

There were 344 closed-ended schemes in 2020–21 compared to 696 in 2008–09, a 102% increase. This growth has been less consistent than in open-ended schemes.

Closed-ended plans show a more erratic yearly pattern, with notable decreases in certain years and increases in others. The proportion of closed-ended plans declines over time across all schemes, going from 24% in 2009-10 to 65% in 2015-16.

Total Schemes:

The total number of schemes (the sum of closed-ended and open-ended schemes) has increased over time, showing a cumulative rise of 84%, from 933 in 2008–09 to 1,714 in 2020–21.

In summary, the table indicates that the mutual fund industry has seen a growth in the overall number of schemes over time. Historically, open-ended plans have contained the majority of total number of schemes, and their popularity has increased gradually. On the other hand, the proportion of closed-ended plans in all plans has changed and they have climbed as well, but at a more variable rate. The types of plans offered by the industry have changed, and adoption of both closed-ended and open-ended plans varies annually.

2.10.3 Category wise Mutual Funds Net Inflow: Private sector Vs Public sector

From the *Table 2.7 and Figure 2.6* we can see the net resource mobilisation from 2008 to 2019. The gross mobilisation shows an overall growth rate of 350% where the private has grown up by 358% and public sector has grown up by 567%. The private sector has a lion's share in the contribution of the total gross mobilisation. Redemption of the resources includes the repurchases. It registers an overall growth of 345% during the study period. The

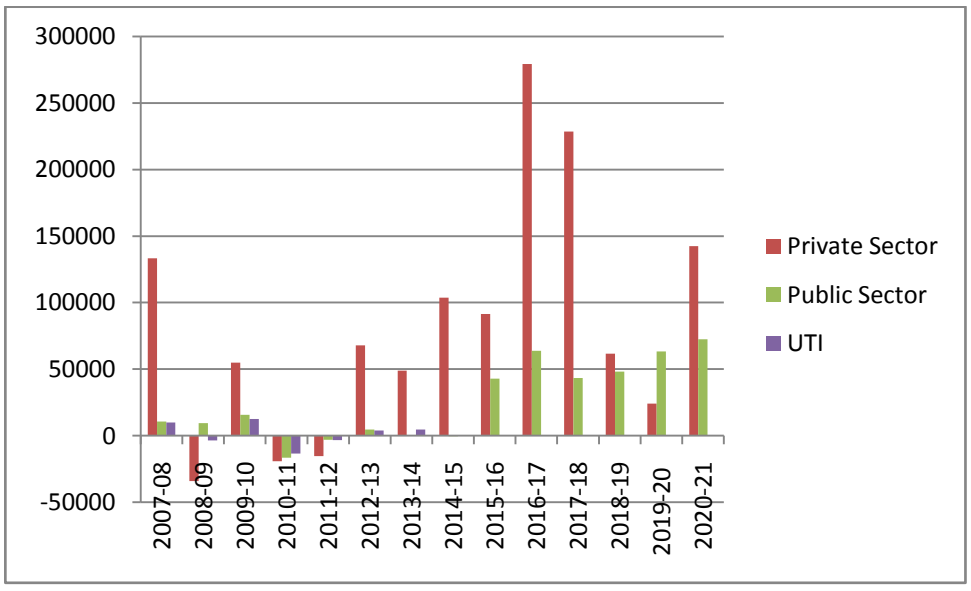
private sector redemption has grown up 353% whereas the public sector redemption has shown an overall growth of 569%. The net inflow is the difference of Gross mobilisation and Redemption. The net inflows have registered an overall growth of 488% during the study period. The private sector contributes the major chunk to the net inflows. The private sector has grown up by 281% whereas the public sector has a growth of 414%.

Table – 2.7: Category wise Mutual Funds Net Inflow

Period	Gross Mobilisation				Redemption*				Net Inflow			
	Private Sector	Public Sector	UTI	Total	Private Sector	Public Sector	UTI	Total	Private Sector	Public Sector	UTI	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
2007-08	3780753	346126	337498	4464371	3647449	335448	327678	4310575	133304	10677	9820	153802
2008-09	4292751	710472	423131	5426353	4326768	701093	426790	5454650	-34018	9380	-3658	-28296
2009-10	7698483	881851	1438688	10019023	7643555	866198	1426189	9935942	54928	15653	12499	83080
2010-11	69,22,924	7,83,858	11,52,733	88,59,515	69,42,140	8,00,494	11,66,288	89,08,921	-19,215	-16,636	-13,555	-49,406
2011-12	56,83,744	5,22,453	6,13,482	68,19,679	56,99,189	5,25,637	6,16,877	68,41,702	-15,446	-3,184	-3,394	-22,024
2012-13	59,87,889	6,33,350	6,46,646	72,67,885	59,19,979	6,28,720	6,42,647	71,91,346	67,911	4,629	3,999	76,539
2013-14	80,49,397	8,02,352	9,16,351	97,68,101	80,00,559	8,01,951	9,11,808	97,14,318	48,838	401	4,543	53,783
2014-15	91,43,962	19,42,297	Na	1,10,86,260	90,40,262	19,42,710	Na	1,09,82,972	1,03,700	-412	Na	1,03,288
2015-16	1,11,26,277	26,39,279	Na	1,37,65,555	1,10,34,883	25,96,492	Na	1,36,31,375	91,394	42,787	Na	1,34,181
2016-17	1,42,47,937	33,67,612	Na	1,76,15,549	1,39,68,549	33,03,951	Na	1,72,72,500	2,79,388	63,661	Na	3,43,049
2017-18	1,73,82,189	36,16,463	Na	2,09,98,652	1,71,53,718	35,73,137	Na	2,07,26,855	2,28,471	43,326	Na	2,71,797
2018-19	1,96,52,989	47,41,374	Na	2,43,94,362	1,95,91,483	46,93,178	Na	2,42,84,661	61,505	48,196	Na	1,09,701
2019-20	1,49,89,990	38,23,467	Na	1,88,13,458	1,49,65,931	37,60,226	Na	1,87,26,157	24,059	63,241	Na	87,301
2020-21	70,15,519	16,23,648	Na	86,39,167	68,73,141	15,51,283	Na	84,24,424	1,42,378	72,365	Na	2,14,743

Source: SEBI Annual Reports 2008-21

Figure 2.6 : Net resources mobilized by Mutual Funds (Ownership)



Source: SEBI Annual Reports 2008- 2021

2.10.4 Growth in Assets under Management of the Indian Mutual Fund industry.

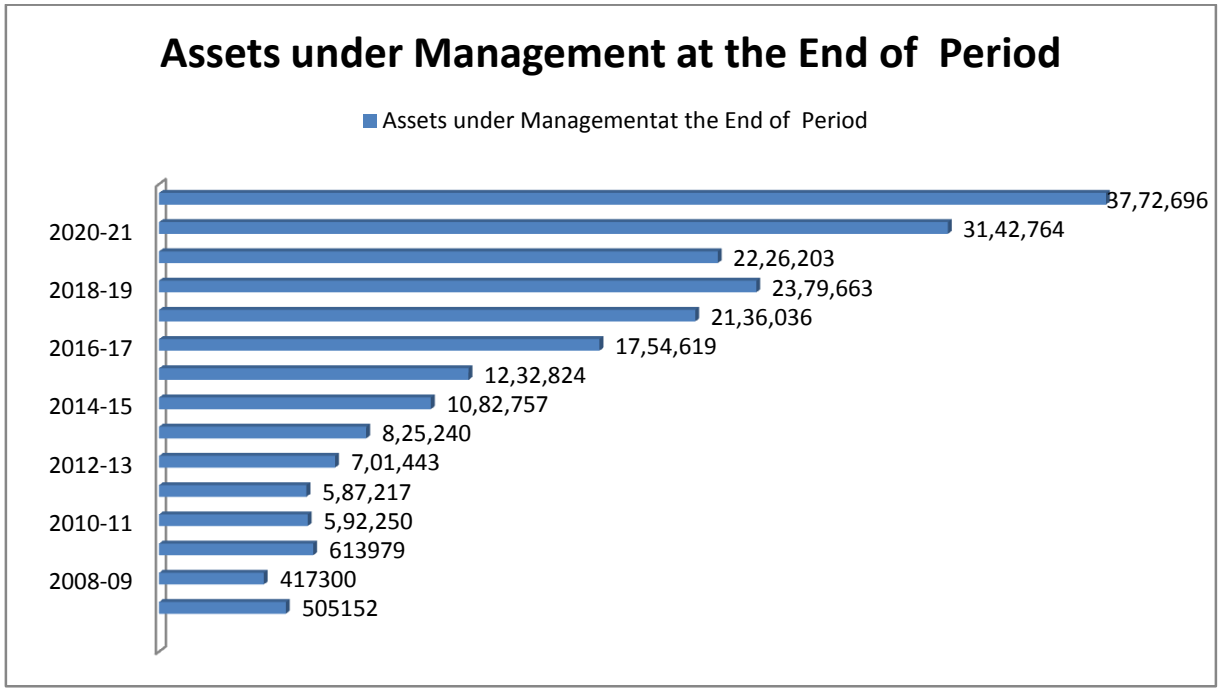
The Assets under Management (AUM) have shown a significant growth of 522% from 2008 to 2021. This growth is quite noticeable, especially from 2010-11 onwards, with a substantial increase in assets. There are periods where the growth is not consistent. For example, from 2007-08 to 2008-09, there was a notable decrease, which may have been due to economic conditions or market fluctuations during that time. Similarly, from 2019-20 to 2020-21, there was a substantial increase, which might be attributed to a positive market performance or increased investments. From 2010-11 to 2018-19, there is a steady increase in assets, which demonstrates consistent growth over this period. The most significant increase in assets occurred between 2014-15 and 2016-17 when the assets more than doubled, indicating a period of rapid growth. This could be due to strong market performance or significant investments. The highest percentage growth is observed between 2016-17 and 2017-18, with assets growing by around ₹ 4,21,417, a remarkable increase. This could be attributed to a booming market or increased investor confidence during that period.

Table – 2.8: Assets under Management at the End of Period

Period	Assets under Management at the End of Period
2007-08	505152
2008-09	417300
2009-10	613979
2010-11	5,92,250
2011-12	5,87,217
2012-13	7,01,443
2013-14	8,25,240
2014-15	10,82,757
2015-16	12,32,824
2016-17	17,54,619
2017-18	21,36,036
2018-19	23,79,663
2019-20	22,26,203
2020-21	31,42,764

Source: SEBI Annual Reports 2008-2021

Figure 2.7: Assets under Management at the End of Period



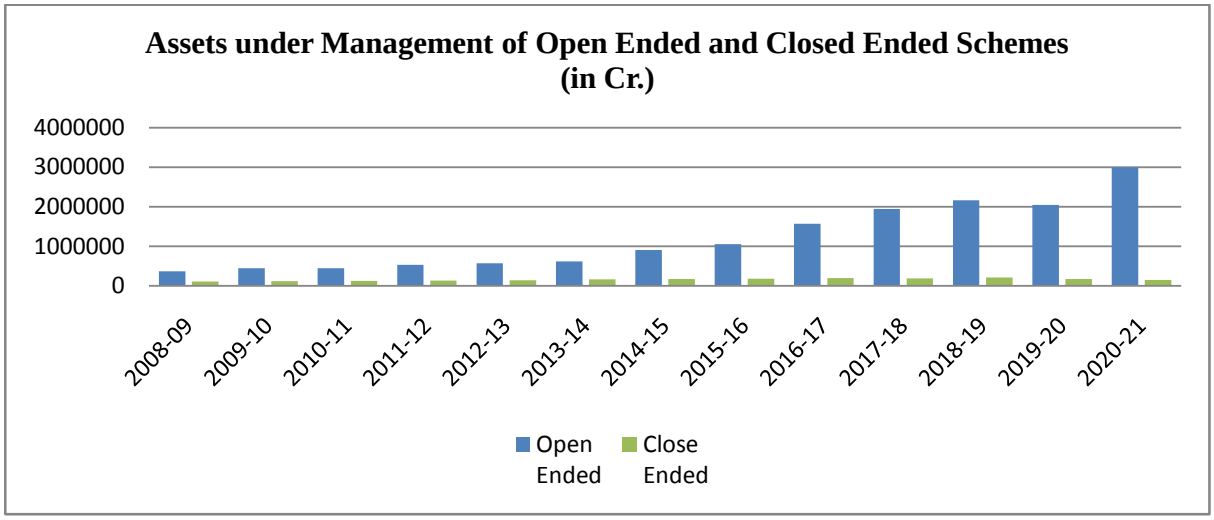
Source: SEBI Annual Reports 2008-2021

Table – 2.9: Asset under Management of Open ended and Closed ended Schemes (in Crs.)

Year	Open Ended	Yr. wise trend Open	Close Ended	Yr. wise trend Close	Total	% Open Ended	%Closed Ended
2008-09	369239	14%	108971	22%	478210	77%	23%
2009-10	441610	20%	120652	11%	562262	79%	21%
2010-11	447196	1%	126897	5%	574093	78%	22%
2011-12	532886	19%	135913	7%	668799	80%	20%
2012-13	573201	8%	137634	1%	710835	81%	19%
2013-14	620317	8%	164344	19%	784661	79%	21%
2014-15	910077	47%	171235	4%	1081312	84%	16%
2015-16	1053762	16%	176743	3%	1230505	86%	14%
2016-17	1573292	49%	192899	9%	1766191	89%	11%
2017-18	1944215	24%	187392	-3%	2131607	91%	9%
2018-19	2167750	11%	209342	12%	2377092	91%	9%
2019-20	2050733	-5%	175076	-16%	2225809	92%	8%
2020-21	2996553	46%	146089	-17%	3142642	95%	5%
TOTAL	**11462348**		**1668769**		**17734018**	**64.63%**	**9.41%**

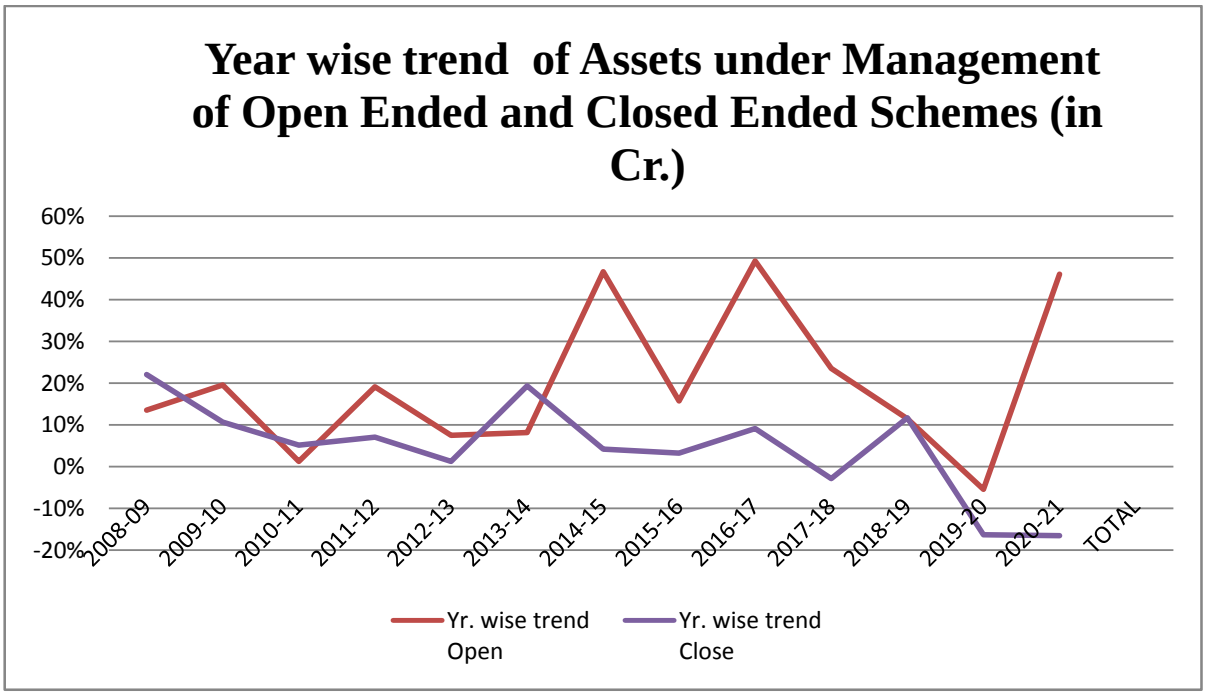
Source: SEBI Annual Reports 2008-2021

Figure 2.8: Assets under Management of Open Ended and Closed Ended Schemes



Source: SEBI Annual Reports 2008- 2021

Figure 2.9: Year wise trend of Assets under Management of Open Ended and Closed Ended Schemes (in crores)



Sources: Complied by the researcher on the data available data from SEBI Annual Reports 2008 -2021

*Interpretation based on **Table 2.8 and 2.9** and **Figure 2.7, 2.8 and 2.9**:*

Asset under Management (AUM) for Open-Ended Schemes:

The Assets under Management (AUM) of open-ended schemes have increased dramatically over the years, rising from 369,239 Crs. in 2008–09 to 29,96,553 Crs. in 2020–21, which is nearly 712% .The AUM of the open ended schemes shows variations with some years of notable growth, like in 2014-15, 2016-17 and 2020-21. AUM is always primarily composed of open-ended schemes, which can account for 77% in 2008-09 to 95% in 2020-21 of the total. This suggests that open-ended mutual fund schemes possess a larger share of AUM in the mutual fund industry.

Asset under Management (AUM) for Closed-Ended Schemes:

Though not as steadily as that of open-ended schemes, the AUM of closed-ended schemes has increased as well. Between 2008–09 and 2020–21, it increased from 108,971 Crs. to 146,089 Crs, which is nearly 34%.. For closed-ended schemes, the growth in AUM seems to be more erratic. The year-wise trend for Asset under Management of the closed-ended schemes shows fluctuations, with some years experiencing growth, such as 2013-14 and 2018-19, and others experiencing declines.

In summary, the table and figures shows that the Asset under Management (AUM) of both open-ended and closed-ended schemes has increased over time, with open-ended schemes consistently holding a larger portion of AUM. Open-ended schemes have performed better than closed-ended schemes in terms of year wise trends in AUM fluctuations, with the latter exhibiting more steady growth. Total assets under management (AUM) in the mutual fund industry have increased significantly; open-ended schemes contributing the most portion. This pattern suggests that investors may have favored open-ended plans more because to their correlation with higher AUM and relatively more stable development.

2.11 Summary of Findings

The mutual fund industry has seen significant change since it was launched in India. The Indian mutual fund industry has developed significantly since its founding in 1963, when it had just 25 crores rupees in total Assets under Management (AUM). By 2023, it had grown to nearly 40.72 lakh crores rupees. As the industry has grown, there have been five main periods in the evolution of the mutual fund industry in India. The establishment of the Unit Trust of

India in 1963 marked the beginning of the mutual fund industry in India, which it dominated for more than 20 years. The launch of public sector mutual funds and the establishment of public sector banks signaled the start of the second phase, which started in 1987. By the end of the year of 1993, the mutual fund industry in India had Asset under Management (AUM) of ₹ 47,004 crores. The third stage of the Indian mutual fund industry began in 1993 with the introduction of private sector mutual fund companies. 33 mutual funds with a combined Asset under Management (AUM) of ₹ 1,21,805 crores were active in the market at the conclusion of the third phase in January 1993. The fourth stage is known as the consolidation phase, during which a number of private sector fund mergers occurred, signifying the expansion and consolidation stage of the Indian mutual fund industry. With an Asset under Management (AUM) of ₹ 8,25,240 crores, the fourth phase concluded by March 2014. The slow development of the mutual fund business in India between 2010 and 2013 is indicative of the impact the financial crisis of 2009 had on the sector. After the absence of investor engagement in the mutual fund business was identified, SEBI implemented a number of progressive initiatives to increase investor participation. Commencing in May 2014, this signaled the commencement of the fifth phase. The progressive policies' adoption aided in the mutual fund industry's recovery in India from the 2009 financial crisis' meltdown. The mutual fund industry in India achieved a significant milestone on May 31, 2014, when it reached an Asset under Management (AUM) valuation of ₹ 10 lakh crores. Three years later, in August 2017, it achieved another big milestone when it reached an Asset under Management (AUM) valuation of ₹ 20 lakh crores. By the end of 2023, there will be 43 mutual funds active in the nation, and the total amount of AUM will be around ₹ 40.72 lakh crores.

The mutual fund industry had a 371 percent rise in total resources from 5,05,152 crore in 2008 to 23,79,584 crore in 2019. The largest increase (4986%) was recorded by other ETFs, which were followed by infrastructure, GILT schemes, growth, income, balanced, gold, and ELSS. It is noteworthy to observe that income schemes held the highest share until March 2018, when they shifted to the second position with 30% of the share, while equity/growth schemes went from the second to the first position with 31% of the share.

The total number of schemes in the mutual fund industry has increased over time. Throughout history, the vast majority of designs have been open-ended, and their acceptance has grown with time. On the other hand, but at a more erratic pace, the percentage of closed-ended schemes in all schemes has increased. So far as gross resource mobilization in mutual funds through public vis-a-vis private sectors is another important dimension of this growth

process. This study shows that resource mobilization through the private sector had been higher than that through the public sector. The net resource mobilization in mutual funds is the difference between the gross mobilisation and redemption value, and the net inflows have registered a spectacular growth of about 488 per cent during the study period. The private sector contributed a major chunk to the net inflows.

Both open-ended and closed-ended schemes have seen a growth in their Asset under Management (AUM) throughout time, with open-ended schemes continuously holding a higher percentage of AUM. In terms of year-over-year patterns in AUM variations, open-ended schemes have outperformed closed-ended schemes, with the latter showing more consistent growth. In the mutual fund sector, the total Assets under Management (AUM) has expanded dramatically, with open-ended schemes accounting for the majority of this increase. This trend indicates that due of their association with larger AUM and comparatively more steady development, open-ended plans may have been preferred by investors more.

Chapter 3:

Performance Analysis of selected Indian Mutual Fund Schemes

Chapter 3

Performance Analysis of selected Indian Mutual Fund Schemes

3.1 Understanding of Risk Return Analysis

As an investment instrument, mutual fund schemes are an innovative and smart option. The general public is drawn to this financial instrument. Any investor can simply, invest in a number of the often offered plans by various mutual fund houses. In the Indian financial sector, there are several mutual fund schemes that meet the various investors' demands. Investors may frequently expect a higher rate of returns on investments from mutual fund schemes while taking on less risk. However, there is risk associated with investing in mutual fund schemes.

The performance of mutual fund schemes may be assessed using risk adjusted performance basis. It is straight forward to assess the performance of mutual fund schemes based on returns. Most investors first determine the rate of return generated by the mutual fund schemes, and then rank the various schemes. On the basis of the ranking, the best scheme with the highest return is chosen. As a result, it is less popular to compare mutual fund schemes' performance based on expected returns. Therefore, the risk element must be considered. It is predicated on the theory that risk and return are related, and high returns are generated on higher risk undertaken.

Beta and standard deviation are two often employed measures for assessing risk in this context. The performance of the mutual fund schemes is determined utilizing these measures when risk is taken into account. The total variability is described in this context using standard deviation. If the number of securities in the portfolio is carefully picked, then this type risk is reduced. The risk that an asset presents to a well diversified portfolio is referred to as beta risk. A prospective investor must be aware of the level of risk undertaken by him. However, beta is the pertinent risk measure if the scheme is a component of a well diversified portfolio.

The success of mutual fund schemes and fund managers are often associated, as several previous studies have demonstrated. The researchers have been debating for a while whether portfolio managers can provide additional returns and outperform market portfolio. In this regard, a precise, trustworthy and well accepted measure is required for evaluating the performance of the fund managers. The academic community views this as a crucial issue. In

addition, investors want a reliable method to assess the success of actively managed portfolios. Numerous measures, including the Sharpe ratio, Treynor ratio and Jensen's alpha are applied in the light of these problems. As a result, the analysis of the mutual fund performance is currently one of the most significant and appealing topics of research for academicians and professionals throughout the globe.

The objectives which are studied in this chapter are:

- To explore the risk return analysis of selected mutual fund schemes.
- To analyse the performance of the selected Equity mutual fund schemes with respect to BSE Sensex and Nifty 50.

3.2 Research Methodology

3.2.1 Research Sample

The Top 20 Open Ended Equity diversified mutual fund schemes have been selected on the basis of monthly returns generated by the mutual fund schemes as on 1st January, 2008 from the website valueresearchonline.com. The selected study period is 1st January, 2008 to 31st December, 2021. The ranking was done by valueresearchonline, an authentic and popular Mutual Fund Research organization.

The mutual fund schemes stated below are arranged according their rankings as graded by valuereaschonline.com.

1. DSP BlackRock Small Cap Fund
2. HDFC Mid-Cap Opportunities Fund
3. ICICI Prudential Value Discovery Fund
4. Franklin India Smaller Companies Fund
5. Sundaram Mid Cap Fund
6. DSP BlackRock Midcap Fund
7. IDFC Multi Cap Fund
8. L&T Midcap Fund

9. UTI Mid Cap Fund
10. Sundaram Small Cap Fund
11. Invesco India Contra Fund
12. Reliance Tax Saver (ELSS) Fund
13. Aditya Birla Sun Life Small Cap Fund
14. Franklin India Prima Fund
15. Invesco India Mid Cap Fund
16. Reliance Multi Cap Fund
17. Invesco India Tax Plan
18. Tata Equity PE Fund
19. L&T Tax Advantage Fund
20. Franklin India Focused Equity Fund

The study is based on secondary data. The closing monthly Net Asset Value (NAV) of the various mutual fund schemes and the closing value of the benchmark indices (BSE Sensex and Nifty 50) are collected every month. The data were gathered from a number of sources, including valueresearchonline.com, the official websites of the various mutual fund companies, the websites of Bombay Stock Exchange (BSE) and National Stock Exchange (NSE).

3.2.2 Description of the Research Tools used

1. Measurement of Return

Net Asset Value (NAV): The market value of the assets less the liabilities of the schemes equals the NAV. The per unit NAV is calculated by dividing the scheme's net asset value on the valuation date by the total number of outstanding units. NAV is the most common and accepted yardstick for determining the performance of mutual fund schemes. The monthly returns for the sample time period are computed.

$$\mathbf{R_p = (NAV_t - NAV_{t-1}) / NAV_{t-1}}$$

Where:

R_p = Returns generated by the mutual fund schemes

NAV_t = Net Asset Value per unit of a mutual fund schemes for the end of a month(t).

NAV_{t-1}=Net Asset Value per unit of a mutual fund schemes for the end of the previous month (t-1).

The monthly returns of the benchmark indices (BSE Sensex and Nifty 50) for the sample time period are computed. The market's closing value is taken for calculation. Nifty 50 and BSE Sensex is considered as Market indices.

$$\mathbf{R_m = Closing\ Value_{\ t} - Closing\ Value_{\ (t-1)} / Closing\ Value_{\ (t-1)}}$$

Where:

R_m = Returns generated by the benchmark indices (BSE Sensex and Nifty 50)

Closing Value $_t$ = Closing value of the benchmark index for the end of a month (t).

Closing Value $_{(t-1)}$ = Closing value of the benchmark index for the end of the previous month (t-1).

The annual average return is the mean of the last 12 months of portfolio return of the respective year. It is compared with the annual average return of the benchmark indices (BSE Sensex & Nifty 50). Thereby, the portfolio returns has been compared with the mean benchmark returns in order to understand how the portfolio has performed with respect to the market returns.

2. Measurement of Risk

Risk is the difference between the actual returns and the expected returns in terms of volatility. The reward that investors demand over and above a risk free rate of return for the risk they have assumed is known as the risk premium. Both diversifiable risk (unsystematic) and non-diversifiable (systematic) risks are recognized. Systematic risk is the risk associated with the entire market. It is non-diversifiable in nature. Unsystematic risk referred to as unique risk, is firm specific. It results from particular uncertainties associated with certain securities. By integrating a large number of assets into well diversified portfolios, these

particular concerns can be eliminated. Diversification can therefore reduce unsystematic risk. The study has used standard deviation and beta as the measure of risk.

The standard deviation, a risk indicator, quantifies the degree of divergence from the expected return or mean.

$$\boldsymbol{SD = \sqrt{\frac{\sum(r_p - r_{avg})^2}{n-1}}}$$

Where

r_p =The monthly return observed in a study time frame.

r_{avg} = The average returns observed over this time frame

n = The number or sample size.

The annual standard deviation is the standard deviation of the last 12 months of portfolio return of the respective year. It is compared with the annual standard deviation of the benchmark indices (BSE Sensex & Nifty 50). Thereby, the annual standard deviation of the mutual fund scheme returns has been compared with the annual standard deviation of benchmark indices returns (BSE Sensex & Nifty 50) in order to understand the risk profile of the portfolio with respect to the market risk.

Beta is a measure for a portfolio's systematic risk. It establishes a fund's volatility in relation to that of its benchmark.

$$\textbf{Beta } (\beta) = \textbf{Cov } (R_p - R_m) / \sigma^2_m$$

Where,

R_p = Returns generated by the mutual fund schemes

R_m = Returns generated by the benchmark indices (BSE Sensex and Nifty 50)

Cov (R_p –R_m) = Covariance of the mutual fund scheme returns and benchmark indices (BSE Sensex and Nifty 50) returns.

σ^2_m= Variance of monthly data of the benchmark indices (BSE Sensex and Nifty 50) returns.

3. Risk Adjusted Performance Measures

Sharpe Ratio: William F Sharpe designed a measure for determining return per unit of risk in 1966. Sharpe ratio is a risk adjusted performance measure. It is used to determine the extra return earned for each unit of total risk assumed. The Sharpe ratio is computed by subtracting the risk free rate of return from the portfolio's average monthly return and dividing the result by the portfolio return's standard deviation.

$$\mathbf{SR= (R_p – R_f) / \sigma_p}$$

Where,

SR is the Sharpe ratio;

R_p is the monthly return generated by the mutual fund schemes;

R_f is the risk free rate and

σ_p is the standard deviation of the mutual fund schemes.

Treynor Ratio: Jack Treynor designed a measure for determining return per unit of systematic risk. Treynor ratio is used to determine the extra return earned per unit of systematic risk. Treynor ratio is calculated by deducting the portfolio's average monthly return from the risk free rate of return and dividing the result by beta.

$$\mathbf{TR= (R_p – R_f) / \beta_p}$$

Where,

TR is the Treynor ratio;

R_p is the monthly return generated by the mutual fund schemes;

R_f is the risk free rate and

β_p is the systematic risk of the mutual fund schemes.

Jensen's Alpha: M.C Jensen designed an objective measure for portfolio performance in 1968 that could be used to judge how successfully portfolio managers selected their investments and managed risk. Jensen's Alpha aims to measure the difference between expected and the actual returns with respect to the level of risk in a portfolio. It aids in determining the fund

manager's propensity for identifying undervalued assets and generating excess returns over the benchmark indices.

$$\textbf{Jensen's alpha } (\alpha) = R_p - [R_f + (R_m - R_f) * \beta_p]$$

Where,

R_p is the monthly return generated by the mutual fund schemes;

R_f is the risk free rate;

R_m is the monthly returns generated by the benchmark indices (BSE Sensex and Nifty 50)

β_p is the systematic risk of the mutual fund schemes.

4. Correlation

Correlation (r) measures the degree of association between two or more variables. Here, in the present study, the variables are the mutual fund scheme returns and benchmark returns i.e, BSE Sensex returns and Nifty 50 returns.

The equation for the correlation coefficient is $Cov(x,y)/S_xS_y$ where *'Cov'* denotes covariance; and S_xS_y, are standard deviations of x *and* y. The simple correlation coefficient or the sample person correlation coefficients is denoted by the formula for r by substituting estimates of the covariances and variances based on a sample into the formula above.

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

An equivalent expression gives the correlation coefficient as the mean of the product of the standard scores. Based on a sample of paired data (X_i, Y_i), the sample person correlation coefficient is.

$$\boldsymbol{r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{X_i - \bar{X}}{S_X}\right)\left(\frac{Y_i - \bar{Y}}{S_Y}\right)}$$

Where $\frac{X_i - \bar{X}}{S_X}$, $\bar{X}$ and S_x are the standard score, sample mean and sample standard deviation respectively.

where, X_i= monthly mean of the mutual fund scheme returns for i th time period.

Y_i= monthly benchmark indices (BSE Sensex and Nifty 50) return for i th return

$\bar{X}$= mean of the monthly mutual fund scheme returns for i th period.

$\bar{Y}$= mean of the monthly benchmark indices (BSE Sensex and Nifty 50) return for i th return

S_x= standard deviation of the monthly mutual fund scheme returns for i th period.

S_y= standard deviation of the monthly benchmark indices (BSE Sensex and Nifty 50) return for i th return

n= number of pairs of observation.

Table 3.1: Criterion to mark mutual fund as Outperformed, Underperformed and Neutral in the present chapter (on the basis of the literature surveyed).

Situation	Positive Returns	Negative Returns
Market Index Returns < Mutual Fund Scheme Returns	O	U
Market Index Returns > Mutual Fund Scheme Returns	U	O
Market Index Returns = Mutual Fund Scheme Returns	N	N

Table 3.2: Criterion for Range and Degree of correlation used in the present study (on the basis of the literature surveyed).

Range of Correlation	Degree of Correlation
Below 0.4	Low
0.4- 0.75	Moderate
Above 0.75	High

3.3 Analysis of the Risk Return analysis of selected Indian Equity Mutual fund schemes.

Table 3.3: DSP Black Rock Small Cap Fund : Risk Return Analysis

Fund	**DSP Small Cap Fund - Regular Plan**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0729	-0.0586	-0.052856896	U	U	0.11799908	0.0635	0.10962	1.2493031	-0.3833763	-0.0362106	-0.0066
2009	0.07387462	0.0541	0.050386135	O	O	0.13957196	0.07813	0.09433	1.5195145	0.2828263	0.02597844	0.0095
2010	0.03207219	0.0131	0.01446593	O	O	0.054460855	0.02948	0.04887	1.1428011	0.53565428	0.02552692	0.0175
2011	-0.0240587	-0.0179	-0.021538858	U	U	0.064944176	0.033768	0.06332	1.4251552	-0.4751578	-0.0216529	0.0043
2012	0.02961491	0.0164	0.021386208	O	O	0.045150389	0.026443	0.04946	0.8883989	0.54739084	0.02781961	0.0145
2013	0.00488636	0.0069	0.005818767	U	U	0.063541746	0.026141	0.04432	1.7421778	-0.0552965	-0.0020168	-0.0009
2014	0.06114938	0.025	0.023280469	O	O	0.045488261	0.022102	0.03616	1.3380122	1.55313434	0.05280174	0.0245
2015	0.01590272	-0.0058	-0.003078288	O	O	0.026631778	0.022602	0.03573	0.3527108	0.63092753	0.0476388	0.0185
2016	0.01242455	0.0021	0.003129966	O	O	0.07178778	0.031014	0.04787	1.7667953	0.3680926	0.0149562	-0.0020
2017	0.03056527	0.0196	0.021295041	O	O	0.031628118	0.015087	0.02711	0.8012191	0.93351335	0.03685043	0.0147
2018	-0.0226109	0.0067	0.004198161	U	U	0.057605518	0.032778	0.04764	0.5218843	-0.4081358	-0.04505	-0.0265
2019	0.00189338	0.0109	0.012079475	U	U	0.052970495	0.023857	0.0346	1.2587357	0.20942571	0.00881312	-0.0142
2020	0.03143967	0.0177	0.016727031	O	O	0.117936381	0.102735	0.10318	1.0510649	0.19366096	0.02173003	0.0133
2021	0.04002998	0.017	0.018306671	O	O	0.039507974	0.036498	0.03538	0.2487817	0.81578422	0.12955123	0.0299

Interpretation of Table 3.3:

a) The table 3.3, highlights that the mutual fund scheme generated positive returns for 11 years. The highest return (0.0738) was in 2009 and the lowest return (-0.0729) was in 2008.

b) The highest variability of the mutual fund scheme return (0.1396) was recorded in the year 2009 and the lowest variability of the mutual fund scheme return (0.0266) was recorded in the year 2015.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with the BSE Sensex for 14 years and 12 years with Nifty 50.

e) The mutual fund scheme outperformed both the benchmark indices (BSE Sensex and Nifty 50) in terms of returns over the study period for 9 years.

f) Beta was higher than 1 for 9 years.

g) The Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

h) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.4: HDFC Mid-Cap Opportunity Fund : Risk Return Analysis

Fund	**HDFC Mid-Cap Opportunity Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0534239	-0.0586	-0.0528569	O	U	0.102418189	0.0635	0.10962	1.05771	-0.251	-0.024	0.007
2009	0.06069926	0.0541	0.050386135	O	O	0.094323187	0.07813	0.09433	0.99431	0.2788	0.0264	0.0067
2010	0.02391116	0.0131	0.01446593	O	O	0.03162745	0.02948	0.04887	0.68676	0.6643	0.0306	0.014
2011	-0.0152528	-0.0179	-0.02153886	O	O	0.055868239	0.033768	0.06332	1.26719	-0.395	-0.017	0.0092
2012	0.02926561	0.0164	0.021386208	O	O	0.048887566	0.026443	0.04946	1.1724	0.4984	0.0208	0.0109
2013	0.00886515	0.0069	0.005818767	O	O	0.051401998	0.026141	0.04432	1.43765	0.009	0.0003	0.0026
2014	0.04926181	0.025	0.023280469	O	O	0.039977607	0.022102	0.03616	1.16552	1.4699	0.0504	0.0186
2015	0.00502408	-0.0058	-0.00307829	O	O	0.02572091	0.022602	0.03573	0.40938	0.2303	0.0145	0.0079
2016	0.01071797	0.0021	0.003129966	O	O	0.061411325	0.031014	0.04787	1.56033	0.4025	0.0158	-0.0004
2017	0.02975152	0.0196	0.021295041	O	O	0.02570793	0.015087	0.02711	0.62049	1.1168	0.0463	0.0172
2018	-0.0084854	0.0067	0.004198161	U	U	0.054071865	0.032778	0.04764	0.52278	-0.174	-0.018	-0.012
2019	0.00113928	0.0109	0.012079475	U	O	0.046212545	0.023857	0.0346	1.05217	0.2237	0.0098	-0.011
2020	0.02280744	0.0177	0.016727031	O	O	0.110238114	0.102735	0.10318	1.01695	0.1289	0.014	0.005
2021	0.02893249	0.017	0.018306671	O	O	0.035619786	0.036498	0.03538	0.65896	0.5933	0.0321	0.0151

Interpretation of Table 3.4:

a) The table 3.4, highlights that the mutual fund scheme generated positive returns for 11 years. The highest return (0.0607) was in 2009 and the lowest return (-0.0534) was in 2008.

b) The highest variability of the mutual fund scheme return (0.1102) was recorded in the year 2020 and the lowest variability of the mutual fund scheme return (0.02571) was recorded in the year 2017.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with the BSE Sensex for 13 years and 7 years for the Nifty 50.

e) The mutual fund scheme outperformed BSE Sensex in terms of returns over the study period for 12 years except 2018 and 2019 and the mutual fund scheme outperformed Nifty 50 in terms of returns over the study period for 12 years except 2008 and 2018.

f) Beta was higher than 1 for 8 years in the study period.

g) Sharpe ratio and Treynor ratio remained positive for 11 years in the study period.

h) Jensen's alpha shows positive results for 11 years indicating the fund manager's stock selecting ability outperformed for 11 years.

Table 3.5: ICICI Prudential Value Discovery Fund: Risk Return Analysis

Fund	**ICICI Prudential Value Discovery Fund**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.0563676	-0.0586	-0.0528569	O	U	0.122054058	0.0635	0.10962	1.1046	-0.235	-0.026	0.0055
2009	0.07828362	0.0541	0.050386135	O	O	0.108461185	0.07813	0.09433	1.19227	0.4046	0.0368	0.0204
2010	0.02097504	0.0131	0.01446593	O	O	0.029286267	0.02948	0.04887	0.69598	0.6172	0.026	0.011
2011	-0.0210504	-0.0179	-0.02153886	U	O	0.052256948	0.033768	0.06332	1.2702	-0.533	-0.022	0.0035
2012	0.03293262	0.0164	0.021386208	O	O	0.045077481	0.026443	0.04946	1.10853	0.6219	0.0253	0.0153
2013	0.00770585	0.0069	0.005818767	O	O	0.04762143	0.026141	0.04432	1.10958	-0.015	-0.0006	0.001
2014	0.04840726	0.025	0.023280469	O	O	0.054488078	0.022102	0.03616	1.51235	1.0628	0.0383	0.0057
2015	0.00479369	-0.0058	-0.00307829	O	O	0.028621659	0.022602	0.03573	0.70595	0.1989	0.0081	0.0092
2016	0.00503819	0.0021	0.003129966	O	O	0.052991584	0.031014	0.04787	1.27592	0.3593	0.0149	-0.002
2017	0.01819683	0.0196	0.021295041	U	U	0.022778802	0.015087	0.02711	0.79029	0.7532	0.0217	0.0025
2018	-0.0029905	0.0067	0.004198161	U	U	0.034400658	0.032778	0.04764	0.70191	-0.113	-0.006	-0.008
2019	0.00079368	0.0109	0.012079475	U	U	0.028182253	0.023857	0.0346	0.87057	0.3546	0.0115	-0.008
2020	0.02730606	0.0177	0.016727031	O	O	0.092020415	0.102735	0.10318	0.82628	0.2033	0.0226	0.0112
2021	0.02908397	0.017	0.018306671	O	O	0.03103906	0.036498	0.03538	0.69441	0.6857	0.0307	0.0149

Interpretation of Table 3.5:

a) The table 3.5, highlights that the mutual fund scheme generated positive returns for 11 years. The highest return (0.0783) was in 2009 and the lowest return (-0.0564) was in 2008.

b) The highest variability in mutual fund scheme return (0.1221) was recorded in the year 2008 and the lowest variability in mutual fund scheme return (0.0228) was recorded in the year 2017.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with BSE Sensex for 11 years and 5 years with Nifty 50.

e) The mutual fund scheme outperformed BSE Sensex in terms of returns over the study period for 10 years except 2011, 2017, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 in terms of returns over the study period for 10 years except 2008, 2017, 2018 and 2019.

f) Beta was higher than 1 for 7 years.

g) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

h) Jensen's alpha shows positive results for 11 years indicating the fund manager's stock selecting ability outperformed for 11 years.

Table 3.6: Franklin India Smaller Companies Fund: Risk Return Analysis

Fund	**Franklin India Smaller Companies Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0733551	-0.0586	-0.0528569	U	U	0.114185168	0.0635	0.10962	1.155	-0.4	-0.03951	-0.00995146
2009	0.06746467	0.0541	0.050386135	O	O	0.123876211	0.07813	0.09433	1.292	0.2669	0.02559	0.00761146
2010	0.01537079	0.0131	0.01446593	O	O	0.048321587	0.02948	0.04887	1.222	0.2581	0.01021	0.00310602
2011	-0.0233528	-0.0179	-0.02153886	U	U	0.052978144	0.033768	0.06332	1.108	-0.569	-0.02722	-0.002793
2012	0.03623448	0.0164	0.021386208	O	O	0.044428951	0.026443	0.04946	1.232	0.7053	0.02544	0.01716957
2013	0.01165242	0.0069	0.005818767	O	O	0.053290831	0.026141	0.04432	1.562	0.061	0.00208	0.00559595
2014	0.05577158	0.025	0.023280469	O	O	0.044162179	0.022102	0.03616	1.318	1.478	0.04953	0.01980722
2015	0.00792808	-0.0058	-0.00307829	O	O	0.025952861	0.022602	0.03573	0.541	0.3402	0.01631	0.01147952
2016	0.00968906	0.0021	0.003129966	O	O	0.058307125	0.031014	0.04787	1.577	0.4063	0.01502	-0.00170657
2017	0.03078021	0.0196	0.021295041	O	O	0.02322599	0.015087	0.02711	0.701	1.2805	0.04245	0.0167383
2018	-0.0150302	0.0067	0.004198161	U	U	0.040971574	0.032778	0.04764	0.491	-0.389	-0.03244	-0.01877838
2019	-0.0032405	0.0109	0.012079475	U	U	0.048112668	0.023857	0.0346	1.159	0.1239	0.00514	-0.01734227
2020	0.02207872	0.0177	0.016727031	O	O	0.120990014	0.102735	0.10318	1.11	0.1114	0.01214	0.00337538
2021	0.03926033	0.017	0.018306671	O	O	0.054766354	0.036498	0.03538	0.087	0.5744	0.36323	0.03066349

Interpretation of Table 3.6:

a) The table 3.6, highlights that the mutual fund scheme generated positive returns for 10 years. The highest return (0.0675) was in 2009 and the lowest return (-0.0734) was in 2008.

b) The highest variability of the mutual fund scheme return (0.1239) was recorded in the year 2009 and the lowest variability of the mutual fund scheme return (0.0232) was recorded in the year 2017.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with BSE Sensex for 14 years and 8 years with Nifty 50.

e) The mutual fund scheme outperformed the market in terms of return over the study period for 10 years except 2008, 2011, 2018 and 2019 for BSE Sensex and Nifty 50.

f) Beta was higher than 1 for 10 years in the study period.

g) Sharpe ratio and Treynor ratio remained positive for 11 years in the study period.

h) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.7: Sundaram Mid Cap Fund: Risk Return Analysis

Fund	**Sundaram Mid Cap Fund**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.0638739	-0.0586	-0.0528569	U	U	0.114663047	0.0635	0.10962	1.016	-0.0356	-0.31548	-0.005
2009	0.07537877	0.0541	0.050386135	O	O	0.160689879	0.07813	0.09433	1.653	0.0248	0.255018	0.0084
2010	0.01662139	0.0131	0.01446593	O	O	0.041096263	0.02948	0.04887	1.049	0.01308	0.333884	0.003
2011	-0.0205491	-0.0179	-0.02153886	U	O	0.060582524	0.033768	0.06332	1.426	-0.0192	-0.45144	0.0079
2012	0.02830674	0.0164	0.021386208	O	O	0.049305322	0.026443	0.04946	1.185	0.01976	0.47473	0.0098
2013	0.00499136	0.0069	0.005818767	U	U	0.051509583	0.026141	0.04432	1.001	-0.0034	-0.06617	-0.002
2014	0.04920448	0.025	0.023280469	O	O	0.057398281	0.022102	0.03616	1.754	0.03347	1.022757	-0.002
2015	0.00941117	-0.0058	-0.00307829	O	O	0.035244624	0.022602	0.03573	0.916	0.01126	0.29256	0.0148
2016	0.01111735	0.0021	0.003129966	O	O	0.067981153	0.031014	0.04787	1.701	0.01477	0.369475	-0.002
2017	0.02922763	0.0196	0.021295041	O	O	0.026731154	0.015087	0.02711	0.61	0.0462	1.054486	0.0169
2018	-0.0127467	0.0067	0.004198161	U	U	0.048624536	0.032778	0.04764	0.595	-0.0229	-0.28066	-0.017
2019	0.00064727	0.0109	0.012079475	U	U	0.044081571	0.023857	0.0346	1.074	0.00917	0.223387	-0.012
2020	0.01602828	0.0177	0.016727031	U	U	0.111791283	0.102735	0.10318	1.007	0.00738	0.066448	-0.002
2021	0.02741743	0.017	0.018306671	O	O	0.034867477	0.036498	0.03538	0.671	0.02921	0.562628	0.0134

Interpretation of Table 3.7:

a) The table 3.7, highlights that the mutual fund scheme generated positive returns for 11 years. The highest return (0.0754) was in 2009 and the lowest return (-0.0639) was in 2008.

b) The highest variability of the mutual fund scheme return (0.1607) was recorded in the year 2009 and the lowest variability of the mutual fund scheme return (0.0267) was recorded in the year 2017.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with BSE Sensex for 13 years and 8 years with Nifty 50.

e) The mutual fund scheme outperformed BSE Sensex over the study period for 8 years except 2008, 2011, 2013, 2018, 2019 and 2020, and the mutual fund scheme outperformed Nifty 50 over the study period for 9 years except 2008, 2013, 2018,2019 and 2020.

f) Beta was higher than 1 for 9 years.

g) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

h) Jensen's alpha shows positive results for 7 years indicating the fund manager's stock selecting ability outperformed for 7 years.

Table 3.8: DSP BlackRock Mid Cap Fund: Risk Return Analysis

Fund	**DSP Mid Cap Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.06475494	-0.0586	-0.0528569	U	U	0.109276023	0.0635	0.10962	1.019422916	-0.33909484	-0.03635	-0.00555477
2009	0.072279745	0.0541	0.050386135	O	O	0.118062534	0.07813	0.09433	1.242887272	0.32084476	0.030477	0.013394866
2010	0.022638607	0.0131	0.01446593	O	O	0.041235433	0.02948	0.04887	0.976912394	0.478680714	0.020205	0.0097741
2011	-0.02409079	-0.0179	-0.02153886	U	U	-0.024090791	0.033768	0.06332	1.47053017	1.282265532	-0.02101	0.005431304
2012	0.032584435	0.0164	0.021386208	O	O	0.032584435	0.026443	0.04946	1.298195813	0.849621454	0.021325	0.012755183
2013	0.003485166	0.0069	0.005818767	U	U	0.068012362	0.026141	0.04432	1.656327029	-0.07226384	-0.00297	-0.00243034
2014	0.046606101	0.025	0.023280469	O	O	0.046606101	0.022102	0.03616	1.864841983	1.203835975	0.030086	-0.00823095
2015	0.007092281	-0.0058	-0.00307829	O	O	0.007092281	0.022602	0.03573	1.053255765	1.126898528	0.007588	0.013153234
2016	0.011300577	0.0021	0.003129966	O	O	0.069835121	0.031014	0.04787	1.705321779	0.362290157	0.014836	-0.0021551
2017	0.028742469	0.0196	0.021295041	O	O	0.030784649	0.015087	0.02711	0.738373851	0.899879337	0.037518	0.013998251
2018	-0.00765332	0.0067	0.004198161	U	U	-0.051168459	0.032778	0.04764	0.476237649	0.167159973	-0.01796	-0.0113155
2019	0.008047325	0.0109	0.012079475	U	U	0.03885564	0.023857	0.0346	0.900981869	0.443882149	0.019143	-0.00086241
2020	0.022500163	0.0177	0.016727031	O	O	0.095468804	0.102735	0.10318	0.855755881	0.14559901	0.016243	0.006112785
2021	0.021354855	0.017	0.018306671	O	O	0.028139614	0.036498	0.03538	0.54515533	0.481700099	0.024864	0.008539426

Interpretation of Table 3.8:

a) The table 3.8, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0722) was in 2009 and the lowest return (-0.0647) was in 2008.

c) The highest variability of themutual fund schemereturn (0.1181) was recorded in the year 2009 and the lowest variability of themutual fund scheme return (0.0078) was recorded in the year 2015.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with the BSE Sensex for 9 years and 6 years with Nifty 50.

f) The mutual fund scheme outperformed both the benchmark indices (BSE Sensex and Nifty 50) over the study period for 7 years except 2008, 2011, 2013, 2018 and 2019.

g) Beta was higher than 1 for 8 years in the study period.

h) Sharpe ratio remained positive for 12 years in the study period.

i) Treynor ratio remained positive for 10 years in the study period.

j) Jensen's alpha shows positive results for 8 years indicating the fund manager's stock selecting ability outperformed for 8 years.

Table 3.9: IDFC Multi Cap Fund: Risk Return Analysis

Fund	**IDFC Multi Cap Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0558012	-0.0586	-0.0528569	O	U	0.105249951	0.0635	0.10962	1.023	-0.267	-0.02746	0.0035
2009	0.06371412	0.0541	0.050386135	O	O	0.088820623	0.07813	0.09433	0.936	0.33	0.031323	0.0109
2010	0.02456134	0.0131	0.01446593	O	O	0.051048696	0.02948	0.04887	0.47	0.4243	0.046061	0.0169
2011	-0.0149735	-0.0179	-0.02153886	O	O	0.054816155	0.033768	0.06332	0.994	-0.397	-0.0219	0.0028
2012	0.02967872	0.0164	0.021386208	O	O	0.040175019	0.026443	0.04946	0.65	0.6168	0.038145	0.0173
2013	0.00550583	0.0069	0.005818767	U	U	0.045398226	0.026141	0.04432	1.188	-0.064	-0.00244	-0.001
2014	0.04022772	0.025	0.023280469	O	O	0.044762504	0.022102	0.03616	1.154	1.1109	0.043099	0.0099
2015	0.00723496	-0.0058	-0.00307829	O	O	0.035429513	0.022602	0.03573	0.861	0.2296	0.009449	0.0124
2016	-0.0008993	0.0021	0.003129966	U	U	0.054594507	0.031014	0.04787	1.337	0.24	0.009795	-0.008
2017	0.02746571	0.0196	0.021295041	O	O	0.022796242	0.015087	0.02711	0.587	1.1592	0.04504	0.0155
2018	-0.0065584	0.0067	0.004198161	U	U	0.0474895	0.032778	0.04764	0.801	-0.157	-0.00932	-0.012
2019	0.00679004	0.0109	0.012079475	U	U	0.038780205	0.023857	0.0346	0.816	0.4123	0.019588	-0.0004
2020	0.01726751	0.0177	0.016727031	U	O	0.095158988	0.102735	0.10318	0.868	0.0911	0.009982	0.0008
2021	0.02442615	0.017	0.018306671	O	O	0.024821797	0.036498	0.03538	0.536	0.6698	0.031037	0.0117

Interpretation of Table 3.9:

a) The table 3.9, highlights that the mutual fund scheme generated positive returns for 10 years.

b) The highest return (0.0637) was in 2009 and the lowest return (-0.0558) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1052) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0228) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 11 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years and 5 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 9 years except 2013, 2016, 2018, 2019 and 2020, and the mutual fund scheme outperformed Nifty 50 over the study period for 9 years except 2008, 2013, 2016, 2018 and 2019.

g) Beta was higher than 1 for 4 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 10 years indicating the fund manager's stock selecting ability outperformed for 10 years.

Table 3.10: L&T Mid Cap Fund: Risk Return Analysis

Fund	**L&T Mid Cap Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0681114	-0.0586	-0.0528569	U	U	0.138851181	0.0635	0.10962	1.2999186	-0.2910409	-0.0310876	-0.0002439
2009	0.07114997	0.0541	0.050386135	O	O	0.13183152	0.07813	0.09433	1.3875715	0.27876464	0.0264851	0.00941481
2010	0.0130923	0.0131	0.01446593	U	U	0.03933035	0.02948	0.04887	1.0602611	0.25914603	0.00961301	-0.0006224
2011	-0.0274192	-0.0179	-0.02153886	U	U	0.049172639	0.033768	0.06332	1.1018069	-0.695899	-0.0310573	-0.0070046
2012	0.02799738	0.0164	0.021386208	O	O	0.040193327	0.026443	0.04946	0.9861855	0.57465717	0.02342093	0.01175625
2013	-0.0035741	0.0069	0.005818767	U	U	0.068639299	0.026141	0.04432	-0.5202096	-0.1744498	0.02301786	-0.0127544
2014	0.05666203	0.025	0.023280469	O	O	0.046306632	0.022102	0.03616	1.3435642	1.42878086	0.04924367	0.01980906
2015	0.00903299	-0.0058	-0.00307829	O	O	0.032308386	0.022602	0.03573	0.7453987	0.307443	0.01332574	0.01358544
2016	0.0096993	0.0021	0.003129966	O	O	0.063522503	0.031014	0.04787	1.6148069	0.37308518	0.01467625	-0.0022991
2017	0.03600214	0.0196	0.021295041	O	O	0.026304119	0.015087	0.02711	0.8812402	1.32915082	0.0396738	0.01860632
2018	-0.0095261	0.0067	0.004198161	U	U	0.048541062	0.032778	0.04764	0.5610999	-0.2147898	-0.0185816	-0.0136805
2019	0.00079357	0.0109	0.012079475	U	U	0.044891225	0.023857	0.0346	1.1038739	0.22261755	0.00905318	-0.0121943
2020	0.02017392	0.0177	0.016727031	O	O	0.103603688	0.102735	0.10318	0.9480025	0.11171337	0.01220874	0.00294709
2021	0.02285548	0.017	0.018306671	O	O	0.033261547	0.036498	0.03538	0.5820804	0.45263927	0.02586495	0.00970034

Interpretation of Table 3.10:

a) The table 3.10, highlights that the mutual fund scheme generated positive returns for 8 years.

b) The highest return (0.0711) was in 2009 and the lowest return (-0.0681) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1389) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0263) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with the BSE Sensex for 12 years and 7 years with Nifty 50.

f) The mutual fund scheme outperformed both the benchmark indices (BSE Sensex and Nifty 50) over the study period for 6 years except 2008, 2010, 2011, 2013, 2018 and 2019.

g) Beta was higher than 1 for 7 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 12 years in the study period.

i) Jensen's alpha shows positive results for 7 years indicating the fund manager's stock selecting ability outperformed for 7 years.

Table 3.11: UTI Mid Cap Fund: Risk Return Analysis

Fund	**UTI MID CAP FUND**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0684872	-0.0586	-0.0528569	U	U	0.120555296	0.0635	0.10962	1.088	-0.338	-0.037	-0.007
2009	0.06907091	0.0541	0.050386135	O	O	0.111643739	0.07813	0.09433	1.148	0.3105	0.0302	0.0121
2010	0.01521945	0.0131	0.01446593	O	O	0.038059042	0.02948	0.04887	0.9	0.3237	0.0137	0.0031
2011	-0.0207052	-0.0179	-0.02153886	U	O	0.062203744	0.033768	0.06332	1.265	-0.442	-0.022	0.0037
2012	0.03013681	0.0164	0.021386208	O	O	0.041455408	0.026443	0.04946	0.731	0.6088	0.0345	0.0168
2013	0.00937537	0.0069	0.005818767	O	O	0.060035673	0.026141	0.04432	1.554	0.0162	0.0006	0.0033
2014	0.05624799	0.025	0.023280469	O	O	0.0504801	0.022102	0.03616	1.56	1.3025	0.0421	0.0119
2015	0.00534681	-0.0058	-0.00307829	O	O	0.026953863	0.022602	0.03573	0.501	0.2318	0.0125	0.0087
2016	0.00476638	0.0021	0.003129966	O	O	0.058556053	0.031014	0.04787	1.506	0.3205	0.0125	-0.005
2017	0.0301101	0.0196	0.021295041	O	O	0.032586353	0.015087	0.02711	0.904	0.8921	0.0322	0.0123
2018	-0.0119899	0.0067	0.004198161	U	U	0.054899472	0.032778	0.04764	0.333	-0.235	-0.039	-0.015
2019	0.00078095	0.0109	0.012079475	U	U	0.045086196	0.023857	0.0346	0.952	0.2214	0.0105	-0.009
2020	0.03512183	0.0177	0.016727031	O	O	0.105740322	0.102735	0.10318	0.933	0.2508	0.0284	0.018
2021	0.03157	0.017	0.018306671	O	O	0.032190033	0.036498	0.03538	0.477	0.7384	0.0499	0.0194

Interpretation of Table 3.11:

a) The table 3.11, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0690) was in 2009 and the lowest return (-0.0685) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1205) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0269) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years and 8 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 8 years except 2008, 2011, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 9 years except 2008, 2018 and 2019.

g) Beta was higher than 1 for 6 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 11 years in the study period.

i) Jensen's alpha shows positive results for 10 years indicating the fund manager's stock selecting ability outperformed for 10 years.

Table 3.12: Sundaram Small Cap Fund: Risk Return Analysis

Fund	**Sundaram Small Cap Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0029231	-0.0586	-0.0528569	O	O	0.200180643	0.0635	0.10962	0.847	0.1238	0.02926	0.0509
2009	0.0748978	0.0541	0.050386135	O	O	0.131860404	0.07813	0.09433	1.39	0.3071	0.02913	0.0131
2010	0.009093	0.0131	0.01446593	U	U	0.045757955	0.02948	0.04887	1.245	0.1353	0.00498	-0.007
2011	-0.0305682	-0.0179	-0.02153886	U	U	0.063860277	0.033768	0.06332	1.418	-0.585	-0.02635	-0.002
2012	0.03246522	0.0164	0.021386208	O	O	0.050751248	0.026443	0.04946	1.118	0.5431	0.02467	0.0147
2013	-0.0021612	0.0069	0.005818767	U	U	0.068435635	0.026141	0.04432	1.55	-0.154	-0.00681	-0.008
2014	0.06392803	0.025	0.023280469	O	O	0.079535159	0.022102	0.03616	2.276	0.9232	0.03226	-0.005
2015	0.00911784	-0.0058	-0.00307829	O	O	0.044660203	0.022602	0.03573	1.016	0.2243	0.00986	0.015
2016	0.00353886	0.0021	0.003129966	O	O	0.088544087	0.031014	0.04787	2.067	0.1981	0.00848	-0.016
2017	0.03819343	0.0196	0.021295041	O	O	0.039005862	0.015087	0.02711	1.018	0.9525	0.03648	0.0183
2018	-0.0265282	0.0067	0.004198161	U	U	0.061545576	0.032778	0.04764	0.473	-0.446	-0.05802	-0.03
2019	-0.0034159	0.0109	0.012079475	U	U	0.062009968	0.023857	0.0346	1.467	0.0933	0.00394	-0.024
2020	0.02852343	0.0177	0.016727031	O	O	0.128254384	0.102735	0.10318	1.162	0.1553	0.01715	0.0094
2021	0.04065415	0.017	0.018306671	O	O	0.034540139	0.036498	0.03538	0.444	0.9512	0.07403	0.0288

Interpretation of Table 3.12:

a) The table 3.12, highlights that the mutual fund scheme generated positive returns for 9 years. The highest return (0.0749) was in 2009 and the lowest return (-0.0306) was in 2011.

b) The highest variability of the mutual fund scheme return (0.2002) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0345) was recorded in the year 2021.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with the BSE Sensex for 13 years and 12 years with Nifty 50.

e) The mutual fund scheme outperformed BSE Sensex over the study period for 9 years except 2010, 2011, 2013, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 9 years except 2010, 2011, 2013, 2018 and 2019.

f) Sharpe ratio and Treynor ratio remained positive for 11 years in the study period.

g) Jensen's alpha shows positive results for 7 years indicating the fund manager's stock selecting ability outperformed for 7 years.

Table 3.13: Invesco India Contra Fund: Risk Return Analysis

Fund	**Invesco India Contra Fund**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.04776	-0.0586	-0.05286	O	O	0.1233	0.06350	0.10962	1.0892	-0.163	-0.0184	0.0136
2009	0.06562	0.0541	0.05039	O	O	0.0998	0.07813	0.09433	1.0199	0.3128	0.0306	0.0111
2010	0.01075	0.0131	0.01447	U	U	0.0355	0.02948	0.04887	0.8043	0.2213	0.0098	-0.0004
2011	-0.01943	-0.0179	-0.02154	U	O	0.0493	0.03377	0.06332	0.9325	-0.532	-0.0281	-0.0032
2012	0.02356	0.0164	0.02139	O	O	0.0467	0.02644	0.04946	1.0603	0.3999	0.0176	0.0065
2013	0.00526	0.0069	0.00582	U	U	0.0565	0.02614	0.04432	1.5374	-0.056	-0.0020	-0.0008
2014	0.04283	0.025	0.02328	O	O	0.0541	0.02210	0.03616	1.5682	0.9673	0.0334	-0.0018
2015	0.00394	-0.0058	-0.00308	O	O	0.0375	0.02260	0.03573	1.0202	0.129	0.0047	0.0098
2016	0.00689	0.0021	0.00313	O	O	0.0564	0.03101	0.04787	1.3326	0.3703	0.0157	-0.0006
2017	0.03212	0.0196	0.02130	O	O	0.0257	0.01509	0.02711	0.8484	1.2073	0.0366	0.0153
2018	-0.00177	0.0067	0.00420	U	U	0.0463	0.03278	0.04764	0.7397	-0.058	-0.0036	-0.0070
2019	0.00551	0.0109	0.01208	U	U	0.0390	0.02386	0.0346	0.9795	0.3769	0.0150	-0.0050
2020	0.02121	0.0177	0.01673	O	O	0.1004	0.10274	0.10318	0.9629	0.1256	0.0131	0.0039
2021	0.02229	0.017	0.01831	O	O	0.0322	0.03650	0.03538	0.6668	0.4497	0.0217	0.0084

Interpretation of Table 3.13:

a) The table 3.13, highlights that the mutual fund scheme generated positive returns for 8 years.

b) The highest return (0.0656) was in 2009 and the lowest return (-0.0478) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1233) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0257) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with the BSE Sensex for 12 years and 7 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 7 years except 2010, 2011, 2013, 2018 and 2019 and the mutual fund scheme outperformed Nifty 50 over the study period for 8 years except 2010, 2013, 2018 and 2019.

g) Beta was higher than 1 for 7 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 7 years indicating the fund manager's stock selecting ability outperformed for 7 years.

Table 3.14: Reliance Tax Saver (ELSS) Fund: Risk Return Analysis

Fund	**Reliance Tax Saver Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0240827	-0.0586	-0.052856896	O	O	0.112008668	0.0635	0.10962	0.93190017	0.0322944	0.00388159	0.03241297
2009	0.05467668	0.0541	0.050386135	O	O	0.091990052	0.07813	0.09433	0.94088231	0.2204225	0.02155071	0.0017413
2010	0.01789491	0.0131	0.01446593	O	O	0.042623754	0.02948	0.04887	0.97844274	0.3517971	0.01532528	0.0050148
2011	-0.0211782	-0.0179	-0.021538858	U	O	0.059848616	0.033768	0.06332	1.1613715	-0.4674832	-0.0240907	0.00070765
2012	0.03336891	0.0164	0.021386208	O	O	0.05478547	0.026443	0.04946	1.19225671	0.51964345	0.02387817	0.01475796
2013	0.00465263	0.0069	0.005818767	U	U	0.063405813	0.026141	0.04432	1.64354866	-0.0591014	-0.00228	-0.001282
2014	0.05391928	0.025	0.023280469	O	O	0.072424322	0.022102	0.03616	2.09832159	0.87566271	0.03022381	-0.0089728
2015	-0.0019897	-0.0058	-0.003078288	O	O	0.032669967	0.022602	0.03573	0.93165679	-0.0333552	-0.0011697	0.00347541
2016	0.00541659	0.0021	0.003129966	O	O	0.065638728	0.031014	0.04787	1.51534614	0.29580999	0.0128133	-0.0049805
2017	0.03248244	0.0196	0.021295041	O	O	0.030716312	0.015087	0.02711	1.04870466	1.02363986	0.02998217	0.01197848
2018	-0.0179054	0.0067	0.004198161	U	U	0.051020415	0.032778	0.04764	0.76733429	-0.3685855	-0.0245074	-0.0232559
2019	0.00281929	0.0109	0.012079475	U	U	0.058683616	0.023857	0.0346	2.00814639	0.20481513	0.00598527	-0.0283444
2020	0.01076471	0.0177	0.016727031	U	U	0.108830933	0.102735	0.10318	1.03709252	0.01989061	0.00208729	-0.0072728
2021	0.02828699	0.017	0.018306671	O	O	0.040795895	0.036498	0.03538	0.97213446	0.50218269	0.02107424	0.01154336

Interpretation of Table 3.14:

a) The table 3.14, highlights that the mutual fund scheme generated positive returns for 10 years.

b) The highest return (0.0547) was in 2009 and the lowest return (-0.0241) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1120) was recorded in the year 2008 and the lowest variability of the mutual fund scheme (0.0307) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 11 years.

e) The fund remained risky in comparison with the BSE Sensex for 14 years and 10 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 9 years except 2011, 2013, 2018, 2019 and 2020, and the mutual fund scheme outperformed Nifty 50 over the study period for 10 years except 2013, 2018, 2019 and 2020.

g) Beta was higher than 1 for 8 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 8 years indicating the fund manager's stock selecting ability outperformed for 8 years.

Table 3.15: Aditya Birla Sun Life Small Cap Fund

Fund	**Aditya Birla Sun Life Small Cap Fund**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.0709411	-0.0586	-0.0528569	U	U	0.114630566	0.0635	0.10962	1.148	-0.377	-0.038	-0.008
2009	0.06911552	0.0541	0.050386135	O	O	0.129578785	0.07813	0.09433	1.329	0.2679	0.0261	0.0085
2010	0.01569264	0.0131	0.01446593	O	O	0.045622417	0.02948	0.04887	1.144	0.2804	0.0112	0.0011
2011	-0.0203848	-0.0179	-0.02153886	U	O	0.056297487	0.033768	0.06332	1.18	-0.483	-0.023	0.002
2012	0.02394421	0.0164	0.021386208	O	O	0.038507048	0.026443	0.04946	1.011	0.4946	0.0188	0.0074
2013	0.00533883	0.0069	0.005818767	U	U	0.055194551	0.026141	0.04432	1.434	-0.055	-0.002	-0.0009
2014	0.04450201	0.025	0.023280469	O	O	0.052591723	0.022102	0.03616	1.545	1.0268	0.0349	0.0007
2015	0.01096298	-0.0058	-0.00307829	O	O	0.029568865	0.022602	0.03573	0.636	0.4012	0.0187	0.015
2016	0.00994179	0.0021	0.003129966	O	O	0.069753619	0.031014	0.04787	1.85	0.3432	0.0129	-0.006
2017	0.0387722	0.0196	0.021295041	O	O	0.037521738	0.015087	0.02711	0.87	1.0056	0.0434	0.0216
2018	-0.0198729	0.0067	0.004198161	U	U	0.052132549	0.032778	0.04764	0.734	-0.398	-0.028	-0.025
2019	-0.0031145	0.0109	0.012079475	U	U	0.055270195	0.023857	0.0346	1.272	0.1101	0.0048	-0.019
2020	0.02459809	0.0177	0.016727031	O	O	0.125405377	0.102735	0.10318	1.137	0.1276	0.0141	0.0056
2021	0.03702854	0.017	0.018306671	O	O	0.048744011	0.036498	0.03538	0.516	0.5996	0.0567	0.0245

Interpretation of Table 3.15:

a) The table 3.15, highlights that the mutual fund scheme generated positive returns for 10 years.

b) The highest return (0.0691) was in 2009 and the lowest return (-0.0709) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1296) was recorded in the year 2009 and the lowest variability of the mutual fund scheme return (0.0296) was recorded in the year 2015.

d) BSE Sensex return and Nifty 50 return remained positive for 11 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 14 years and 10 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 9 years except 2008, 2011, 2013, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 10 years except 2008, 2013, 2018 and 2019.

g) Beta was higher than 1 for 11 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.16: Franklin India Prima Fund: Risk Return Analysis

Fund	**Franklin India Prima Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.07121	-0.0586	-0.05286	U	U	0.11810	0.0635	0.10962	1.084	-0.368	-0.0402	-0.01
2009	0.06806	0.0541	0.05039	O	O	0.11573	0.07813	0.09433	1.173	0.2909	0.02869	0.01055
2010	0.01562	0.0131	0.01447	O	O	0.04563	0.02948	0.04887	1.133	0.2787	0.01122	0.00116
2011	-0.01933	-0.0179	-0.02154	U	O	0.05104	0.033768	0.06332	0.818	-0.512	-0.032	-0.0059
2012	0.03181	0.0164	0.02139	O	O	0.03946	0.026443	0.04946	1.027	0.682	0.0262	0.01509
2013	0.00702	0.0069	0.00582	O	O	0.04814	0.026141	0.04432	1.253	-0.029	-0.0011	0.0005
2014	0.05018	0.025	0.02328	O	O	0.04505	0.022102	0.03616	1.317	1.3248	0.04531	0.01424
2015	0.00590	-0.0058	-0.00308	O	O	0.02952	0.022602	0.03573	0.732	0.2305	0.00929	0.01039
2016	0.00817	0.0021	0.00313	O	O	0.05481	0.031014	0.04787	1.413	0.4044	0.01569	-0.0006
2017	0.02855	0.0196	0.02130	O	O	0.02590	0.015087	0.02711	0.861	1.062	0.03197	0.01154
2018	-0.00729	0.0067	0.00420	U	U	0.04346	0.032778	0.04764	0.58	-0.189	-0.0141	-0.0116
2019	0.00955	0.0109	0.01208	U	U	0.03770	0.023857	0.0346	0.754	0.4972	0.02485	0.00358
2020	0.01375	0.0177	0.01673	U	U	0.10936	0.102735	0.10318	1.023	0.0471	0.00503	-0.0042
2021	0.02443	0.017	0.01831	O	O	0.03777	0.036498	0.03538	0.767	0.4404	0.0217	0.00958

Interpretation of Table 3.16:

a) The table 3.16, highlights that the mutual fund scheme generated positive returns for 11 years. The highest return (0.0680) was in 2009 and the lowest return (-0.0712) was in 2008.

b) The highest variability of the mutual fund scheme return (0.1181) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0295) was recorded in the year 2015.

c) BSE Sensex return and Nifty 50 return remained positive for 11 years.

d) The mutual fund scheme remained risky in comparison with BSE Sensex for 14 years and 8 years with Nifty 50.

e) The mutual fund scheme outperformed BSE Sensex over the study period for 9 years except 2008, 2011, 2018, 2019 and 2020, and the mutual fund scheme outperformed Nifty 50 over the study period for 10 years except 2008, 2018, 2019 and 2020.

f) Beta was higher than 1 for 8 years in the study period.

g) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

h) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.17: Invesco India Midcap Fund: Risk Return Analysis

Fund	**Invesco India Midcap Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0755693	-0.0586	-0.0528569	U	U	0.124236771	0.0635	0.10962	1.222	-0.385	-0.039	-0.01
2009	0.06648361	0.0541	0.050386135	O	O	0.10694441	0.07813	0.09433	1.047	0.3	0.0306	0.0114
2010	0.02008016	0.0131	0.01446593	O	O	0.043094447	0.02948	0.04887	0.904	0.3987	0.019	0.008
2011	-0.0145635	-0.0179	-0.02153886	O	O	0.053488832	0.033768	0.06332	1.051	-0.399	-0.02	0.0046
2012	0.03006623	0.0164	0.021386208	O	O	0.03636907	0.026443	0.04946	0.853	0.692	0.0295	0.0154
2013	0.00669435	0.0069	0.005818767	U	O	0.060356011	0.026141	0.04432	1.662	-0.028	-0.001	0.0008
2014	0.05010278	0.025	0.023280469	O	O	0.055910734	0.022102	0.03616	1.578	1.066	0.0378	0.0052
2015	0.00561833	-0.0058	-0.00307829	O	O	0.031256378	0.022602	0.03573	1.031	0.2085	0.0063	0.0116
2016	0.00238426	0.0021	0.003129966	O	U	0.056772075	0.031014	0.04787	1.539	0.2886	0.0106	-0.008
2017	0.03142132	0.0196	0.021295041	O	O	0.029115015	0.015087	0.02711	0.817	1.0435	0.0372	0.0152
2018	-0.00322	0.0067	0.004198161	U	U	0.05248212	0.032778	0.04764	0.606	-0.079	-0.007	-0.008
2019	0.00396539	0.0109	0.012079475	U	U	0.042914435	0.023857	0.0346	0.937	0.3068	0.014	-0.006
2020	0.02316312	0.0177	0.016727031	O	O	0.09671686	0.102735	0.10318	0.875	0.1506	0.0166	0.0066
2021	0.03086763	0.017	0.018306671	O	O	0.034627912	0.036498	0.03538	0.468	0.6662	0.0493	0.0188

Interpretation of Table 3.17:

a) The table 3.17, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0665) was in 2009 and the lowest return (-0.0756) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1242) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.02912) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme outperformed BSE Sensex over the study period for 8 years except 2008, 2013, 2018 and 2019 and the mutual fund scheme outperformed Nifty 50 over the study period for 8 years except 2008, 2016, 2018 and 2019.

f) Beta was higher than 1 for 7 years in the study period.

g) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

h) Jensen's alpha shows positive results for 10 years indicating the fund manager's stock selecting ability outperformed for 10 years.

Table 3.18: Reliance Multi Cap Fund: Risk Return Analysis

Fund	**RELIANCE MULTI CAP FUND**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.03075	-0.0586	-0.0528569	O	O	0.12101209	0.0635	0.10962	1.056	-0.025	-0.003	0.0296
2009	0.06805311	0.0541	0.050386135	O	O	0.10764647	0.07813	0.09433	1.015	0.3126	0.0332	0.0137
2010	0.02336636	0.0131	0.01446593	O	O	0.046673519	0.02948	0.04887	0.983	0.4385	0.0208	0.0104
2011	-0.0185004	-0.0179	-0.02153886	U	O	0.059066966	0.033768	0.06332	1.242	-0.428	-0.02	0.0054
2012	0.03378006	0.0164	0.021386208	O	O	0.046562387	0.026443	0.04946	0.98	0.6202	0.0295	0.0176
2013	0.00468097	0.0069	0.005818767	U	U	0.046119692	0.026141	0.04432	1.092	-0.081	-0.003	-0.002
2014	0.04077873	0.025	0.023280469	O	O	0.047810134	0.022102	0.03616	1.433	1.0516	0.0351	0.0008
2015	0.00086659	-0.0058	-0.00307829	O	O	0.03101415	0.022602	0.03573	0.811	0.057	0.0022	0.0057
2016	-0.0040282	0.0021	0.003129966	U	U	0.060423229	0.031014	0.04787	1.527	0.165	0.0065	-0.015
2017	0.02931084	0.0196	0.021295041	O	O	0.027812586	0.015087	0.02711	1.231	1.0165	0.023	0.0054
2018	-0.00054	0.0067	0.004198161	U	U	0.053117643	0.032778	0.04764	-0.01	-0.027	0.1498	-0.001
2019	0.00285029	0.0109	0.012079475	U	U	0.04759599	0.023857	0.0346	1.408	0.2532	0.0086	-0.016
2020	0.00762361	0.0177	0.016727031	U	U	0.121033536	0.102735	0.10318	1.132	-0.008	-0.0009	-0.011
2021	0.03484406	0.017	0.018306671	O	O	0.050957977	0.036498	0.03538	1.054	0.5307	0.0257	0.0173

Interpretation of Table 3.18:

a) The table 3.18, highlights that the mutual fund scheme generated positive returns for 8 years.

b) The highest return (0.0680) was in 2009 and the lowest return (-0.031) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1210) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0278) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years and 8 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 7 years except 2011, 2013, 2016, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 8 years except 2013, 2016, 2018 and 2019.

g) Beta was higher than 1 for 8 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.19: Invesco India Tax Plan: Risk Return Analysis

Fund	**INVESCO INDIA TAX PLAN**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.05008	-0.0586	-0.052857	O	O	0.103380	0.0635	0.10962	0.837	-0.216	-0.0267	0.0035
2009	0.05504	0.0541	0.050386	O	O	0.086971	0.07813	0.09433	0.889	0.2373	0.0232	0.0031
2010	0.01741	0.0131	0.014466	O	O	0.036730	0.02948	0.04887	0.74	0.395	0.0196	0.0070
2011	-0.01617	-0.0179	-0.021539	O	O	0.049821	0.033768	0.06332	0.945	-0.461	-0.0243	0.0004
2012	0.02297	0.0164	0.021386	O	O	0.038572	0.026443	0.04946	0.755	0.4685	0.0239	0.0094
2013	0.00914	0.0069	0.005819	O	O	0.048676	0.026141	0.04432	1.286	0.0152	0.0006	0.0027
2014	0.03757	0.025	0.023280	O	O	0.041723	0.022102	0.03616	1.402	1.1283	0.0336	-0.0013
2015	0.00521	-0.0058	-0.003078	O	O	0.032826	0.022602	0.03573	0.985	0.1863	0.0062	0.0109
2016	0.00438	0.0021	0.003130	O	O	0.058796	0.031014	0.04787	1.284	0.3126	0.0143	-0.0023
2017	0.02601	0.0196	0.021295	O	O	0.022182	0.015087	0.02711	0.85	1.1258	0.0294	0.0092
2018	-0.00843	0.0067	0.004198	U	U	0.045649	0.032778	0.04764	0.808	-0.204	-0.0115	-0.0140
2019	0.00817	0.0109	0.012079	U	U	0.037206	0.023857	0.0346	0.895	0.4668	0.0194	-0.0006
2020	0.01934	0.0177	0.016727	O	O	0.095655	0.102735	0.10318	0.911	0.1123	0.0118	0.0025
2021	0.02413	0.017	0.018307	O	O	0.028556	0.036498	0.03538	0.642	0.5717	0.0254	0.0104

Interpretation of Table 3.19:

a) The table 3.19, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0550) was in 2009 and the lowest return (-0.0500) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1034) was recorded in the year 2008 and the lowest variability of themutual fund scheme return (0.0222) was recorded in the year 2017.

d) BSE Sensex Index return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years while in comparison with Nifty 50 the fund remained low risky for 8 years.

f) The mutual fund scheme outperformed both the benchmark indices (BSE Sensex and Nifty 50) over the study period for 10 years except 2018 and 2019.

g) Beta was higher than 1 for 3 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 11 years in the study period.

i) Jensen's alpha shows positive results for 10 years indicating the fund manager's stock selecting ability outperformed for 10 years.

Table 3.20: Tata Equity PE Fund: Risk Return Analysis

Fund	**Tata Equity PE Fund regular**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.0569364	-0.0586	-0.0528569	O	U	0.119575759	0.0635	0.10962	1.092	-0.245	-0.027	0.0045
2009	0.0654156	0.0541	0.050386135	O	O	0.103161346	0.07813	0.09433	0.95	0.3007	0.0326	0.0123
2010	0.01367843	0.0131	0.01446593	O	U	0.037334979	0.02948	0.04887	0.872	0.2887	0.0124	0.0019
2011	-0.021061	-0.0179	-0.02153886	U	O	0.052753666	0.033768	0.06332	1.211	-0.528	-0.023	0.0021
2012	0.0231509	0.0164	0.021386208	O	O	0.055095378	0.026443	0.04946	1.406	0.3313	0.013	0.0021
2013	0.00270282	0.0069	0.005818767	U	U	0.052838473	0.026141	0.04432	1.207	-0.108	-0.005	-0.004
2014	0.04636943	0.025	0.023280469	O	O	0.056358995	0.022102	0.03616	1.615	0.9913	0.0346	0.0002
2015	0.00089743	-0.0058	-0.00307829	O	O	0.037062128	0.022602	0.03573	0.839	0.0485	0.0021	0.0059
2016	0.01446135	0.0021	0.003129966	O	O	0.064112656	0.031014	0.04787	1.616	0.4439	0.0176	0.0024
2017	0.02841359	0.0196	0.021295041	O	O	0.02830124	0.015087	0.02711	0.566	0.9672	0.0483	0.0169
2018	-0.0051575	0.0067	0.004198161	U	U	0.044794934	0.032778	0.04764	0.657	-0.135	-0.009	-0.01
2019	0.00485575	0.0109	0.012079475	U	U	0.0345515	0.023857	0.0346	0.76	0.4068	0.0185	-0.001
2020	0.02064321	0.0177	0.016727031	O	O	0.096648324	0.102735	0.10318	0.892	0.1246	0.0135	0.0039
2021	0.02210736	0.017	0.018306671	O	O	0.028789596	0.036498	0.03538	0.769	0.497	0.0186	0.0072

Interpretation of Table 3.20:

a) The table 3.20, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0654) was in 2009 and the lowest return (-0.0569) was in 2008.

c) The highest variability of mutual fund scheme return (0.1196) was recorded in the year 2008 and the lowest variability of mutual fund scheme return (0.0283) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years and 8 years with Nifty 50.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 8 years except 2011, 2013, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 7 years except 2008, 2010, 2013, 2018 and 2019.

g) Beta was higher than 1 for 6 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 11 years indicating the fund manager's stock selecting ability outperformed for 11 years.

Table 3.21: L&T Tax Advantage Fund: Risk Return Analysis

Fund	**L&T TAX ADVANTAGE FUND**											
Year	*Annual Average Fund Return*	*Annual Average BSE Sensex Return*	*Annual Average Nifty 50 Returns*	*Trend (BSE Sensex)*	*Trend (Nifty 50)*	*Annual Average SD of Fund Return*	*Annual Average SD of BSE Sensex*	*Annual Average SD of Nifty 50*	*Beta*	*Sharpe Ratio*	*Treynor Ratio*	*Jensen Alpha*
2008	-0.05177053	-0.0586	-0.052856896	O	O	0.097555219	0.0635	0.10962	0.914	-0.2467	-0.0263	0.00418
2009	0.055632843	0.0541	0.050386135	O	O	0.083047381	0.07813	0.09433	0.819	0.25567	0.02592	0.00509
2010	0.022710785	0.0131	0.01446593	O	O	0.035646206	0.02948	0.04887	0.806	0.55576	0.02456	0.01158
2011	-0.01825554	-0.0179	-0.021538858	U	O	0.050668075	0.033768	0.06332	0.888	-0.4945	-0.0282	-0.0031
2012	0.020263825	0.0164	0.021386208	O	U	0.040208314	0.026443	0.04946	0.747	0.38211	0.02057	0.00677
2013	0.006362946	0.0069	0.005818767	U	O	0.042740191	0.026141	0.04432	1.147	-0.0477	-0.0018	-0.0003
2014	0.032106362	0.025	0.023280469	O	O	0.042397337	0.022102	0.03616	1.294	0.98134	0.03214	-0.0031
2015	0.002888506	-0.0058	-0.003078288	O	O	0.033567614	0.022602	0.03573	0.561	0.11286	0.00676	0.00654
2016	0.007833597	0.0021	0.003129966	O	O	0.053329601	0.031014	0.04787	1.3	0.40941	0.0168	0.00091
2017	0.030058303	0.0196	0.021295041	O	O	0.022871012	0.015087	0.02711	0.804	1.26878	0.0361	0.0141
2018	-0.00622702	0.0067	0.004198161	U	U	0.040863729	0.032778	0.04764	0.572	-0.1744	-0.0125	-0.0104
2019	0.004449197	0.0109	0.012079475	U	U	0.038401592	0.023857	0.0346	1.11	0.35543	0.0123	-0.0087
2020	0.020206596	0.0177	0.016727031	O	O	0.102065733	0.102735	0.10318	0.958	0.11372	0.01212	0.00289
2021	0.023304152	0.017	0.018306671	O	O	0.029907175	0.036498	0.03538	0.594	0.51841	0.02612	0.01004

Interpretation of Table 3.21:

a) The table 3.21, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0556) was in 2009 and the lowest return (-0.0518) was in 2008.

c) The highest variability of the mutual fund scheme return (0.0976) was recorded in the year 2008 and the lowest variability of the mutual fund scheme return (0.0229) was recorded in the year 2017.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years while in comparison with Nifty 50, the mutual fund scheme remained low risky for 10 years.

f) The mutual fund scheme outperformed BSE Sensex over the study period for 8 years except 2011, 2013, 2018 and 2019, and the mutual fund scheme outperformed Nifty 50 over the study period for 9 years except 2012, 2018 and 2019.

g) Beta was higher than 1 for 4 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 9 years indicating the fund manager's stock selecting ability outperformed for 9 years.

Table 3.22: Franklin India Focused Equity Fund: Risk Return Analysis

Fund	**Franklin India Focused Equity Fund**											
Year	***Annual Average Fund Return***	***Annual Average BSE Sensex Return***	***Annual Average Nifty 50 Returns***	***Trend (BSE Sensex)***	***Trend (Nifty 50)***	***Annual Average SD of Fund Return***	***Annual Average SD of BSE Sensex***	***Annual Average SD of Nifty 50***	***Beta***	***Sharpe Ratio***	***Treynor Ratio***	***Jensen Alpha***
2008	-0.0641687	-0.0586	-0.0528569	U	U	0.10631125	0.0635	0.10962	1.093	-0.343	-0.033	-0.003
2009	0.0636691	0.0541	0.050386135	O	O	0.107381355	0.07813	0.09433	1.093	0.2726	0.0268	0.0077
2010	0.01262257	0.0131	0.01446593	U	U	0.048325921	0.02948	0.04887	1.207	0.2012	0.0081	-0.003
2011	-0.0219383	-0.0179	-0.02153886	U	U	0.06059074	0.033768	0.06332	1.235	-0.474	-0.023	0.0018
2012	0.03089269	0.0164	0.021386208	O	O	0.046084528	0.026443	0.04946	1.038	0.564	0.025	0.0141
2013	0.00835301	0.0069	0.005818767	O	O	0.046479789	0.026141	0.04432	1.21	-0.001	-0.3883	0.0018
2014	0.05085367	0.025	0.023280469	O	O	0.044061002	0.022102	0.03616	0.339	1.3698	0.1781	0.0487
2015	0.00174878	-0.0058	-0.00307829	O	O	0.032892816	0.022602	0.03573	0.7	0.0805	0.0038	0.0061
2016	0.00555677	0.0021	0.003129966	O	O	0.058012124	0.031014	0.04787	1.33	0.3371	0.0147	-0.002
2017	0.02736046	0.0196	0.021295041	O	O	0.033631104	0.015087	0.02711	1.193	0.7826	0.0221	0.0042
2018	-0.0068025	0.0067	0.004198161	U	U	0.041481755	0.032778	0.04764	0.815	-0.186	-0.009	-0.012
2019	0.00958963	0.0109	0.012079475	U	U	0.04526617	0.023857	0.0346	1.426	0.4151	0.0132	-0.01
2020	0.01474542	0.0177	0.016727031	U	U	0.110923043	0.102735	0.10318	1.045	0.0554	0.0059	-0.003
2021	0.02897294	0.017	0.018306671	O	O	0.045332877	0.036498	0.03538	0.907	0.4671	0.0234	0.0128

Interpretation of Table 3.22:

a) The table 3.22, highlights that the mutual fund scheme generated positive returns for 9 years.

b) The highest return (0.0637) was in 2009 and the lowest return (-0.0642) was in 2008.

c) The highest variability of the mutual fund scheme return (0.1074) was recorded in the year 2009 and the lowest variability of the mutual fund scheme (0.0329) was recorded in the year 2015.

d) BSE Sensex return and Nifty 50 return remained positive for 9 years.

e) The mutual fund scheme remained risky in comparison with BSE Sensex for 12 years and 6 years with Nifty 50.

f) The mutual fund scheme outperformed both the benchmark indices (BSE Sensex and Nifty 50) over the study period for 7 years except 2008, 2010, 2011, 2018 and 2019.

g) Beta was higher than 1 for 10 years in the study period.

h) Sharpe ratio and Treynor ratio remained positive for 10 years in the study period.

i) Jensen's alpha shows positive results for 8 years indicating the fund manager's stock selecting ability outperformed for 8 years.

3.4 Analysis the performance of the selected equity Mutual Fund Schemes with respect to BSE Sensex and Nifty 50.

Investors may evaluate a mutual fund scheme's performance and fit with their investing goals by looking at how closely it correlates with the benchmark indices. Benchmark indices can be used as a reference point or standard by investors to compare the performance of mutual fund schemes. By looking at the correlation between the mutual fund scheme and the benchmark indices, investors may evaluate how closely the returns of the mutual fund schemes match the performance of the wider market. Correlation analysis may be used by investors to assess if a mutual fund scheme is accomplishing its stated investment objectives.

Correlation can disclose details about the risk profile of a mutual fund scheme. A mutual fund scheme's performance is likely to be impacted by the same market forces that affect the benchmark index if there is a significant connection between them. This information may be used by investors to assess the mutual fund scheme's risk exposure and volatility potential. Investors may use correlation as a tool to evaluate the performance of mutual fund schemes with respect to benchmark indices. If there is a significant correlation between the benchmark indices and the mutual fund scheme, investors may predict that the mutual fund scheme's performance will closely track movements in the market. This information enables investors to set acceptable performance expectations.

Correlation analysis may be used by investors to determine whether the mutual fund scheme manager is offering value through active management. The fund manager's capacity to generate alpha is shown by a scheme's low correlation to its benchmark indices and consistent outperformance of the benchmark indices. On the other side, a high correlation might mean that the scheme is mostly managed passively and is just replicating the benchmark indices.

Investors who comprehend the link can benefit from portfolio diversification. A mutual fund scheme may be a useful instrument for diversification within a larger investment portfolio if it has a low correlation with a benchmark index. A low correlated scheme can aid in risk distribution, because its performance is less reliant on changes in the benchmark indices. Mutual fund schemes having a strong correlation to benchmark indices usually utilize passive strategies, such as index funds or ETFs. Low correlation may be a sign of an actively managed scheme that aims to deviate from the benchmark indices.

The closing monthly Net Asset Value (NAV) of the various mutual fund schemes and the closing value of the benchmark indices (BSE Sensex and Nifty 50) are collected every month. For the analysis, Pearson's Correlation Coefficient test is undertaken between the percentage return generated by the mutual fund schemes and the percentage return generated by BSE Sensex and Nifty 50.

To examine the correlation between the returns of the mutual fund schemes and the returns of the benchmark indices (BSE Sensex and Nifty 50), the following hypothesis is formulated.

Null Hypothesis

H_0: There is no correlation between returns of the Benchmark Indices (BSE Sensex and Nifty 50) and Mutual Fund Schemes.

Alternative Hypothesis

H_1: There is correlation between returns of the Benchmark Indices (BSE Sensex and Nifty 50) and Mutual Fund Schemes.

Table 3.23: DSP Small Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**DSP Small Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.978	0.00*	H	0.975	0.00*	H
2009	0.985	0.00*	H	0.979	0.00*	H
2010	0.863	0.00*	H	0.909	0.00*	H
2011	0.739	0.00*	M	0.787	0.00*	M
2012	0.954	0.00*	H	0.931	0.00*	H
2013	0.803	0.00*	H	0.869	0.00*	H
2014	0.994	0.00*	H	0.979	0.00*	H
2015	-0.79	0.00*	L	-0.784	0.00*	L
2016	0.948	0.00*	H	0.929	0.00*	H
2017	0.905	0.00*	H	0.904	0.00*	H
2018	-0.461	0.131	L	-0.035	0.914	L
2019	0.357	0.255	L	0.64	0.025*	M
2020	0.97	0.00*	H	0.972	0.00*	H
2021	0.925	0.00*	H	0.938	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.23:

a) In 2015 & 2018 the correlation with BSE Sensex and Nifty 50 were recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018 and 2019.

c) In 2015, the benchmark indices (BSE Sensex and Nifty 50) generated negative returns whereas, the mutual fund scheme generated positive returns, indicating the outperformance of the fund manager in stock picking abilities and diversification. This can be further clear from a positive Jensen's alpha in 2015.

d) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2018.

e) A high correlation is recorded for 10 years with BSE Sensex and 10 years with Nifty 50.

Table 3.24: HDFC Mid-Cap Opportunity Fund: Correlation Analysis with Benchmark Indices

Fund	**HDFC Mid-Cap Opportunity Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.97	0.00*	H	0.977	0.00*	H
2009	0.986	0.00*	H	0.981	0.00*	H
2010	0.935	0.00*	H	0.957	0.00*	H
2011	0.536	0.073	M	0.61	0.035*	M
2012	0.967	0.00*	H	0.938	0.00*	H
2013	0.868	0.00*	H	0.904	0.00*	H
2014	0.992	0.00*	H	0.983	0.00*	H
2015	-0.359	0.252	L	-0.248	0.438	L
2016	0.959	0.00*	H	0.935	0.00*	H
2017	0.944	0.00*	H	0.939	0.00*	H
2018	-0.144	0.654	L	0.339	0.281	L
2019	0.433	0.159	L	0.732	0.007*	M
2020	0.988	0.00*	H	0.989	0.00*	H
2021	0.956	0.00*	H	0.969	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.24:

a) In 2015 & 2018 the correlation with BSE Sensex were recorded negative, where, in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 and 2019.

c) In 2015, the benchmark indices (BSE Sensex and Nifty 50) generated negative returns whereas, the mutual fund scheme generated positive returns, indicating the outperformance of the fund manager in stock picking abilities and diversification. This can be further clear from a positive Jensen's alpha in 2015.

d) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 and 2018.

e) A high correlation is recorded for 10 years with BSE Sensex and 10 years with Nifty 50.

Table 3.25: ICICI Prudential Value Discovery Fund: Correlation Analysis with Benchmark Indices

Fund	**ICICI Prudential Value Discovery Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.962	0.00*	H	0.991	0.00*	H
2009	0.989	0.00*	H	0.982	0.00*	H
2010	0.938	0.00*	H	0.969	0.00*	H
2011	0.933	0.00*	H	0.95	0.00*	H
2012	0.958	0.00*	H	0.9	0.00*	H
2013	0.797	0.00*	H	0.875	0.00*	H
2014	0.992	0.00*	H	0.994	0.00*	H
2015	0.374	0.231	L	0.428	0.166	L
2016	0.954	0.00*	H	0.98	0.00*	H
2017	0.945	0.00*	H	0.964	0.00*	H
2018	0.622	0.031*	M	0.81	0.001*	H
2019	0.539	0.071	M	0.736	0.006*	M
2020	0.95	0.00*	H	0.957	0.00*	H
2021	0.978	0.00*	H	0.987	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.25:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015.

d) A high correlation is recorded for 11 years with BSE Sensex and 12 years with Nifty 50.

Table 3.26 Franklin India Smaller Companies Fund: Correlation Analysis with Benchmark Indices

Fund	**Franklin India Smaller Companies Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.969	0.00*	H	0.963	0.00*	H
2009	0.99	0.00*	H	0.991	0.00*	H
2010	0.915	0.00*	H	0.95	0.00*	H
2011	0.878	0.00*	H	0.928	0.00*	H
2012	0.969	0.00*	H	0.937	0.00*	H
2013	0.936	0.00*	H	0.921	0.00*	H
2014	0.995	0.00*	H	0.986	0.00*	H
2015	-0.476	0.117	L	-0.386	0.215	L
2016	0.97	0.00*	H	0.963	0.00*	H
2017	0.954	0.00*	H	0.952	0.00*	H
2018	-0.386	0.215	L	0.43	0.894	L
2019	0.047	0.884	L	0.357	0.255	L
2020	0.974	0.00*	H	0.972	0.00*	H
2021	0.916	0.00*	H	0.927	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.26:

a) In 2015 & 2018 the correlation with BSE Sensex were recorded negative, where, in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015 and 2019.

c) In 2018, the benchmark indices (BSE Sensex and Nifty 50) generated positive returns whereas the mutual fund scheme generated negative returns, indicating the underperformance of the fund manager in stock picking abilities and diversification. This can be further clear from a negative Jensen's alpha in 2018.

d) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 and 2018.

e) A high correlation is recorded for 11 years with BSE Sensex and 12 years with Nifty 50.

Table 3.27 Sundaram Mid Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**Sundaram Mid Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.971	0.00*	H	0.989	0.00*	H
2009	0.987	0.00*	H	0.992	0.00*	H
2010	0.947	0.00*	H	0.962	0.00*	H
2011	0.708	0.01*	M	0.733	0.007*	M
2012	0.95	0.00*	H	0.974	0.00*	H
2013	0.803	0.002*	H	0.889	0.00*	H
2014	0.991	0.00*	H	0.985	0.00*	H
2015	-0.32	0.311	L	-0.269	0.398	L
2016	0.955	0.00*	H	0.933	0.00*	H
2017	0.954	0.00*	H	0.955	0.00*	H
2018	-0.302	0.34	L	0.143	0.648	L
2019	0.518	0.085	M	0.79	0.002*	H
2020	0.949	0.00*	H	0.946	0.00*	H
2021	0.97	0.00*	H	0.977	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.27:

a) In 2015 & 2018 the correlation with BSE Sensex were recorded negative, where, in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 and 2018.

d) A high correlation is recorded for 10 years with BSE Sensex and 11 years with Nifty 50.

Table 3.28 DSP Mid Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**DSP Mid Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.97	0.00*	H	0.977	0.00*	H
2009	0.984	0.00*	H	0.98	0.00*	H
2010	0.926	0.00*	H	0.95	0.00*	H
2011	0.947	0.005*	H	0.816	0.002*	H
2012	0.981	0.00*	H	0.947	0.00*	H
2013	0.747	0.005*	M	0.864	0.00*	H
2014	0.988	0.00*	H	0.981	0.00*	H
2015	-0.148	0.647	L	-0.094	0.772	L
2016	0.961	0.00*	H	0.941	0.00*	H
2017	0.952	0.00*	H	0.964	0.00*	H
2018	-0.23	0.473	L	0.274	0.389	L
2019	0.836	0.001*	H	0.968	0.00*	H
2020	0.981	0.00*	H	0.984	0.00*	H
2021	0.948	0.00*	H	0.962	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.28:

a) In 2015 and 2018 the correlation with BSE Sensex was recorded negative and in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018.

c) In 2015, the benchmark indices (BSE Sensex and Nifty 50) generated negative returns whereas the mutual fund scheme generated positive returns, indicating the outperformance of the fund manager in stock picking abilities and diversification. This can be further clear from the positive Jensen's alpha in 2015.

d) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 and 2018.

e) A high correlation is recorded for 11 years with BSE Sensex and 12 years with Nifty 50.

Table 3.29 IDFC Multi Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**IDFC Multi Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.972	0.00*	H	0.987	0.00*	H
2009	0.99	0.00*	H	0.988	0.00*	H
2010	0.908	0.00*	H	0.901	0.00*	H
2011	0.365	0.243	L	0.516	0.086	M
2012	0.945	0.00*	H	0.924	0.00*	H
2013	0.867	0.00*	H	0.925	0.00*	H
2014	0.991	0.00*	H	0.986	0.00*	H
2015	0.288	0.363	L	0.186	0.562	L
2016	0.933	0.00*	H	0.976	0.00*	H
2017	0.978	0.00*	H	0.976	0.00*	H
2018	0.185	0.565	L	0.623	0.031*	M
2019	0.788	0.00*	H	0.956	0.00*	H
2020	0.962	0.00*	H	0.957	0.00*	H
2021	0.967	0.00*	H	0.973	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.29:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2011, 2015 and 2018.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2011 and 2015 .

d) A high correlation is recorded for 11 years with BSE Sensex and 11 years with Nifty 50.

Table 3.30 L&T Mid Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**L&T Mid Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.968	0.00*	H	0.99	0.00*	H
2009	0.991	0.00*	H	0.99	0.00*	H
2010	0.956	0.00*	H	0.968	0.00*	H
2011	0.951	0.00*	H	0.932	0.00*	H
2012	0.975	0.00*	H	0.938	0.00*	H
2013	0.684	0.014*	M	0.462	0.14	M
2014	0.994	0.00*	H	0.987	0.00*	H
2015	-0.465	0.128	L	-0.428	0.165	L
2016	0.945	0.00*	H	0.889	0.00*	H
2017	0.985	0.00*	H	0.987	0.00*	H
2018	-0.226	0.48	L	0.274	0.389	L
2019	0.516	0.86	M	0.791	0.002*	H
2020	0.981	0.00*	H	0.983	0.00*	H
2021	0.949	0.00*	H	0.963	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.30:

a) In 2015 and 2018 the correlation with BSE Sensex were recorded negative and in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2013, 2015 and 2018.

d) A high correlation is recorded for 10 years with BSE Sensex and 11 years with Nifty 50.

Table 3.31 UTI Mid Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**UTI MID CAP FUND**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.969	0.00*	H	0.984	0.00*	H
2009	0.982	0.00*	H	0.977	0.00*	H
2010	0.887	0.00*	H	0.922	0.00*	H
2011	0.684	0.014*	M	0.786	0.002*	H
2012	0.955	0.00*	H	0.921	0.00*	H
2013	0.901	0.00*	H	0.908	0.00*	H
2014	0.994	0.00*	H	0.982	0.00*	H
2015	-0.346	0.27	L	-0.345	0.273	L
2016	0.966	0.00*	H	0.966	0.00*	H
2017	0.92	0.00*	H	0.937	0.00*	H
2018	-0.28	0.378	L	0.115	0.721	L
2019	0.531	0.076	L	0.807	0.001*	H
2020	0.977	0.00*	H	0.979	0.00*	H
2021	0.961	0.00*	H	0.967	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.31:

a) In 2015 & 2018 the correlation with BSE Sensex were recorded negative, whereas, in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 and 2018 .

d) A high correlation is recorded for 10 years with BSE Sensex and 12 years with Nifty 50.

Table 3.32 Sundaram Small Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**Sundaram Small Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.909	0.00*	H	0.936	0.00*	H
2009	0.988	0.00*	H	0.986	0.00*	H
2010	0.895	0.00*	H	0.929	0.00*	H
2011	0.911	0.00*	H	0.915	0.00*	H
2012	0.962	0.00*	H	0.947	0.00*	H
2013	0.629	0.028*	M	0.772	0.003*	M
2014	0.99	0.00*	H	0.983	0.00*	H
2015	-0.146	0.65	L	-0.076	0.816	L
2016	0.94	0.00*	H	0.929	0.00*	H
2017	0.954	0.00*	H	0.95	0.00*	H
2018	-0.515	0.087	L	-0.095	0.769	L
2019	0.158	0.624	L	0.479	0.115	M
2020	0.978	0.00*	H	0.976	0.00*	H
2021	0.943	0.00*	H	0.956	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.32:

a) In 2015 & 2018 the correlation with BSE Sensex and Nifty 50 were recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015, 2018 and 2019.

d) A high correlation is recorded for 10 years with BSE Sensex and 10 years with Nifty 50.

Table 3.33 Invesco India Contra Fund: Correlation Analysis with Benchmark Indices

Fund	**Invesco India Contra Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.949	0.00*	H	0.986	0.00*	H
2009	0.989	0.00*	H	0.988	0.00*	H
2010	0.93	0.00*	H	0.971	0.00*	H
2011	0.869	0.00*	H	0.957	0.00*	H
2012	0.959	0.00*	H	0.971	0.00*	H
2013	0.716	0.00*	M	0.843	0.00*	H
2014	0.994	0.00*	H	0.993	0.00*	H
2015	0.612	0.034*	M	0.703	0.011*	M
2016	0.957	0.00*	H	0.962	0.00*	H
2017	0.95	0.00*	H	0.96	0.00*	H
2018	0.434	0.159	M	0.843	0.001*	H
2019	0.772	0.003*	M	0.96	0.00*	H
2020	0.993	0.00*	H	0.995	0.00*	H
2021	0.974	0.00*	H	0.982	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.33:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018.

c) All the correlations with Nifty 50 are significant at 5 percent level of significance.

d) A high correlation is recorded for 10 years with BSE Sensex and 13 years with Nifty 50.

Table 3.34 Reliance Tax Saver Fund: Correlation Analysis with Benchmark Indices

Fund	**Reliance Tax Saver Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	-0.478	0.116	L	-0.371	0.235	L
2009	0.987	0.00*	H	0.993	0.00*	H
2010	0.915	0.00*	H	0.958	0.00*	H
2011	0.842	0.00*	H	0.935	0.00*	H
2012	0.967	0.00*	H	0.926	0.00*	H
2013	0.741	0.006*	M	0.867	0.00*	H
2014	0.99	0.00*	H	0.99	0.00*	H
2015	0.846	0.00*	H	0.87	0.00*	H
2016	0.949	0.00*	H	0.954	0.00*	H
2017	0.965	0.00*	H	0.979	0.00*	H
2018	-0.288	0.364	L	0.119	0.712	L
2019	0.568	0.054	M	0.768	0.004*	H
2020	0.934	0.00*	H	0.93	0.00*	H
2021	0.981	0.00*	H	0.989	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.34:

a) In 2008 & 2018 the correlation with BSE Sensex were recorded negative and in 2008 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2008, 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2008 and 2018.

d) A high correlation is recorded for 10 years with BSE Sensex and 12 years with Nifty 50.

Table 3.35 Aditya Birla Sun Life Small Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**Aditya Birla Sun Life Small Cap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.977	0.00*	H	0.98	0.00*	H
2009	0.984	0.00*	H	0.982	0.00*	H
2010	0.884	0.00*	H	0.914	0.00*	H
2011	0.668	0.018*	M	0.731	0.007*	M
2012	0.97	0.00*	H	0.933	0.00*	H
2013	0.873	0.00*	H	0.928	0.00*	H
2014	0.985	0.00*	H	0.979	0.00*	H
2015	-0.557	0.06*	L	-0.25	0.132	L
2016	0.969	0.00*	H	0.948	0.00*	H
2017	0.945	0.00*	H	0.956	0.00*	H
2018	-0.382	0.221	L	0.047	0.885	L
2019	-0.034	0.915	L	0.268	0.4	L
2020	0.976	0.00*	H	0.976	0.00*	H
2021	0.92	0.00*	H	0.938	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.35:

a) In 2015, 2018 & 2019 the correlation with BSE Sensex were recorded negative and in 2015 the correlation with Nifty 50 was recorded negative.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015, 2018 & 2019 .

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015, 2018 & 2019.

d) A high correlation is recorded for 10 years with BSE Sensex and 10 years with Nifty 50.

Table 3.36 Franklin India Prima Fund: Correlation Analysis with Benchmark Indices

Fund	**Franklin India Prima Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.973	0.00*	H	0.977	0.00*	H
2009	0.989	0.00*	H	0.991	0.00*	H
2010	0.928	0.00*	H	0.966	0.00*	H
2011	0.887	0.00*	H	0.963	0.00*	H
2012	0.969	0.00*	H	0.961	0.00*	H
2013	0.896	0.00*	H	0.963	0.00*	H
2014	0.993	0.00*	H	0.979	0.00*	H
2015	0.633	0.027*	M	0.68	0.015*	M
2016	0.944	0.00*	H	0.968	0.00*	H
2017	0.942	0.00*	H	0.059	0.00*	L
2018	0.176	0.585	L	0.577	0.05*	M
2019	0.834	0.001*	H	0.938	0.00*	H
2020	0.966	0.00*	H	0.963	0.00*	H
2021	0.973	0.00*	H	0.983	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.36:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018.

c) All the correlations with Nifty 50 are significant at 5 percent level of significance.

d) A high correlation is recorded for 12 years with BSE Sensex and 11 years with Nifty 50.

Table 3.37 Invesco India Midcap Fund: Correlation Analysis with Benchmark Indices

Fund	**Invesco India Midcap Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.974	0.00*	H	0.983	0.00*	H
2009	0.986	0.00*	H	0.98	0.00*	H
2010	0.897	0.00*	H	0.935	0.00*	H
2011	0.419	0.175	M	0.508	0.092	L
2012	0.972	0.00*	H	0.931	0.00*	H
2013	0.818	0.001*	H	0.914	0.00*	H
2014	0.992	0.00*	H	0.987	0.00*	H
2015	0.316	0.316	L	0.28	0.379	L
2016	0.974	0.00*	H	0.945	0.00*	H
2017	0.939	0.00*	H	0.949	0.946	H
2018	0.341	0.278	L	0.741	0.006*	M
2019	0.66	0.019*	M	0.889	0.00*	H
2020	0.985	0.00*	H	0.986	0.00*	H
2021	0.954	0.00*	H	0.961	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.37:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2011, 2015 and 2018.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2011, 2015 & 2017.

d) A high correlation is recorded for 10 years with BSE Sensex and 11 years with Nifty 50.

Table 3.38 Reliance Multi Cap Fund: Correlation Analysis with Benchmark Indices

Fund	**RELIANCE MULTI CAP FUND**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.966	0.00*	H	0.986	0.00*	H
2009	0.977	0.00*	H	0.977	0.00*	H
2010	0.922	0.00*	H	0.986	0.00*	H
2011	0.785	0.003*	H	0.892	0.00*	H
2012	0.951	0.00*	H	0.924	0.00*	H
2013	0.716	0.009	M	0.828	0.001*	H
2014	0.989	0.00*	H	0.982	0.00*	H
2015	0.659	0.02*	M	0.785	0.003*	H
2016	0.95	0.00*	H	0.958	0.00*	H
2017	0.964	0.00*	H	0.968	0.00*	H
2018	-0.17	0.597	L	0.262	0.411	L
2019	0.569	0.053	H	0.786	0.002*	H
2020	0.886	0.00*	H	0.88	0.00*	H
2021	0.979	0.00*	H	0.985	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.38:

a) In 2018 the correlation with BSE Sensex was recorded negative and all the correlation with Nifty 50 were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018 and 2019.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2018.

d) A high correlation is recorded for 11 years with BSE Sensex and 13 years with Nifty 50.

Table 3.39 Invesco India Tax Plan: Correlation Analysis with Benchmark Indices

Fund	**INVESCO INDIA TAX PLAN**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.951	0.00*	H	0.972	0.00*	H
2009	0.989	0.00*	H	0.987	0.00*	H
2010	0.919	0.00*	H	0.966	0.00*	H
2011	0.714	0.009*	M	0.829	0.001*	H
2012	0.961	0.00*	H	0.974	0.00*	H
2013	0.882	0.00*	H	0.965	0.00*	H
2014	0.996	0.00*	H	0.988	0.00*	H
2015	0.444	0.149	L	0.428	0.165	L
2016	0.96	0.00*	H	0.976	0.00*	H
2017	0.976	0.00*	H	0.986	0.00*	H
2018	0.564	0.056	M	0.914	0.00*	H
2019	0.849	0.00*	H	0.972	0.00*	H
2020	0.995	0.00*	H	0.995	0.00*	H
2021	0.975	0.00*	H	0.982	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.39:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015 and 2018.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015.

d) A high correlation is recorded for 11 years with BSE Sensex and 13 years with Nifty 50.

Table 3.40 Tata Equity PE Fund: Correlation Analysis with Benchmark Indices

Fund	**Tata Equity PE Fund regular**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.957	0.00*	H	0.982	0.00*	H
2009	0.982	0.00*	H	0.983	0.00*	H
2010	0.951	0.00*	H	0.99	0.00*	H
2011	0.934	0.00*	H	0.975	0.00*	H
2012	0.918	0.00*	H	0.961	0.00*	H
2013	0.661	0.019*	M	0.842	0.001*	H
2014	0.987	0.00*	H	0.96	0.988	H
2015	0.802	0.002*	H	0.83	0.001*	H
2016	0.948	0.00*	H	0.913	0.00*	H
2017	0.969	0.00*	H	0.979	0.00*	H
2018	0.029	0.929	L	0.492	0.104	L
2019	0.821	0.00*	H	0.98	0.00*	H
2020	0.988	0.00*	H	0.991	0.00*	H
2021	0.988	0.00*	H	0.991	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.40:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2018.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2014 and 2018.

d) A high correlation is recorded for 12 years with BSE Sensex and 13 years with Nifty 50.

Table 3.41 L&T Tax Advantage Fund: Correlation Analysis with Benchmark Indices

Fund	**L&T TAX ADVANTAGE FUND**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.969	0.00*	H	0.991	0.00*	H
2009	0.988	0.00*	H	0.991	0.00*	H
2010	0.938	0.00*	H	0.968	0.00*	H
2011	0.864	0.00*	H	0.983	0.00*	H
2012	0.946	0.00*	H	0.991	0.00*	H
2013	0.909	0.00*	H	0.969	0.00*	H
2014	0.993	0.00*	H	0.994	0.00*	H
2015	0.349	0.266	L	0.504	0.095	L
2016	0.959	0.00*	H	0.957	0.00*	H
2017	0.987	0.00*	H	0.989	0.00*	H
2018	-0.022	0.946	L	0.481	0.114	L
2019	0.852	0.00*	H	0.975	0.00*	H
2020	0.993	0.00*	H	0.994	0.00*	H
2021	0.953	0.00*	H	0.963	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.41:

a) In 2018 the correlation with BSE Sensex was recorded negative and all the correlation with Nifty 50 were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015 and 2018.

c) The correlations with Nifty 50 are significant at 5 percent level of significance except for 2015 & 2018.

d) A high correlation is recorded for 12 years with BSE Sensex and 12 years with Nifty 50.

Table 3.42 Franklin India Focused Equity Fund: Correlation Analysis with Benchmark Indices

Fund	**Franklin India Focused Equity Fund**					
Year	***r (BSE Sensex)***	***p-value***	***Degree of r (BSE Sensex)***	***r (Nifty 50)***	***p-value***	***Degree of r (Nifty 50)***
2008	0.973	0.00*	H	0.977	0.00*	H
2009	0.989	0.00*	H	0.991	0.00*	H
2010	0.928	0.00*	H	0.966	0.00*	H
2011	0.887	0.00*	H	0.963	0.00*	H
2012	0.969	0.00*	H	0.961	0.00*	H
2013	0.896	0.00*	H	0.963	0.00*	H
2014	0.993	0.00*	H	0.979	0.00*	H
2015	0.633	0.027	M	0.68	0.015*	M
2016	0.944	0.00*	H	0.968	0.00*	H
2017	0.942	0.00*	H	0.959	0.00*	H
2018	0.176	0.585	L	0.577	0.05*	M
2019	0.834	0.001*	H	0.938	0.00*	H
2020	0.966	0.00*	H	0.963	0.00*	H
2021	0.973	0.00*	H	0.983	0.00*	H

*significant at 5 percent level of significance

Interpretation of Table 3.42:

a) All the correlation with Nifty 50 and BSE Sensex were recorded positive.

b) The correlations with BSE Sensex are significant at 5 percent level of significance except for 2015.

c) All the correlations with Nifty 50 are significant at 5 percent level of significance.

d) A high correlation is recorded for 12 years with BSE Sensex and 12 years with Nifty 50.

Table 3.43: Overall Correlation between all the selected mutual fund scheme returns and Benchmark indices (BSE Sensex and Nifty 50) returns

Fund	BSE SENSEX (r_1)	p-value	NIFTY 50 (r_2)	p-value
DSP Small Cap Fund	0.926	.000*	0.937	.000*
HDFC Mid-Cap Opportunity Fund	0.955	.000*	0.965	.000*
ICICI Prudential Value Discovery Fund	0.965	.000*	0.970	.000*
Franklin India Smaller Companies Fund	0.950	.000*	0.960	.000*
Sundaram Mid Cap Fund	0.957	.000*	0.964	.000*
DSP Mid Cap Fund	0.967	.000*	0.978	.000*
IDFC Multi Cap Fund	0.965	.000*	0.974	.000*
L&T Mid Cap Fund	0.954	.000*	0.964	.000*
Sundaram Small Cap Fund	0.692	.018*	0.725	.012*
Invesco India Contra Fund	0.965	.000*	0.972	.000*
Reliance Tax Saver Fund	0.919	.000*	0.936	.000*
Aditya Birla Sun Life Small Cap Fund	0.945	.000*	0.954	.000*
Franklin India Prima Fund	0.970	.000*	0.974	.000*
Invesco India Midcap Fund	0.975	.000*	0.975	.000*
Tata Equity PE Fund regular	0.966	.000*	0.971	.000*
L&T Tax Advantage Fund	0.972	.000*	0.982	.000*
UTI MID CAP FUND	0.957	.000*	0.962	.000*
Reliance Multi Cap Fund	0.976	.000*	0.984	.000*
Invesco India Tax Plan	0.981	.000*	0.986	.000*
Franklin India Focused Equity Fund	0.966	.000*	0.972	.000*

* Significant at 5 percent level of significance

Interpretations of Table 3.43:

a) For all the selected equity mutual fund schemes, the correlation between the benchmark indices return and the mutual fund scheme return is highly and positively correlated at 5percent level of significance.

b) A high and positive correlation between a mutual fund scheme returns and a benchmark indices return indicates that the mutual fund scheme's performance closely mirrors the movements of the benchmark indices.

c) The mutual fund scheme efficiently tracks the performance of the benchmark indices. The mutual fund scheme normally increases and typically decreases along with the benchmark indices. This link demonstrates how the benchmark indices' performance has a big influence on the mutual fund scheme's results.

d) The mutual fund scheme's performance is significantly dependent on the broader market conditions represented by the benchmark index. Movements in the indices may be a primary driver of the mutual fund scheme returns.

3.5 Summary of Findings

Mutual fund schemes are a cutting-edge investment choice that serve the demands of the masses. There are several schemes in the Indian financial market that cater to different investor needs and deliver more rewards at lower risk. The danger of putting money into mutual fund schemes does exist, though. Although anticipated returns are more common, risk adjusted performance basis may also be used to evaluate the performance of mutual fund schemes. Return and risk are correlated, and taking on more risk results in larger returns. In this context, two frequently employed metrics for evaluating risk are beta and standard deviation. Standard deviation is used to characterise overall variability, whereas beta risk refers to the risk that an asset brings to a well-diversified portfolio. Researchers disagree about whether portfolio managers can outperform market portfolios and provide extra returns, despite the fact that mutual fund schemes and fund managers are frequently linked to mutual fund scheme performance. A reliable, accurate, and well recognised metric is needed to assess the performance of fund managers. Various measures, such as the Sharpe ratio, Treynor ratio, and Jensen's alpha, are applied to assess the success of actively managed portfolios.

The study aims to look into the performance of selected open ended equity mutual fund schemes in India for its second and third objectives. The top 20 open ended equity mutual fund schemes have been chosen. In this case, the performance analysis of the sample schemes was carried out using different performance evaluating measures for measuring risk and return, such as average return, standard deviation, beta, and correlation coefficient. The analysis will be useful in helping the AMCs formulate risk management policies and in helping individual and institutional investors formulate gainful investment strategies. To assess the scheme's performance, the study also used risk-adjusted performance evaluation models such as Jensen's alpha, Treynor ratio, and Sharpe ratio. Here, the return and risk of the Mutual fund schemes are compared with the two popular benchmark indices, i.e., BSE Sensex and Nifty 50. If the average performance of the portfolio is found to be higher than the benchmark indices (BSE Sensex and Nifty 50), then it is said to have outperformed (O); otherwise, it is said to have underperformed (U). If the standard deviation of the portfolio is found to be greater than the standard deviation of the benchmark indices (BSE Sensex and Nifty 50), then the risk profile is said to be Highly Risky (H) or Low Risky (L)

Table 3.44 Snapshots of Risk-Return Profile of all the selected mutual fund schemes

	Fund	Average Return of the portfolio	Performance against BSE SENSEX	Performance against Nifty	SD of the portfolio	Risk Profile against BSE SENSEX	Risk Profile against Nifty
1	DSP Small Cap Fund - Regular Plan	0.0153	O	O	0.066373179	H	H
2	HDFC Mid-Cap Opportunity Fund	0.013800975	O	O	0.055963336	H	H
3	ICICI Prudential Value Discovery Fund	0.013793455	O	O	0.053519991	H	L
4	Franklin India Smaller Companies Fund	0.012946553	O	O	0.060969261	H	H
5	Sundaram Mid Cap Fund	0.012227296	O	O	0.064611907	H	H
6	IDFC Multi Cap Fund	0.012045693	O	O	0.053524423	H	L
7	Sundaram Small Cap Fund	0.016772507	O	O	0.078495824	H	H
8	Reliance Tax Saver Fund	0.012794741	O	O	0.063245897	H	H
9	Aditya Birla Sun Life Small Cap Fund	0.011827392	O	O	0.065058495	H	H
10	Franklin India Prima Fund	0.011800442	O	O	0.057261628	H	H
11	Invesco India Midcap Fund	0.012678167	O	O	0.058877505	H	H
12	Tata Equity PE Fund regular	0.011395784	O	O	0.057955641	H	H
13	L&T TAX ADVANTAGE FUND	0.010683144	O	O	0.050947798	H	L
14	UTI MID CAP FUND	0.013115521	O	O	0.060031807	H	H
15	RELIANCE MULTI CAP FUND	0.013738284	O	O	0.061917598	H	H
16	INVESCO INDIA TAX PLAN	0.011049944	O	O	0.051910113	H	L
17	Franklin India Focused Equity Fund	0.011532544	O	O	0.05905532	H	H
18	DSP Mid Cap Fund	0.01286662	O	O	0.043620982	H	L
19	L&T Mid Cap Fund	0.011344877	O	O	0.061911248	H	H
20	Invesco India Contra Fund	0.012214666	O	O	0.057339966	H	H

From the above Table 3.44, we can see that Sundaram Small Cap Fund, DSP Small Cap Fund, HDFC Mid Cap Opportunity Fund, ICICI Prudential Value Discovery Fund, and Reliance Multi cap fund are the top 5 performing mutual fund schemes in terms of Average

Returns in the given sample during the study period. L&T Tax Advantage Fund, Invesco India Tax Plan, L&T Mid Cap Fund, Tata Equity PE Fund, and Franklin India Focused Equity Fund are at the bottom of the selected mutual fund schemes in terms of Average returns in the given sample during the study period.

Sundaram Small Cap Fund, DSP Small Cap Fund, Aditya Birla Sun Life Small Cap Fund, Sundaram Mid Cap Fund, and Reliance Tax Saver Fund are the top risky mutual fund schemes with high average standard deviation among the sample mutual fund schemes during the study period. DSP Mid Cap Fund, L&T Tax Advantage Fund, Invesco India Tax Plan, ICICI Prudential Value Discovery Fund, and IDFC Multi Cap Fund are found to have Low risk in comparison to market risk, during the study period.

After a comprehensive analysis, we can find that the five best-performing funds in the sample, based on average returns, are Sundaram Small Cap Fund, DSP Small Cap Fund, HDFC Mid Cap Opportunity Fund, ICICI Prudential Value Discovery Fund, and Reliance Multi Cap Fund. Among the sample funds, Sundaram Mid Cap Fund, Aditya Birla Sun Life Small Cap Fund, DSP Small Cap Fund, Sundaram Small Cap Fund, and Reliance Tax Saver Fund are the most volatile funds with high average standard deviation.

The volatility of the mutual fund scheme is indicated by the systematic risk (Beta). Over the course of the investigation, the most volatile funds were DSP Small Cap Fund and HDFC Mid-Cap Opportunity Fund. All of the mutual fund schemes that were chosen had positive average beta, which amply demonstrates that the returns of the mutual fund schemes and the returns of the benchmark indices (BSE Sensex and Nifty 50) move in the same direction. The fund manager's efficiency is shown by a positive value of Jensen's alpha. It displays the fund manager's capacity for "stock piling." Throughout the research period, all of the chosen funds had positive Jensen's alpha, demonstrating the fund manager's superior stock selecting abilities. The two schemes with the greatest Jensen’s alpha are HDFC Mid-Cap Opportunity Fund and DSP Small Cap Fund. The average Sharpe ratio of all the selected mutual fund schemes are found to be positive. A positive Sharpe Ratio indicates that the mutual fund scheme has generated a return higher than the risk-free rate or benchmark for the amount of risk taken. The average Treynor ratio of all the selected mutual fund schemes are found to be positive. A positive Treynor Ratio means that the mutual fund scheme has generated returns in excess of the risk-free rate or benchmark, adjusted for systematic risk. Thus it suggests that

the mutual fund schemes have delivered returns above what could be expected given the level of risk associated with it.

Investors can assess a mutual fund scheme's performance by examining its correlation with benchmark indices. Benchmark indices serve as a reference point for comparing mutual fund schemes' returns to the wider market. Correlation analysis helps assess if a scheme is meeting its investment objectives and discloses details about the risk profile of the scheme. If there is a significant correlation between the indices returns and the scheme returns, investors can predict that the scheme will closely track market movements, setting acceptable performance expectations. Correlation analysis can also determine if the fund manager is offering value through active management. A low correlation indicates a fund manager's ability to generate positive Jensen’s alpha, while a high correlation suggests passive management. A low correlation can help diversify a larger investment portfolio and aid in risk distribution. Schemes with a strong correlation often use passive strategies, while a low correlation may indicate an actively managed scheme aiming to deviate from benchmark indices. The third objective of the study explores the relationship between the returns of the mutual fund schemes and the returns of the benchmark indices (BSE Sensex and Nifty 50). We can observe that all the mutual fund schemes are highly correlated with the market and is significant at 5 percent level of significance. The performance of the benchmark indices (BSE Sensex and Nifty 50) is effectively tracked by the mutual fund schemes. Along with the benchmark indices (BSE Sensex and Nifty 50), the mutual fund schemes usually experiences positive and negative returns. This link illustrates how the mutual fund scheme's performance is significantly impacted by the performance of the benchmark indexes. In the entire study period, ICICI Prudential Value Discovery Fund has highest number of high correlations during the entire study period.

Chapter 4:

Analysis of Volatility of Selected Indian Mutual Fund Schemes

Chapter 4

Analysis of Volatility of Selected Indian Mutual Fund Schemes

4.1 Understanding of Volatility

Volatility in the financial markets are referred to as the degree of change or fluctuation in the prices of financial assets over a certain period of time. These financial assets can be shares, stocks, mutual funds, bonds, commodities, currencies, etc. It is a measure of the degree to which the prices of various financial assets deviate from average or predicted values. In simple words, market volatility measures the degree of risk and uncertainty present in the financial markets. Low volatility denotes more steady and moderate price swings, whereas high volatility shows quick and unpredictable changes in asset prices.

Market Volatility may be influenced by a wide range of factors, including the publication of economic data, changes in global politics, corporate earnings, market sentiments, and external shocks. It is commonly quantified using statistical measurements. Volatility must be understood and managed by traders, investors, and financial institutions since it directly affects their investment decisions.

Market volatility can have a direct impact on the performance of mutual fund schemes. During periods of high volatility, scheme returns may experience fluctuations, affecting the Net Asset Value (NAV) of the mutual fund schemes. Equity-oriented mutual fund schemes are particularly sensitive to market volatility as they primarily invest in stocks *(Soni,2011).* Fluctuating benchmark indices may lead to gains or losses for these schemes, depending on the timing and quality of their investment decisions.

Mutual fund managers employ various risk management strategies to navigate market volatility. These strategies include diversification, asset allocation, and active portfolio management. Diversification across different sectors, asset classes, and geographies helps reduce the impact of volatility on the overall portfolio. Fund managers may also adjust their asset allocation based on their outlook for the market, reducing exposure to high-risk assets during periods of heightened volatility.

Asset allocation is a crucial factor in managing the impact of market volatility on mutual fund schemes. Diversifying investments across asset classes, such as equities, debt, and others, helps mitigate the impact of market fluctuations. Asset allocation must align with investors'

risk tolerance and investment goals, taking into account their time horizon and financial objectives.

Certain mutual fund categories, such as sectoral and thematic funds, are more exposed to specific sectors or themes. These funds may experience higher volatility compared to diversified funds, as their performance is closely tied to the performance of their concentrated investments. Investors considering sectoral or thematic funds should be prepared for increased volatility and closely monitor the performance of the specific sectors or themes.

Market volatility may lead to emotional decision-making by investors. Fear and panic during market downturns may cause some investors to sell their mutual fund investments at the wrong time, potentially locking in losses. On the other hand, periods of market optimism may lead to increased investments, potentially at elevated prices. Such emotional decisions may have a detrimental impact on investment returns. It is crucial for investors to maintain a disciplined and long-term approach, avoiding knee-jerk reactions to market volatility.

Market volatility may also create investment opportunities for skilled fund managers. During market downturns, attractive investment opportunities may arise, allowing fund managers to buy quality stocks or securities at discounted prices. Skilled fund managers with the ability to identify undervalued assets and capitalize on market dislocations can generate superior returns over the long term.

It's important for investors to assess their risk tolerance and investment goals before investing in mutual funds. Understanding the potential impact of market volatility, having a long-term perspective, and consulting with financial advisors may help investors make informed decisions and manage the impact of market fluctuations on their mutual fund investments.

4.2 Research Methodology

In this chapter, the last objective of the research is studied

- To analyse the market fluctuations (i.e, volatility) of the selected Mutual Fund Schemes.

To study the last objective the Top 20 Open Ended Equity diversified mutual fund schemes are selected on the basis of monthly returns generated by the mutual fund schemes as on 1 st January, 2008 from the website valueresearchonline.com. The selected study period is 1st January, 2008 to 31st December, 2021. The ranking was done by valueresearchonline, an

authentic and popular Mutual Fund Research organization. The closing monthly Net Asset Value (NAV) of the selected mutual fund schemes and the closing value of the benchmark indices (BSE Sensex) are collected every month. Based on the literature surveyed, BSE Sensex is selected as the benchmark index. The closing value of the BSE Sensex is collected from the website of Bombay Stock Exchange (BSE).

Research tools adopted:

1. OLS: Using the Ordinary Least Square (OLS) regression optimization approach, one can get a straight line in the linear regression model that is as close as possible to the data points. Here, OLS is used to analyse the linear relationship between the monthly mutual fund scheme returns and BSE Sensex returns.

2. ARCH LM test of the Residuals of OLS: The test is undertaken to check the reliability and validity of the linear OLS model.

3. Augmented Dickey Fuller test (ADF Test): It is a popular statistical test that determines if the time series data is stationary or not. This test is undertaken to analyse whether the time series data relating to monthly mutual fund scheme returns and BSE Sensex monthly returns over 14 years (N= 12*14=168 per mutual fund scheme), is stationary with respect to time.

4. Normality test: Jarque Bera Test is undertaken to check whether the dependent variable (i.e, monthly mutual fund scheme return) follows normal distribution with zero variance over data points.

5. GARCH (1,1) test: GARCH test has been conducted to forecast the time series data with respect to conditional heteroskedasticity, which is a phenomenon where the variance of the time series data changes with respect to the data points. There can be two situations under GARCH forecasting which may be classified as:

   c) Data may cluster during certain time periods, when there is high volatility.

   d) Data may stabilize during the time period when volatility is low.

   Now it was observed certain mutual fund schemes during the phase of high volatility followed a non-normal distribution. In case, the mutual fund schemes followed a normal distribution, we adopted Gaussian distribution fit to validate the effect of

clustering. In other cases, where it was found to be non-normal distribution, the student t-distribution fit has been run to check the clustering.

6. Stationarity test of the Residuals of the GARCH test: Augmented Dickey Fuller test (ADF Test) is undertaken to check the presence of ARCH effects within the residuals of GARCH (1,1). It assesses if there is any volatility clustering in the squared residuals after fitting the GARCH (1,1) model. A significant GARCH (1,1) along with an insignificant ARCH LM test validates a better model fit for the mutual fund scheme volatility and clustering.

7. ARCH LM test of the residuals of the GARCH (1,1) model: The ARCH-LM test (Autoregressive Conditional Heteroskedasticity Lagrange Multiplier test) is a diagnostic test used to check for the presence of ARCH effects in the residuals of a GARCH(1,1) model. A significant GARCH (1,1) along with an insignificant ARCH LM test of the residuals of GARCH (1,1) suggests that the model effectively captures the conditional variance patterns without the need for further modifications to account for additional conditional heteroskedasticity in the residuals. A significant ARCH LM test suggests that there may be additional volatility dynamics not accounted for by the GARCH (1,1) model. In such case, we have considered the next order GARCH (2, 1) model to improve the model's performance.

4.3 Analysis of Data

4.3.1 Ordinary Least Squares

Initially, OLS has been used to find the sum of squared difference between the response variable (monthly returns generated by the mutual fund schemes) and the values predicted by the linear model. OLS stands for Ordinary Least Squares, which is a widely used method in statistics and econometrics for estimating the parameters of a linear regression model. The primary goal of OLS is to find the best-fitting line that minimizes the sum of squared differences between the observed dependent variable (response variable) and the values predicted by the linear model.

The model fit is written as:

$$y = a + \beta x_1 + \epsilon$$

where, a = y axis intercept

y = response variable (monthly mutual fund scheme returns)

x_1= predicted variable

β= linear regression coefficient

ϵ= error term

Based on the above model fit, the following hypothesis has been adopted.

Hypothesis:

H_0: The monthly returns of the BSE Sensex does not have significant linear relationship with monthly mutual fund scheme returns.

H_1: The monthly returns of the BSE Sensex have significant linear relationship with monthly fund scheme returns.

Table 4.1: Results of Ordinary Least Squares (OLS)

Mutual Fund Scheme	Coefficient (β)	R-Square	Adjusted R-Square	Durbin-Watson Statistic	F-Statistic (p-value)
Scheme 1	1.2094	0.5821	0.5796	2.2227	0.0000*
Scheme 2	1.0235	0.6202	0.6179	2.3584	0.0000*
Scheme 3	0.9948	0.6142	0.6119	2.2711	0.0000*
Scheme 4	1.1524	0.6007	0.6184	2.3492	0.0000*
Scheme 5	1.1390	0.5940	0.5915	2.4283	0.0000*
Scheme 6	1.0570	0.5722	0.5696	2.2910	0.0000*
Scheme 7	0.9395	0.5780	0.5754	2.3770	0.0000*
Scheme 8	1.0951	0.5470	0.5443	2.4074	0.0000*
Scheme 9	1.0455	0.5638	0.5611	2.2692	0.0000*
Scheme 10	1.1953	0.4641	0.4609	2.5030	0.0000*
Scheme 11	1.0005	0.5903	0.5878	2.4694	0.0000*
Scheme 12	1.0389	0.5704	0.5678	2.2585	0.0000*
Scheme 13	1.1847	0.6113	0.6089	2.2509	0.0000*
Scheme 14	1.0799	0.6218	0.6195	2.4608	0.0000*
Scheme 15	1.0643	0.5756	0.5731	2.2719	0.0000*
Scheme 16	1.0767	0.5906	0.5881	2.4385	0.0000*
Scheme 17	0.9146	0.5920	0.5895	2.5316	0.0000*
Scheme 18	1.0185	0.5641	0.5615	2.5122	0.0000*
Scheme 19	0.9149	0.6124	0.6101	2.5760	0.0000*
Scheme 20	1.0945	0.6541	0.6520	2.4413	0.0000*

*significant at 5 percent level of significance.

Scheme wise Interpretation of Results of Ordinary Least Squares based on Table 4.1:

Scheme 1 (DSP BlackRock Small Cap Fund)

The coefficient of Scheme 1 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 1, $\beta = 1.2094$, which represents that the monthly mutual fund scheme returns will change 1.2094 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5821, which represents that 58.21% variation of Mutual fund scheme 1 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.22 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 2 (HDFC Mid-Cap Opportunities Fund)

The coefficient of Scheme 2 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 2, $\beta = 1.0235$, which represents that the monthly mutual fund scheme returns will change 1.0235 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6202, which represents that 62.02% variation of Mutual fund scheme 2 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.36 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 3 (ICICI Prudential Value Discovery Fund)

The coefficient of Scheme 3 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 3, $\beta = 0.9948$, which represents that the monthly mutual fund scheme returns will

change 0.9948 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6142, which represents that 61.42% variation of Mutual fund scheme 3 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.27 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 4 (Franklin India Smaller Companies Fund)

The coefficient of Scheme 4 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 4, β =1.1524, which represents that the monthly mutual fund scheme returns will change 1.1524 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6007, which represents that 60.07% variation of Mutual fund scheme 4 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.35 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 5 (Sundaram Mid Cap Fund)

The coefficient of Scheme 5 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 5, β =1.1390, which represents that the monthly mutual fund scheme returns will change 1.1390 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5940, which represents that 59.40% variation of Mutual fund scheme 5 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.43 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not

spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 6 (DSP BlackRock Midcap Fund)

The coefficient of Scheme 6 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 6, β =1.0570, which represents that the monthly mutual fund scheme returns will change 1.0570 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5722, which represents that 57.22% variation of Mutual fund scheme 6 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.29 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 7 (IDFC Multi Cap Fund)

The coefficient of Scheme 7 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 7, β =0.9395, which represents that the monthly mutual fund scheme returns will change 0.9395 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5780, which represents that 57.80 % variation of Mutual fund scheme 7 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.38 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 8 (L&T Midcap Fund)

The coefficient of Scheme 8 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 8, β =1.0951, which represents that the monthly mutual fund scheme returns will change 1.0951 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5470, which represents that 54.70 % variation of Mutual fund scheme 8 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.41 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 9 (UTI Mid Cap Fund)

The coefficient of Scheme 9 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 9 , β =1.0455, which represents that the monthly mutual fund scheme returns will change 1.0455 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5638, which represents that 56.38 % variation of Mutual fund scheme 9 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.27 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 10 (Sundaram Small Cap Fund)

The coefficient of Scheme 10 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 10 , β =1.1953, which represents that the monthly mutual fund scheme returns will change 1.1953 percent due to change in BSE Sensex monthly returns by 1 percent. The β

coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.4641, which represents that 46.41% variation of Mutual fund scheme 10 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.50 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 11 (Invesco India Contra Fund)

The coefficient of Scheme 11 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 11, β =1.0005, which represents that the monthly mutual fund scheme returns will change 1.0005 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5903, which represents that 59.03% variation of Mutual fund scheme 11 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.47 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 12 (Reliance Tax Saver (ELSS) Fund)

The coefficient of Scheme 12 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 12, β =1.0389, which represents that the monthly mutual fund scheme returns will change 1.0389 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5704, which represents that 57.04% variation of Mutual fund scheme 12 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.26 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious The F-statistics confirms that the linear regression model is significant at 5 percent

level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

The coefficient of Scheme 13 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 13, β =1.1847, which represents that the monthly mutual fund scheme returns will change 1.1847 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6113, which represents that 61.13% variation of Mutual fund scheme 13 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.25 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 14 (Franklin India Prima Fund)

The coefficient of Scheme 14 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 14, β =1.0799, which represents that the monthly mutual fund scheme returns will change 1.0799 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6218, which represents that 62.18% variation of Mutual fund scheme 14 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.46 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 15 (Invesco India Mid Cap Fund)

The coefficient of Scheme15 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For

Scheme 15, β =1.0643, which represents that the monthly mutual fund scheme returns will change 1.0643 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5756, which represents that 57.56% variation of Mutual fund scheme 15 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.27 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 16 (Reliance Multi Cap Fund)

The coefficient of Scheme 16 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 16, β =1.0767, which represents that the monthly mutual fund scheme returns will change 1.0767 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5906, which represents that 59.06% variation of Mutual fund scheme 16 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.44 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 17 (Invesco India Tax Plan)

The coefficient of Scheme 17 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 17, β =0.9146, which represents that the monthly mutual fund scheme returns will change 0.9146 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5920, which represents that 59.20% variation of Mutual fund scheme 17 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.53 which is close to 2 and

it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 18 (Tata Equity PE Fund)

The coefficient of Scheme 18 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 18, β =1.0185, which represents that the monthly mutual fund scheme returns will change 1.0185 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.5641, which represents that 56.41% variation of Mutual fund scheme 18 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.51 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 19 (L&T Tax Advantage Fund)

The coefficient of Scheme 19 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 19, β =0.9149, which represents that the monthly mutual fund scheme returns will change 0.9149 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6124, which represents that 61.24% variation of Mutual fund scheme 19 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.58 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

Scheme 20 (Franklin India Focused Equity Fund)

The coefficient of Scheme 20 is the estimated coefficient of the regression equation, with respect to the monthly returns of the BSE Sensex at 5 percent level of significance. For Scheme 20 , β =1.0945, which represents that the monthly mutual fund scheme returns will change 1.0945 percent due to change in BSE Sensex monthly returns by 1 percent. The β coefficient is positive, which indicates a positive relationship between the response variable and the predicted variable. The R-square value is 0.6541, which represents that 65.41% variation of Mutual fund scheme 20 monthly returns is predicted through the change in BSE Sensex monthly returns. Further, the Durbin Watson statistics is 2.44 which is close to 2 and it suggests that there is no auto correlation in the linear model fit and so the result is not spurious. The F-statistics confirms that the linear regression model is significant at 5 percent level of significance. And thus the null hypothesis is rejected and the alternative hypothesis is accepted.

4.3.2 ARCH LM Test of the Residuals of OLS

The ARCH LM (Autoregressive Conditional Heteroskedasticity Lagrange Multiplier) test is a statistical test used to investigate whether there is conditional heteroskedasticity, which means that the variance of the residuals is not constant but depends on the values of the independent variables or the lagged residuals. The ARCH LM test helps to assess whether the residuals of the OLS regression model exhibit conditional heteroskedasticity, which is essential for the validity and reliability of the regression analysis. Based on the above objectives, the following hypothesis has been drawn.

Hypothesis:

H_0: There is no conditional heteroskedasticity in the model's residuals. In other words, the variance of the residuals is constant (homoscedasticity).

H_1: There is conditional heteroskedasticity in the model's residuals. The variance of the residuals is not constant and depends on the values of the independent variables or the lagged residuals.

Table 4.2: Results of ARCH LM test of the Residuals of OLS

Mutual Fund Schemes	t-statistic	p-value	Inference
Scheme 1	2.3929	0.0178*	H_1 accepted.
Scheme 2	1.6907	0.0917**	H_0 accepted.
Scheme 3	4.7489	0.0000*	H_1 accepted.
Scheme 4	3.9215	0.0001*	H_1 accepted.
Scheme 5	4.6754	0.0000*	H_1 accepted.
Scheme 6	2.5978	0.0102*	H_1 accepted.
Scheme 7	2.9019	0.0042*	H_1 accepted.
Scheme 8	3.2993	0.0012*	H_1 accepted.
Scheme 9	1.9042	0.0486*	H_1 accepted.
Scheme 10	5.2498	0.0000*	H_1 accepted.
Scheme 11	7.2945	0.0000*	H_1 accepted.
Scheme 12	1.6915	0.0926**	H_0 accepted.
Scheme 13	4.5659	0.0000*	H_1 accepted.
Scheme 14	6.4177	0.0000*	H_1 accepted.
Scheme 15	6.6263	0.0000*	H_1 accepted.
Scheme 16	2.6160	0.0097*	H_1 accepted.
Scheme 17	8.1979	0.0000*	H_1 accepted.
Scheme 18	4.9009	0.0000*	H_1 accepted.
Scheme 19	3.2223	0.0015*	H_1 accepted.
Scheme 20	3.5802	0.0005*	H_1 accepted.

*Significant at 5 percent level of significance

**Insignificant at 5 percent level of significance

Scheme wise Interpretation of Results of ARCH LM test of the Residuals of Ordinary Least Squares based on Table 4.2:

Scheme 1 (DSP BlackRock Small Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 2.3929 and so, there exists conditional heteroskedasticity in the model's

residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 2 (HDFC Mid-Cap Opportunities Fund)

From the ARCH LM test, it has been observed that the t-statistic is insignificant at 5 percent level of significance. So, the Alternative Hypothesis is rejected and Null Hypothesis is accepted. The variance of the residuals of the OLS is constant over time and does not depends on the lagged residuals. In other words, the variance of the residuals is homoskedastic. Thus, for Scheme 2, OLS is the best fit model.

Scheme 3 (ICICI Prudential Value Discovery Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 4.7489 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 4 (Franklin India Smaller Companies Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 3.9215 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 5 (Sundaram Mid Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 4.6754 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 6 (DSP BlackRock Midcap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 2.5978 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 7 (IDFC Multi Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 2.9019 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 8 (L&T Midcap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 3.2993 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 9 (UTI Mid Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 1.9042 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 10 (Sundaram Small Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 5.2498 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 11 (Invesco India Contra Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 7.2945 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 12 (Reliance Tax Saver (ELSS) Fund)

From the ARCH LM test, it has been observed that the t-statistic is insignificant at 5 percent level of significance. So, the Alternative Hypothesis is rejected and Null Hypothesis is

accepted. The variance of the residuals of the OLS is constant over time and does not depends on the lagged residuals. In other words, the variance of the residuals is homoskedastic. Thus, for Scheme 12, OLS is the best fit model.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 4.5659 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 14 (Franklin India Prima Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 6.4177 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 15 (Invesco India Mid Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 6.6263 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 16 (Reliance Multi Cap Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 2.6160 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 17 (Invesco India Tax Plan)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 8.1979 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 18 (Tata Equity PE Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 4.9009 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 19 (L&T Tax Advantage Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 3.2223 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

Scheme 20 (Franklin India Focused Equity Fund)

From the ARCH LM test, it has been observed that the t-statistic at 5 percent level of significance is 3.5802 and so, there exists conditional heteroskedasticity in the model's residuals. So, the Alternative Hypothesis is accepted. The variance of the residuals of the OLS is not constant over time and depends on the lagged residuals.

4.3.3 Augmented Dickey Fuller (ADF) Test

Post ARCH LM test where conditional heteroskedasticity was established in the model's residuals for the mutual fund schemes (except Scheme 2 and Scheme 12), we have conducted ADF to confirm the stationarity of the mutual fund scheme returns with the BSE Sensex return at the first difference with 5 percent level of significance. Based on the above objectives, the following hypothesis has been drawn.

Hypothesis

H_0: The monthly returns of the mutual fund schemes have a unit root, indicating they are non-stationary.

H_1: The monthly returns of the mutual fund schemes do not have a unit root, indicating they are stationary.

Table 4.3: Augmented Dickey Fuller (ADF) Test at first difference

Mutual Fund Schemes	t-statistic	p-value	Inference
Scheme 1	-10.5783	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 3	-10.0817	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 4	-10.4773	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 5	-11.2307	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 6	-12.7754	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 7	-13.1434	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 8	-13.9065	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 9	-13.1222	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 10	-12.1980	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 11	-8.9369	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 13	-13.1228	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 14	-16.0857	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 15	-10.4288	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 16	-8.8076	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 17	-11.2295	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 18	-10.1145	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 19	-13.3691	0.00*	H_1 is accepted- Integrated at I(1)
Scheme 20	-8.8108	0.00*	H_1 is accepted- Integrated at I(1)

*significant at 5 percent level of significance

Scheme wise Interpretation of Results of Augmented Dickey Fuller test of the monthly returns generated by the selected mutual fund schemes based on Table 4.3:

Scheme 1 (DSP BlackRock Small Cap Fund)

The monthly returns generated by Scheme 1 is stationary at first difference at 5 percent level of significance with t-statistic being -10.5783. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -10.5783. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 3 (ICICI Prudential Value Discovery Fund)

The monthly returns generated by Scheme 3 is stationary at first difference at 5 percent level of significance with t-statistic being -10.0817. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -10.0817. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 4 (Franklin India Smaller Companies Fund)

The monthly returns generated by Scheme 4 is stationary at first difference at 5 percent level of significance with t-statistic being -10.4773. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -10.4773. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 5 (Sundaram Mid Cap Fund)

The monthly returns generated by Scheme 5 is stationary at first difference at 5 percent level of significance with t-statistic being -11.2307. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -11.2307. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 6 (DSP BlackRock Midcap Fund)

The monthly returns generated by Scheme 6 is stationary at first difference at 5 percent level of significance with t-statistic being -12.7754. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -12.7754. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 7 (IDFC Multi Cap Fund)

The monthly returns generated by Scheme 7 is stationary at first difference at 5 percent level of significance with t-statistic being -13.1434. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -

13.1434. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 8 (L&T Midcap Fund)

The monthly returns generated by Scheme 8 is stationary at first difference at 5 percent level of significance with t-statistic being -13.9065. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -13.9065. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 9 (UTI Mid Cap Fund)

The monthly returns generated by Scheme 9 is stationary at first difference at 5 percent level of significance with t-statistic being -13.1222. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -13.1222. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 10 (Sundaram Small Cap Fund)

The monthly returns generated by Scheme 10 is stationary at first difference at 5 percent level of significance with t-statistic being -12.1980. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -12.1980. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 11 (Invesco India Contra Fund)

The monthly returns generated by Scheme 11 is stationary at first difference at 5 percent level of significance with t-statistic being -8.9369. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -8.9369. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

The monthly returns generated by Scheme 13 is stationary at first difference at 5 percent level of significance with t-statistic being -13.1228. This signifies that the lag of the model's

residuals becomes stationary after the first difference and it originates from the x-axis at -13.1228. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 14 (Franklin India Prima Fund)

The monthly returns generated by Scheme 14 is stationary at first difference at 5 percent level of significance with t-statistic being -16.0857. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -16.0857. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 15 (Invesco India Mid Cap Fund)

The monthly returns generated by Scheme 15 is stationary at first difference at 5 percent level of significance with t-statistic being -10.4288. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -10.4288. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 16 (Reliance Multi Cap Fund)

The monthly returns generated by Scheme 16 is stationary at first difference at 5 percent level of significance with t-statistic being -8.8076. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -8.8076. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 17 (Invesco India Tax Plan)

The monthly returns generated by Scheme 17 is stationary at first difference at 5 percent level of significance with t-statistic being -11.2295. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -11.2295. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 18 (Tata Equity PE Fund)

The monthly returns generated by Scheme 18 is stationary at first difference at 5 percent level of significance with t-statistic being -10.1145. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis -10.1145. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 19 (L&T Tax Advantage Fund)

The monthly returns generated by Scheme 19 is stationary at first difference at 5 percent level of significance with t-statistic being -13.3691. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -13.3691. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

Scheme 20 (Franklin India Focused Equity Fund)

The monthly returns generated by Scheme 20 is stationary at first difference at 5 percent level of significance with t-statistic being -8.8108. This signifies that the lag of the model's residuals becomes stationary after the first difference and it originates from the x-axis at -8.8108. As, the null hypothesis of the ARCH LM test has been rejected, so to establish a better model fit as compared to OLS, the ADF test has been attempted on the time series data.

4.3.4 Normality Test (Jarque Bera Test)

The normality test of the monthly return of the mutual fund schemes has been conducted in order to check the pattern of the distribution. If the monthly return of the mutual fund schemes follows a normal distribution with zero variance, then the best model fit will be Gaussian time interval test. Alternatively, for non normal distribution the student t-test may be adopted. The hypothesis, thus used using Jarque Bera Normality test is as follows:

Hypothesis:

H_0: The distribution follows a normal distribution.

H_1: The distribution follows a non normal distribution.

Table 4.4: Results of the Normality Test of the monthly returns of the Mutual fund schemes

Mutual Fund Schemes	Coefficient	p-value	Inference
Scheme 1	9.9550	0.00*	H_1 is accepted.
Scheme 3	22.1586	0.00*	H_1 is accepted.
Scheme 4	13.7643	0.00*	H_1 is accepted.
Scheme 5	11.8081	0.00*	H_1 is accepted.
Scheme 6	0.4745	0.7880**	H_0 is accepted.
Scheme 7	1.5108	0.4699**	H_0 is accepted.
Scheme 8	78.1109	0.00*	H_1 is accepted.
Scheme 9	2.6865	0.2610**	H_0 is accepted.
Scheme 10	72.0239	0.00*	H_1 is accepted.
Scheme 11	21.1966	0.00*	H_1 is accepted.
Scheme 13	2.7447	0.2535**	H_0 is accepted.
Scheme 14	27.1650	0.00*	H_1 is accepted.
Scheme 15	26.7572	0.00*	H_1 is accepted.
Scheme 16	3.7865	0.15**	H_0 is accepted.
Scheme 17	24.6967	0.00*	H_1 is accepted.
Scheme 18	7.5483	0.02*	H_1 is accepted.
Scheme 19	0.5341	0.7656**	H_0 is accepted.
Scheme 20	2.2775	0.3202**	H_0 is accepted.

*significant at 5 percent level of significance

**Insignificant at 5 percent level of significance

Scheme wise Interpretation of Results of Normality test of the monthly returns generated by the selected mutual fund schemes based on Table 4.4:

Scheme 1 (DSP BlackRock Small Cap Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 3 (ICICI Prudential Value Discovery Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 4 (Franklin India Smaller Companies Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 5 (Sundaram Mid Cap Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 6 (DSP BlackRock Midcap Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 7 (IDFC Multi Cap Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 8 (L&T Midcap Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is

concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 9 (UTI Mid Cap Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 10 (Sundaram Small Cap Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 11 (Invesco India Contra Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 14 (Franklin India Prima Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 15 (Invesco India Mid Cap Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 16 (Reliance Multi Cap Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 17 (Invesco India Tax Plan)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 18 (Tata Equity PE Fund)

The p-value confirms that the alternative hypothesis is accepted at 5 percent level of significance. This means that the distribution follows a non-normal pattern and so it is concluded that a student t distribution GARCH model may be an appropriate fit to test the persistence of volatility in the lagged square residuals and lagged conditional variances.

Scheme 19 (L&T Tax Advantage Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

Scheme 20 (Franklin India Focused Equity Fund)

The p-value is insignificant at 5 percent level of significance, which confirms that the null hypothesis is accepted. This means that the distribution follows a normal pattern. Thus to test

the volatility of the lagged residuals and the impact of the conditional variances GARCH model with Gaussian distribution may be an appropriate fit.

4.3.5 Generalised Autoregressive Conditional Heteroskedasticity model [GARCH(1,1)]

The GARCH(1,1) model, short for Generalized Autoregressive Conditional Heteroskedasticity model with order (1,1), is a widely used econometric model for analyzing and forecasting time series data with conditional heteroskedasticity. Conditional heteroskedasticity refers to the phenomenon where the variance of a time series changes over time, typically clustering during periods of high volatility and stabilizing during periods of low volatility.

The GARCH(1,1) model combines autoregressive components and moving average components with lagged squared residuals to capture the volatility dynamics in the time series. It is a popular extension of the ARCH (Autoregressive Conditional Heteroskedasticity) model, which only considers lagged squared residuals.

The GARCH(1,1) model can be represented by the following equation:

$$\mathbf{y_t = \mu + \varepsilon_t}$$

$$\mathbf{\varepsilon_t = \sigma_t * z_t}$$

$$\mathbf{\sigma_t^2 = \alpha_0 + \alpha_1 * \varepsilon_{(t-1)}^2 + \beta_1 * \sigma_{(t-1)}^2}$$

where:

- y_t represents the observed value of the time series at time t.
- μ is the constant term.
- ε_t is the conditional error term at time t, which follows a standard normal distribution (mean 0, variance 1).
- σ_t^2 is the conditional variance (volatility) at time t.
- z_t is a white noise error term with mean 0 and variance 1.
- α_0 is the constant term of the GARCH model.
- α_1 is the coefficient of the lagged squared residuals (ARCH term).

- β_1 is the coefficient of the lagged conditional variance (GARCH term).
- $\boldsymbol{\varepsilon_{(t-1)}^2}$ is the squared residuals at time t-1.

The GARCH (1,1) model allows for persistence in volatility, as the lagged squared residuals ($\varepsilon_{(t-1)}^2$) and lagged conditional variance ($\sigma_{(t-1)}^2$) have an impact on the current conditional variance (σ_t^2). The coefficient (β1) determine the strength of this persistence. Based on the above purpose, the following hypothesis is formed:

Hypothesis:

H_0: There is no effect of lagged conditional variance on the current volatility or $\beta_1 = 0$.

H_1: There is effect of lagged conditional variance on the current volatility or $\beta_1 \neq 0$.

Table 4.5: Details of the GARCH (1,1) model

Mutual Fund Scheme	GARCH(1) Coefficient (β_1)	z-Statistic	p-value	R-square	Durbin-Watson Statistic
Scheme 1	1.0480	24.4616	0.0000*	0.5779	2.1948
Scheme 3	0.6305	3.0846	0.0020*	0.6014	2.1739
Scheme 4	0.8919	11.5883	0.0000*	0.6182	2.3489
Scheme 5	1.0435	25.4877	0.0000*	0.5921	2.4145
Scheme 6	1.0573	25.9046	0.0000*	0.5656	2.2473
Scheme 7	1.0511	29.4098	0.0000*	0.5713	2.3350
Scheme 8	0.8683	9.8806	0.0000*	0.5424	2.3747
Scheme 9	1.0580	25.5406	0.0000*	0.5584	2.2432
Scheme 10	0.5973	3.3705	0.0008*	0.4630	2.5052
Scheme 11	0.7563	6.7990	0.0000*	0.5856	2.4416
Scheme 13	0.8600	7.6593	0.0000*	0.6105	2.2465
Scheme 14	1.0424	25.1378	0.0000*	0.6187	2.4326
Scheme 15	0.7619	4.7414	0.0000*	0.5709	2.2355
Scheme 16	0.7875	7.2432	0.0000*	0.5876	2.4237
Scheme 17	0.7432	5.7608	0.0000*	0.5863	2.4973
Scheme 18	0.7264	4.9257	0.0000*	0.5597	2.4809
Scheme 19	1.0588	18.7195	0.0000*	0.6082	2.5492
Scheme 20	1.0542	21.2860	0.0000*	0.6524	2.4350

*significant at 5 percent level of significance

Table 4.6: Results of the GARCH (1,1) model

Mutual Fund Scheme	GARCH(1) Coefficient (β_1)	p-value	Inferences
Scheme 1	1.0480	0.0000*	H_1 is accepted.
Scheme 3	0.6305	0.0020*	H_1 is accepted.
Scheme 4	0.8919	0.0000*	H_1 is accepted.
Scheme 5	1.0435	0.0000*	H_1 is accepted.
Scheme 6	1.0573	0.0000*	H_1 is accepted.
Scheme 7	1.0511	0.0000*	H_1 is accepted.
Scheme 8	0.8683	0.0000*	H_1 is accepted.
Scheme 9	1.0580	0.0000*	H_1 is accepted.
Scheme 10	0.5973	0.0008*	H_1 is accepted.
Scheme 11	0.7563	0.0000*	H_1 is accepted.
Scheme 13	0.8600	0.0000*	H_1 is accepted.
Scheme 14	1.0424	0.0000*	H_1 is accepted.
Scheme 15	0.7619	0.0000*	H_1 is accepted.
Scheme 16	0.7875	0.0000*	H_1 is accepted.
Scheme 17	0.7432	0.0000*	H_1 is accepted.
Scheme 18	0.7264	0.0000*	H_1 is accepted.
Scheme 19	1.0588	0.0000*	H_1 is accepted.
Scheme 20	1.0542	0.0000*	H_1 is accepted.

*significant at 5 percent level of significance

Scheme wise Interpretation of Results of GARCH (1,1) model based on Table 4.5 and Table 4.6:

Scheme 1 (DSP BlackRock Small Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 1, it is observed that β_1= 1.0480 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged

conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5779 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.19, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 1 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 1, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 3 (ICICI Prudential Value Discovery Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 3, it is observed that β_1= 0.6305 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6014 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.17, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 3 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 3, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 4 (Franklin India Smaller Companies Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 4, it is observed that β_1= 0.8919 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6182 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being

2.35 , which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 4 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 4, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 5 (Sundaram Mid Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 5, it is observed that β_1= 1.0435 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5921 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.41, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 5 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 5, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 6 (DSP BlackRock Midcap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 6, it is observed that β_1= 1.0573 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5656 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.25, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 6 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 6, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 7 (IDFC Multi Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 7, it is observed that β_1= 1.0511 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5713 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.34, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 7 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 7, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 8 (L&T Midcap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 8, it is observed that β_1= 0.8683 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5424 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.37, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 8 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 8, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 9 (UTI Mid Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 9, it is observed that β_1= 1.0580 which represents that the

lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5584 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.24, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 9 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 9, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 10 (Sundaram Small Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 10, it is observed that β_1= 0.5973 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.4630 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.51, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 10 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 10, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 11 (Invesco India Contra Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 11, it is observed that β_1= 0.7563 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than

zero, so the strength of the coefficient is persistent. The model fit of 0.5856 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.44, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 11 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 11, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 13, it is observed that β_1= 0.86 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6105 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.25, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 13 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 13, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 14 (Franklin India Prima Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 14, it is observed that β_1= 1.0424 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6187 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.43, which is close to 2, so there is no problem of auto correlation amongst the variance of

Scheme 14 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 14, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 15 (Invesco India Mid Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 15, it is observed that β_1= 0.7619 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5709 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.24, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 15 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 15, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 16 (Reliance Multi Cap Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 16, it is observed that β_1= 0.7875 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5876 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.42, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 16 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 16, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 17 (Invesco India Tax Plan)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 17, it is observed that β_1= 0.7432 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5863 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.50, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 17 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 17, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 18 (Tata Equity PE Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 18, it is observed that β_1= 0.7264 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.5597 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.48, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 18 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 18, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 19 (L&T Tax Advantage Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 19, it is observed that β_1= 1.0588 which represents that the

lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6082 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.55, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 19 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 19, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

Scheme 20 (Franklin India Focused Equity Fund)

The GARCH (1,1) model has been used for testing the time series data with respect to heteroskedasticity. For Scheme 20, it is observed that β_1= 1.0542 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (1,1) model is an extension of ARCH model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6524 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.44, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 20 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 20, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

4.3.6 Augmented Dickey Fuller Test of the residuals in a GARCH(1,1) model

The unit root test of the residuals in the GARCH(1,1) model aims to determine whether the residuals are stationary or possess a unit root (i.e., non-stationary). A unit root in the residuals suggests that the model's conditional variance is not fully capturing all the stochastic behavior, and there may be some remaining non-stationarity or trend in the data. The unit root test is undertaken with Augmented Dickey-Fuller Test at level.

In summary, the unit root test of the residuals in a GARCH(1,1) model helps to assess whether the model's conditional variance adequately captures all the stochastic behavior in the data. The ADF test indicates stationary residuals, it provides more confidence in the appropriateness of the GARCH(1,1) model for the data.

For testing the stationarity of the residuals, the following hypothesis is formulated:

Hypothesis:

H_0: The residuals have a unit root, indicating they are non-stationary.

H_1: The residuals are stationary and do not have a unit root.

Table 4.7: Results of Augmented Dickey Fuller Test of the residuals in the GARCH(1,1) model

Mutual Fund Scheme	p-value	Inference
Scheme 1	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 3	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 4	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 5	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 6	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 7	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 8	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 9	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 10	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 11	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 13	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 14	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 15	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 16	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 17	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 18	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 19	0.0000*	H_1 is accepted – Integrated at Level I(0)
Scheme 20	0.0000*	H_1 is accepted – Integrated at Level I(0)

*Significant at 5 percent level of significance

Interpretation of Results of Augmented Dickey Fuller Test of the residuals in a GARCH(1,1) model based on Table 4.7:

For all the mutual fund schemes, the unit root test has been conducted with ADF and it suggests that the residuals of the GARCH (1,1) model do not have a unit root. This means that the conditional behavior of the response variable (i.e, monthly returns of the mutual fund schemes) is not fully capturing the probable behavior and there exists no non-stationarity trend in the residuals. Further as GARCH (1,1) model is stationary at first difference so, the existence of the unit root can be validated at (n-1) level of lag difference (i.e, integrated at level).

4.3.7 Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) Test of the Residuals of GARCH (1,1) model

The Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH-LM) Test is a diagnostic test used to check for the presence of ARCH effects in the residuals of a GARCH(1,1) model. The test assesses whether there is any remaining autocorrelation or volatility clustering in the squared residuals after fitting the GARCH(1,1) model. A significant GARCH(1,1) model alongside an insignificant ARCH LM test of the residuals suggests that the model effectively captures the conditional variance patterns without the need for further modifications to account for additional conditional heteroskedasticity in the residuals.

Here, the ARCH LM has been conducted to measure and validate the effect of auto correlation or volatility in the squared residuals after fitting GARCH (1,1) model. The hypothesis formulated for ARCH LM test is as follows:

Hypothesis:

H_0: There is no ARCH effect, and the squared residuals are homoskedastic (no remaining autocorrelation).

H_1: There is an ARCH effect, and the squared residuals are heteroskedastic (exhibit autocorrelation or volatility clustering).

Table 4.8: Results of Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) Test of the residuals in the GARCH(1,1) model

Mutual Fund Scheme	t-statistic	p-value	Inference
Scheme 1	-0.3982	0.6910**	H_0 is accepted.
Scheme 3	-1.3516	0.1784**	H_0 is accepted.
Scheme 4	2.8315	0.0050*	H_1 is accepted.
Scheme 5	1.5211	0.1302**	H_0 is accepted
Scheme 6	0.8026	0.4234**	H_0 is accepted
Scheme 7	-1.2734	0.2047**	H_0 is accepted
Scheme 8	0.0378	0.9698**	H_0 is accepted
Scheme 9	0.3384	0.7355**	H_0 is accepted
Scheme 10	-0.2033	0.8390**	H_0 is accepted
Scheme 11	0.3407	0.7338**	H_0 is accepted
Scheme 13	0.7991	0.4254**	H_0 is accepted
Scheme 14	1.8552	0.0647**	H_0 is accepted
Scheme 15	0.7843	0.4340**	H_0 is accepted
Scheme 16	-0.9962	0.3206**	H_0 is accepted
Scheme 17	0.6239	0.5336**	H_0 is accepted
Scheme 18	-0.7015	0.4810**	H_0 is accepted
Scheme 19	-0.6557	0.5130**	H_0 is accepted
Scheme 20	-0.7745	0.4397**	H_0 is accepted

*significant at 5 percent level of significance

**Insignificant at 5 percent level of significance.

Scheme wise Interpretation of Results of Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) Test of the residuals in a GARCH(1,1) model based on Table 4.7:

Scheme 1 (DSP BlackRock Small Cap Fund)

The t-statistic is -0.3982 , which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no

ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 3 (ICICI Prudential Value Discovery Fund)

The t-statistic is -1.3516, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 4 (Franklin India Smaller Companies Fund)

The t-statistic is 2.8315 which is significant at 5 percent level of significance and so, we can reject the null hypothesis (H_0) in favor of the alternative hypothesis (H_1). This indicates that there is evidence of an ARCH effect in the squared residuals, and they are not fully homoskedastic. As the test indicates the presence of an ARCH effect in case of this mutual fund scheme, it suggests that there may be additional volatility dynamics not accounted for by the GARCH(1,1) model. In such case, we have to consider the next order GARCH (2,1) model to improve the model's performance

Scheme 5 (Sundaram Mid Cap Fund)

The t-statistic is 1.5211, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 6 (DSP BlackRock Midcap Fund)

The t-statistic is 0.8026, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 7 (IDFC Multi Cap Fund)

The t-statistic is -1.2734, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no

ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 8 (L&T Midcap Fund)

The t-statistic is 0.0378, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 9 (UTI Mid Cap Fund)

The t-statistic is 0.3384, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 10 (Sundaram Small Cap Fund)

The t-statistic is -0.2033, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 11 (Invesco India Contra Fund)

The t-statistic is 0.3407, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 13 (Aditya Birla Sun Life Small Cap Fund)

The t-statistic is 0.7991, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 14 (Franklin India Prima Fund)

The t-statistic is 1.8552, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 15 (Invesco India Mid Cap Fund)

The t-statistic is 0.7843, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 16 (Reliance Multi Cap Fund)

The t-statistic is -0.9962, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 17 (Invesco India Tax Plan)

The t-statistic is 0.6239, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 18 (Tata Equity PE Fund)

The t-statistic is -0.7015, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 19 (L&T Tax Advantage Fund)

The t-statistic is -0.6557, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no

ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

Scheme 20 (Franklin India Focused Equity Fund)

The t-statistic is -0.7745, which is insignificant at 5 percent level of significance and so we accept the null hypothesis and reject the alternative hypothesis. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic.

4.3.8 Adoption of GARCH(2,1) for Scheme 4 (Franklin India Smaller Companies Fund)

For Mutual fund Scheme 4 (i.e, Franklin India Smaller Companies Fund), p-value is significant at 5 percent level of significance thus we accept the alternative hypothesis. In this case, we have enough evidence to conclude that there is an ARCH effect in the squared residuals, and the GARCH(1,1) model may not be adequately capturing the volatility clustering in the data. As the test indicates the presence of an ARCH effect in the residuals of GARCH (1,1), which suggests that there may be additional volatility dynamics not accounted for by the GARCH(1,1) model. In such case, we have considered the next order GARCH (2,1) model to improve the model's performance, following Donald's (n-1) method of stationarity and volatility measurement.

The GARCH(2,1) model can be represented by the following equation:

$$\boldsymbol{\sigma_t^2 = \alpha_0 + \alpha_1 * \varepsilon_{(t-1)}^2 + \alpha_2 * \varepsilon_{(t-2)}^2 \ \beta_1 * \sigma_{(t-1)}^2}$$

- σ_t^2 is the conditional variance (volatility) at time t.
- α_0 is the constant term of the GARCH model.
- α_1 and a_2 is the coefficients of the lagged squared residuals (ARCH term).
- β_1 is the coefficient of the lagged conditional variance (GARCH term).
- $\boldsymbol{\varepsilon_{(t-1)}^2}$ and $\boldsymbol{\varepsilon_{(t-2)}^2}$ are the squared residuals at times (t-1) and (t-2), respectively.

Table 4.9: Results of GARCH (2,1) model for Franklin India Smaller Companies Fund

Mutual Fund Scheme	GARCH (β1) Coefficient	p-value	R-square	Durbin Watson Statistic
Scheme 4	0.9491	0.0000*	0.6184	2.3412

*significant at 5 percent level of significance

Interpretation of the results of the GARCH (2,1) model based on Table 4.9

For Scheme 4, it is observed that β_1= 0.9491 which represents that the lagged conditional variance on current volatility is not equal to zero, for which alternative hypothesis gets accepted. The GARCH (2,1) model is an extension of GARCH(1,1) model whereby it considers the combined effect of lagged square residuals (i.e, ARCH term) and lagged conditional variance (i.e, GARCH term) on current conditional variance. As β_1 is greater than zero, so the strength of the coefficient is persistent. The model fit of 0.6184 explains that the observed value of the time series and the coefficient of lagged conditional variance is persistent and clustered during the time of high volatility. The Durbin Watson statistic being 2.34, which is close to 2, so there is no problem of auto correlation amongst the variance of Scheme 4 over time. As the model become stationary at first difference, so the z-statistics is high for Scheme 4, which represents that the mutual fund scheme is significantly volatile and clustered and so, stabilization occurs at a slow pace.

The residuals of GARCH (2,1) model shows that the residuals are stationary at first difference. The t statistic is recorded as -14.62 with p-value 0.0000 (significant at 5 percent level of significance).

The Autoregressive Conditional Heteroskedasticity Lagrange Multiplier (ARCH LM) Test is further applied on the residuals and the t-statistic is recorded as 1.1957 with p-value 0.2310 (insignificant) which confirms appropriateness of the GARCH(2,1) model for the data. This implies that there is no ARCH effect and the squared residuals do not have any autocorrelation or significant volatility clustering. Thus, it becomes homoskedastic. So, we can conclude that for Franklin India Smaller Companies Fund, GARCH (2,1) is the best fit model.

4.4 Summary of Findings

Market volatility refers to the fluctuation in the prices of financial assets over time, affecting the risk and uncertainty present in the financial markets. It can be influenced by factors such as economic data, global politics, corporate earnings, market sentiments, and external shocks. Market volatility directly affects the performance of mutual fund schemes, with equity-oriented schemes being particularly sensitive to it. Mutual fund managers use risk management strategies such as diversification, asset allocation, and active portfolio management to navigate market volatility. Asset allocation must align with investors' risk tolerance and investment goals, taking into account their time horizon and financial objectives. Sectoral and thematic funds may experience higher volatility compared to diversified funds. Market volatility can lead to emotional decision-making, potentially causing investors to sell their investments at the wrong time or increase investments at elevated prices. Skilled fund managers can capitalize on market dislocations and generate superior returns over the long term.

The volatility of selected mutual fund schemes has been analysed in the fourth objective with reference to fluctuation in Net Asset Values of those mutual fund schemes over a certain period of time. Here, volatility has been compared with reference to the benchmark returns which has been measured through the closing value of the BSE Sensex. Through an extensive analysis of the last objective of the study we can find that for Scheme 2 and Scheme 12, the OLS model fit was accepted at 5 percent level of significance whereby, the alternative hypothesis of the OLS was accepted at we could conclude that the monthly returns of BSE Sensex and monthly mutual fund scheme returns are linearly related. For all other Mutual fund schemes, time series analysis was undertaken. As per the ARCH LM test of the OLS, it was observed that there was conditional heteroskedasticity in the model’s residuals and the lag effect persistent for which the ADF test was undertaken. All the schemes except Scheme 2 and 12 were observed to have integrated at the first level. Thereafter, to identify the best model fit for GARCH (1,1), the normality test showed that for Schemes 1, 3, 4, 5,8, 10,11,14,15,17 and 18 the normality test was found to be significant at 5 percent level of significance for which the student t-test was followed. In the case of Schemes 6,7,9,13,16,19 and 20 it was found to be insignificant and Gaussian distribution was adopted.

Based on the best model fit, observed with the Jarque Bera normality test with further investigation with the GARCH (1,1) it was concluded that the alternative hypothesis was

accepted for all the schemes. The GARCH coefficient ranges from 0.5973 for Scheme 10 to 1.0480 for Scheme 1. So, Scheme 10 is the least volatile with lagged effects and Scheme 1 is the most volatile scheme.

Based on the Gaussian distribution test of interval and students t test, the residuals of the GARCH (1,1) or GARCH (2,1) model was tested for ARCH LM to verify if there existent any auto correlation or volatility clustering in squared residuals. If for any of the mutual fund schemes, the ARCH LM is found to be significant then the results of the GARCH model are stated to suffer from heteroskedasticity of lagged variables. To avoid this the ARCH LM should come insignificant along with significant GARCH(1,1). For all the mutual fund schemes, the null hypothesis was accepted at 5 percent level of significance with exception of Scheme 4. This suggested that there is no ARCH effect in the squared residuals obtained from GARCH (1,1) and thereby the residuals do not suffer from autocorrelation or are homoskedastic. This signifies that for most of the mutual fund schemes, the volatility clustering occurs due to 1-period lag (one month lag) which shows that the movement of the benchmark returns has an associated correlation with the mutual fund scheme returns which has a trickle-down effect for at least one time period and most of the mutual fund schemes are non volatile during the phase of integration of the lagged variable. So at times of upward returns of the market, most of the mutual fund schemes are volatile but during stabilization, it shows a stabilization pattern.

Finally, for Scheme 4, it was observed that the fund only becomes stationary at the GARCH(2,1) and so, it integrates at the second level. The GARCH (2,1) model is used to improve the model's fitness following the recommendations of Donald's (n-1) rule, where n= the level at which the residual is stationary. The results of the GARCH (2,1) model show the acceptance of the alternative hypothesis at 5 percent level of significance, which is similar to the results of the other mutual fund schemes. The ARCH LM test of the residuals for Scheme 4, is insignificant which confirms the appropriateness of GARCH (2,1). The mutual fund scheme becomes homoskedastic at the second level and the squared residual of GARCH (2,1) does not suffer from any auto correlation or volatility clustering. For all the cases due to high volatility caused by asymmetric market information, the process of stabilization occurs at a slow pace.

Table 4.10 Snapshots of the Best fitted Models

Scheme	***Best Fitted Model***
DSP BlackRock Small Cap Fund	GARCH (1,1)
HDFC Mid-Cap Opportunities Fund	OLS Method (No significant volatility clustering found)
ICICI Prudential Value Discovery Fund	GARCH (1,1)
Franklin India Smaller Companies Fund	GARCH (2,1)
Sundaram Mid Cap Fund	GARCH (1,1)
DSP BlackRock Midcap Fund	GARCH (1,1)
IDFC Multi Cap Fund	GARCH (1,1)
L&T Midcap Fund	GARCH (1,1)
UTI Mid Cap Fund	GARCH (1,1)
Sundaram Small Cap Fund	GARCH (1,1)
Invesco India Contra Fund	GARCH (1,1)
Reliance Tax Saver (ELSS) Fund	OLS Method (No significant volatility clustering found)
Aditya Birla Sun Life Small Cap Fund	GARCH (1,1)
Franklin India Prima Fund	GARCH (1,1)
Invesco India Mid Cap Fund	GARCH (1,1)
Reliance Multi Cap Fund	GARCH (1,1)
Invesco India Tax Plan	GARCH (1,1)
Tata Equity PE Fund	GARCH (1,1)
L&T Tax Advantage Fund	GARCH (1,1)
Franklin India Focused Equity Fund	GARCH (1,1)

Chapter 5:

Conclusion and Recommendations

Chapter 5

Conclusion and Recommendations

5.1 Summarised Findings and Conclusion

In the analysis of the first objective, the focus was mainly on showing the growth trend of different categories of mutual funds in India during 2008-21. This virtuous growth trajectory has been a clear reflection of the depth and breadth of the Indian mutual fund market over the last one and a half decades. This growth has been estimated not only based on resource mobilization by Mutual funds but also by the number of Mutual funds in the financial market. It has been observed that the total resource mobilized by Mutual funds under several categories increased by about 371 per cent during 2008-19. The flourishing number of Mutual funds during that period was also noteworthy. Among the Mutual funds, the premier positions were occupied by Income funds and Equity/ Growth funds and the funds under these schemes were growing at a faster pace. The share of income fund in the total number of Mutual funds increased from about 48% to 61% during 2008-19. The Income fund and Growth/Equity fund together constituted about 84% of the total number of Mutual funds in 2019.

The preference for open-ended schemes was dominant during 2008-13 but the preference shifted in favour of close-ended schemes during 2013-19. Thus, the growth trajectory of these schemes clearly revealed that preference pattern. However, during 2019-21 there was again a reversal in this preference in favour of open-ended schemes implying some erratic nature of growth trends in this respect. Despite such indications of erratic growth trend the Assets under Management (AUM) of open-ended schemes have increased dramatically over the years and the statistical information affirms that the AUM of open-ended schemes increased by about 712 per cent during 2008-21.

So far as gross resource mobilization in mutual funds through public vis-a-vis private sectors is another important dimension of this growth process. This study shows that resource mobilization through the private sector had been higher than that through the public sector. The net resource mobilization in mutual funds is the difference between the gross mobilisation and redemption value, and the net inflows have registered a spectacular growth of about 488 per cent during the study period. The private sector contributed a major chunk to the net inflows.

Hence, we can conclude that the growth of mutual funds both in volume and value terms in India has experienced a significant boost over the last one and a half decades but the varieties of mutual funds are concentrated mainly in income funds and growth/equity funds. This apart, the maximum share of income funds in total numbers of mutual funds implies the natural risk-averse attitude of the investors in the mutual market.

The study aims to look into the performance of selected open ended equity mutual fund schemes in India for its second and third objectives. The top 20 open ended equity mutual fund schemes have been chosen. In this case, the performance analysis of the sample schemes was carried out using different performance evaluating measures for measuring risk and return, such as average return, standard deviation, beta, and correlation coefficient. The analysis will be useful in helping the AMCs formulate risk management policies and in helping individual and institutional investors formulate gainful investment strategies. To assess the scheme's performance, the study also used risk-adjusted performance evaluation models such as Jensen's alpha, Treynor ratio, and Sharpe ratio. Here, the return and risk of the Mutual fund schemes are compared with the two popular benchmark indices, i.e., BSE Sensex and Nifty 50. If the average performance of the portfolio is found to be higher than the benchmark indices (BSE Sensex and Nifty 50), then it is said to have outperformed (O); otherwise, it is said to have underperformed (U). If the standard deviation of the portfolio is found to be greater than the standard deviation of the benchmark indices (BSE Sensex and Nifty 50), then the risk profile is said to be Highly Risky (H) or Low Risky (L). All the selected mutual fund schemes have outperformed the benchmark indices (BSE Sensex and Nifty 50) in terms of annual average scheme returns across the study period. All the mutual fund schemes are found to be risky in terms of standard deviation when compared to BSE Sensex across the study period. All the selected mutual fund schemes except ICICI Prudential Value Discovery fund, IDFC Multi Cap Fund, L&T Tax Advantage Fund, and Invesco India Tax Plan are found to be risky in terms of standard deviation when compared to Nifty 50 across the study period.

After an extensive analysis, we observed that Sundaram Small Cap Fund, DSP Small Cap Fund, HDFC Mid Cap Opportunity Fund, ICICI Prudential Value Discovery Fund, and Reliance Multi cap fund are the top 5 performing mutual fund schemes in terms of Average Returns in the given sample during the study period. L&T Tax Advantage Fund, Invesco India Tax Plan, L&T Mid Cap Fund, Tata Equity PE Fund, and Franklin India Focused

Equity Fund are at the bottom of the selected mutual fund schemes in terms of Average returns in the given sample during the study period.

Sundaram Small Cap Fund, DSP Small Cap Fund, Aditya Birla Sun Life Small Cap Fund, Sundaram Mid Cap Fund, and Reliance Tax Saver Fund are the top risky mutual fund schemes with high average standard deviation among the sample mutual fund schemes during the study period. DSP Mid Cap Fund, L&T Tax Advantage Fund, Invesco India Tax Plan, ICICI Prudential Value Discovery Fund, and IDFC Multi Cap Fund are found to have Low risk in comparison to market risk, during the study period.

Beta is used to evaluate systematic risk and stock volatility. DSP Small Cap Fund and HDFC Mid-Cap Opportunity Fund remained the most volatile during the entire study period. The average beta of all the selected mutual fund schemes remained positive, which indicates that the mutual fund schemes and the benchmark indices (BSE Sensex and Nifty 50) move in the same direction overall.

The positive value of Jensen's alpha indicates the efficiency of the fund manager. It shows the 'stock piling' ability of the fund manager. All the selected mutual fund schemes have shown positive Jensen's alpha during the study period indicating the best stock selection skills of the fund manager. DSP Small Cap Fund and HDFC Mid-Cap Opportunity Fund have the highest Jensen alpha.

The average Sharpe ratios of all the selected mutual fund schemes are found to be positive. A positive Sharpe Ratio indicates that the mutual fund scheme has generated a return higher than the risk-free rate or benchmark for the amount of risk taken. The average Treynor ratios of all the selected mutual fund schemes are found to be positive. A positive Treynor Ratio means that the mutual fund scheme has generated returns in excess of the risk-free rate or benchmark, adjusted for systematic risk. Thus it suggests that the mutual fund schemes have delivered returns above what could be expected given the level of risk associated with it.

Investors can assess a mutual fund scheme's performance by examining its correlation with benchmark indices. Benchmark indices serve as a reference point for comparing mutual fund schemes' returns to the wider market. Correlation analysis helps assess if a scheme is meeting its investment objectives and discloses details about the risk profile of the scheme. If there is a significant correlation between the indices returns and the scheme returns, investors can predict that the scheme will closely track market movements, setting acceptable performance

expectations. Correlation analysis can also determine if the fund manager is offering value through active management. A low correlation indicates a fund manager's ability to generate positive Jensen's alpha, while a high correlation suggests passive management. A low correlation can help diversify a larger investment portfolio and aid in risk distribution. Schemes with a strong correlation often use passive strategies, while a low correlation may indicate an actively managed scheme aiming to deviate from benchmark indices. The third objective of the study explores the relationship between the returns of the mutual fund schemes and the returns of the benchmark indices (BSE Sensex and Nifty 50). We can observe that all the mutual fund schemes are highly correlated with the market and is significant at 5 percent level of significance. The performance of the benchmark indices (BSE Sensex and Nifty 50) is effectively tracked by the mutual fund schemes. Along with the benchmark indices (BSE Sensex and Nifty 50), the mutual fund schemes usually experiences positive and negative returns. This link illustrates how the mutual fund scheme's performance is significantly impacted by the performance of the benchmark indexes. In the entire study period, ICICI Prudential Value Discovery Fund has highest number of high correlations during the entire study period.

The volatility of selected mutual fund schemes has been analysed in the fourth objective with reference to fluctuation in prices of those mutual fund schemes over a certain period of time. Volatility also leads to better investment opportunities for efficient fund managers. Here, volatility has been compared with reference to the benchmark returns which has been measured through the closing value of the BSE Sensex.

To measure volatility we have used OLS Regression to analyse the relationship between the monthly returns of Mutual fund schemes and BSE Sensex returns. Thereafter, the ARCH LM test of the residuals of the OLS has been undertaken to check the reliability and validity of the OLS model. Further, the ADF test has been conducted as the first measure of time series analysis to validate if the mutual fund scheme returns and BSE Sensex returns become stationary with respect to time. To check the distribution of the response variable and thereby, to identify the best model fit, the Jarque Bera normality test was conducted on monthly mutual fund scheme returns. Thereafter, GARCH (1,1) test has been conducted to measure the effect of clustering and volatility over time periods. For normal distributions based on the results of the Jarque Bera tests, the Gaussian distribution has been adopted. In case of, for non-normal distribution, the students t-test has been adopted. Further,the ADF test has been conducted upon the residuals of GARCH (1,1) or GARCH (2,1) as the case may be to

validate if any volatility clustering occurs among the residuals. Finally,the ARCH LM test of GARCH residuals has been conducted to measure, the presence of any heteroskedasticity among the GARCH residuals. Thus, the sequence of time series tests validates the exogenous effect of ex-post mutual fund scheme returns on market volatility.

Based on the sequence of the above tests, we have drawn the following inferences. For Scheme 2 and Scheme 12, the OLS model fit was accepted at 5 percent level of significance whereby, the alternative hypothesis of the OLS was accepted at we could conclude that the monthly returns of BSE Sensex and monthly mutual fund scheme returns are linearly related. A change of 1% in BSE Sensex returns would lead to a 1.0235% change in the Scheme 2 returns and a 1.0389% change in the Scheme 12 returns. For all other Mutual fund schemes, time series analysis was undertaken. As per the ARCH LM test of the OLS, it was observed that there was conditional heteroskedasticity in the model's residuals and the lag effect persistent for which the ADF test was undertaken.

The ADF measures that there is no unit root in the response variable, indicating that there is stationarity. All the schemes except Scheme 2 and 12 were observed to have integrated at the first level. Thereafter, to identify the best model fit for GARCH (1,1), the normality test showed that for Schemes 1, 3, 4, 5,8, 10,11,14,15,17 and 18 the normality test was found to be significant at 5 percent level of significance for which the student t-test was followed. In the case of Schemes 6,7,9,13,16,19 and 20 it was found to be insignificant and Gaussian distribution was adopted.

Based on the best model fit, observed with the Jarque Bera normality test with further investigation with the GARCH(1,1) it was concluded that the alternative hypothesis was accepted for all the schemes. The GARCH coefficient ranges from 0.5973 for Scheme 10 to 1.0480 for Scheme 1. So, Scheme 10 is the least volatile with lagged effects and Scheme 1 is the most volatile scheme.

Based on the Gaussian distribution test of interval and students t test, the residuals of the GARCH (1,1) or GARCH (2,1) model was tested for ARCH LM to verify if there existent any auto correlation or volatility clustering in squared residuals. If for any of the mutual fund schemes, the ARCH LM is found to be significant then the results of the GARCH model are stated to suffer from heteroskedasticity of lagged variables. To avoid this the ARCH LM should come insignificant along with significant GARCH(1,1). For all the mutual fund schemes, the null hypothesis was accepted at 5 percent level of significance with exception of

Scheme 4. This suggested that there is no ARCH effect in the squared residuals obtained from GARCH (1,1) and thereby the residuals do not suffer from autocorrelation or are homoskedastic. This signifies that for most of the mutual fund schemes, the volatility clustering occurs due to 1-period lag (one month lag) which shows that the movement of the benchmark returns has an associated correlation with the mutual fund scheme returns which has a trickle-down effect for at least one time period and most of the mutual fund schemes are non volatile during the phase of integration of the lagged variable. So at times of upward returns of the market, most of the mutual fund schemes are volatile but during stabilization, it shows a stabilization pattern.

Finally, for Scheme 4, it was observed that the fund only becomes stationary at the GARCH(2,1) and so, it integrates at the second level. The GARCH (2,1) model is used to improve the model's fitness following the recommendations of Donald's (n-1) rule, where n= the level at which the residual is stationary. The results of the GARCH (2,1) model show the acceptance of the alternative hypothesis at 5 percent level of significance, which is similar to the results of the other mutual fund schemes. The ARCH LM test of the residuals for Scheme 4, is insignificant which confirms the appropriateness of GARCH (2,1). The mutual fund scheme becomes homoskedastic at the second level and the squared residual of GARCH (2,1) does not suffer from any auto correlation or volatility clustering. For all the cases due to high volatility caused by asymmetric market information, the process of stabilization occurs at a slow pace.

5.2 Recommendations

Certain recommendations have been made in light of the data analysis and conclusions, which might be advantageous for both individual investors and the economy at large if implemented.

a) The mutual fund industry has grown immensely over the last decade. If appropriate steps are taken by the Government of India and the industry as a whole then the mutual fund industry will continue growing at an even faster pace.

b) Mutual fund companies are becoming more involved in encouraging investors to develop a habit of investing. In the mutual fund sector, there are now 43 Asset Management Companies (AMCs). As a result, both established Asset Management Companies (AMCs) and prospective newcomers to the market may take the study's

conclusions into account and make a logical choice with the exclusive goal of maximising unit holders' wealth. This will help them to protect their interests. In order to optimise their investment plan and realise the greatest possible returns, both current and potential investors may consider the findings of this study.

c) Increasing investor knowledge is necessary to increase individual investor participation in the mutual fund industry. Investor's awareness can be increased through the joint efforts of SEBI, AMFI, AMCs, CII and the Ministry of Finance.

d) A thorough examination of mutual fund scheme performance throughout the study period shows that mutual fund schemes beat the market indices, which means that their returns were much higher than those of the market indices. As a result, investors have the opportunity to choose mutual funds as investment instruments.

e) The findings will have a significant impact on how investors decide what to buy. Mutual fund schemes with higher risk than the market have generated higher returns than the market. Given that most of the time, more risk equals better returns, investors may consider this while making their investing decisions, especially when it comes to professionally managed and widely diversified mutual funds.

f) Investors may also utilise the study's findings to determine the timing and scheme selectivity of their mutual fund investments. Investors may consult a competent portfolio manager if they lack knowledge of the mutual fund industry and schemes.

g) If investors have appropriate information about the risks and returns of mutual fund schemes, they will make better investment decisions for their future investments. One should see all the aspects of risk relevant for different time horizons as per one's risk appetite.

h) Many mutual funds underperformed during the 2008 global financial crisis. The investors' confidence in the funds was shaken by this. People shouldn't fear, though, since the markets should ultimately recover and the same funds may continue to perform well. Consequently, investors have to hold onto their investments for a longer amount of time despite market fluctuations. In the end, this would lower the risk and balance the returns.

i) Correlation analysis provides information about the risk profile associated with the market and aids in determining if an investment plan is fulfilling its goals. Thus, while selecting a mutual fund scheme, one should always compare it with benchmark indices and peer performance to understand the risk involved and overall returns better.

j) Maintaining an investment for an extended duration is usually preferable, as even with market swings, the volatility is mitigated over time, optimising returns.

k) Every mutual fund scheme will be subject to a certain level of volatility. This may be carefully considered by the investors to match their investment objectives with possible fluctuations of the benchmark indices.

l) As volatility of mutual fund schemes may be impacted by the volatility in the benchmark indices. The investor may consider a detailed volatility analysis of both.

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