

An Empirical Investigation of Quant Fund Performance Relative to Traditional Funds: A Case Study of Nippon India

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of Quant Fund Performance
Relative to Traditional Funds

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Pranav Mishra, Assistant Professor, IPER, Bhopal, India

Neeta Ghangrekar, Associate Professor, Faculty of Management, Rabindranath Tagore University, Bhopal, Madhya Pradesh 464993, India

Sangeeta Jauhari, Professor, Department of Humanities & Liberal Arts, Rabindranath Tagore University, Bhopal, Madhya Pradesh 464993, India

Abstract

In the contemporary world technologies like Artificial Intelligence & Machine Learning are touching every aspect of the human life, and the mutual fund industry is not an exception. From a layman's perspective, it appears that a machine would always generate better results than a human. This paper is aimed at determining how far this presumption is true for the mutual fund schemes in the Indian context. For this, the performance of the quant fund is contrasted against a few traditional funds from the same fund house in terms of returns, risks, and vital ratios. A total of six funds were considered for the study. Lastly, an attempt is made to test the hypothesis to ascertain whether machine-driven portfolio management is better than traditional portfolio management using the one-way ANOVA as the data set proved to be normally distributed when tested using the Shapiro-Wilk test. Our results show that so far as Nippon India Mutual Fund is concerned its quant fund has failed to impress the industry through various performance parameters which raises a significant question-do we really need those quant funds? The monthly returns generated by the quant fund was found to be 20.33% below than that generated by the traditional funds under study. Even the risk exposure of the quant fund is akin to the traditional funds compared. The outcome of this work is expected to add value both to the academic literature as well as to the professionals from the mutual fund industry.

Keywords : Quant funds, mutual fund, investment, omega, performance evaluation.

JEL Classification G11, G23

1. Introduction

Since time immemorial humans have been curious to search for ways to grow their surplus funds. From an Indian perspective, Fixed Deposits are believed to be the oldest and most trusted investment avenue after the set-up of the formal banking system. This type of option is extended by the banks wherein you can park your surplus funds for a specified period and as a return enjoy a pre-determined interest rate on your investments. In case of any liquidity requirement in between, the investor is left with only two alternatives. Either he can take a loan against his fixed deposit and start paying interest charged by his bank or the other alternative is to liquidate the fixed deposit and withdraw the entire money thereby paying the pre-closure penalties. Further, the returns provided by the fixed deposits are also not so impressive as compared to the potential that the market has with it. In a nutshell, it may thus be concluded that though fixed deposits offer secured investment options thereby mitigating the risk to a certain extent, they fail drastically when it comes to a decent return on the investment made. The fixed deposit is more popular with the senior society in India. To make things worse the interest received on fixed deposits is subject to a TDS (Tax Deducted at Source). (<https://www.studocu.com/in/document/university-of-kerala/investment-manage->



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On the other extreme is the direct investment in stocks through the capital market. This investment avenue promises better returns than traditional fixed deposits. But to reap such a level of returns from the market there is a need for in-depth knowledge of the economic forces and the market nuisance. Further, it also requires the constant follow-up of your portfolio. To reduce risk in the capital market the investor is expected to hold a well-diversified portfolio. This in turn increases the amount of investment that could justify the diversification needs. Short-term investment in the capital market is quite risky as it requires a long investment horizon to be successful in the stock market. Picking the right stock and market timings could turn out to be very tricky and complex at times. This paved the way for another type of investment avenue, namely mutual funds.

Mutual funds are an investment tool where monies are pooled from different unit-holders to invest the amount into various stocks, bonds, and other similar market instruments. In addition to this, the portfolio of a mutual fund scheme is managed by a professional specially trained for the same and who has expertise and knowledge of dealing with the dynamic market forces. Mutual fund schemes can invest in a large number of securities and thereby naturally extend the benefits of diversification to its investors. (<https://www.investopedia.com/terms/m/mutualfund.asp>). The other benefits associated with mutual fund investment are enunciated in the upcoming paragraphs.

Mutual fund schemes make it easy for even small and petty investors to invest their surplus funds in the capital market. For many investors investing directly into the capital market could be quite expensive. Many schemes on the contrary allow for minimum investment of as low as INR 500 to INR 1000. Further, the Systematic Investment Plan (SIP) offered by these mutual fund companies instil a habit of regular savings amongst the investors. Mutual funds provide easy liquidity options to the unit-holders at the time of sudden financial requirement through open-ended schemes. Upon redemption, the money gets credited to the bank account the very next day to 3-5 working days depending upon the type of scheme.

Mutual fund schemes are a low-cost investment option for the public. Regulation 52 of the SEBI Mutual Fund Regulations 1996 provides a check over the expense ratio that any scheme can have. The expense ratio is the ratio of a fund's annual operating expenses to the fund's daily net assets value. Another advantage of mutual fund investment is that in certain cases it provides tax benefits to its investors. Investment in the Equity Linked Savings Schemes provides deductions up to INR 1,50,000 annually under Section 80C of the Income Tax Act 1961. Further, this investment avenue is considered safest as it is regulated by multiple regulators like the Securities Exchange Board of India & AMFI etc. (<https://www.amfiindia.com/investor-corner/knowledge-center/advantages-of-investing-in-mutual-funds.html>).

Owing to the above-mentioned merits mutual fund investment is gradually becoming popular amongst Indian investors. This is evident from the following figures. The (AUM)Asset Under Management rose from a mere INR 67,000 million at the end of year 1988 to INR 44.39 trillion as on 30th June 2023. The number of investor folios has gone up from 7.46 crore folios (30th June 2018) to 14.91 crore folios (30th June 2023) which is a double-fold increase within 5 year span. (<https://www.amfiindia.com/research-information/mf-history>).

To increase the attractiveness of the mutual fund schemes the industry has always tried to bring in innovation with the various products. The various types of mutual fund schemes are the result of such innovation. The latest in this series is the advent of the mutual fund product that utilizes algorithms and machine learning technology in portfolio management. These funds are termed Quant Funds.

Many Asset Management companies in India have launched their quant fund schemes which are shown below

Nippon India Quant Fund (erstwhile Reliance Mutual Funds) (early 2008)

DSP Quant Fund (early 2019)

TATA Quant Fund (early 2020)
ICICI Pru Quant Fund (late 2020)
Quant Quantamental Fund (early 2021)
Axis Quant Fund (early 2021)
IIFL Quant Fund (late 2021)

(<http://www.tomorrowmakers.com/mutual-funds/-article>).

It may be noted that Nippon India Mutual Fund showed courage and was at the forefront of introducing a new and innovative product dating back to the year 2008. Since then, it took nearly a decade for others to follow. Till now also the concept of quant funds is still in its infancy so far as India is concerned. Only 07 out of 44 registered AMCs thought of keeping quant funds in their bouquet of offerings.

A perusal of the holding patterns of various quant mutual fund schemes shows extensive disparity as enumerated below in Table 1.

	Small Cap & Cash	Mid Cap	Large Cap
Nippon India Quant Fund-Direct Plan-Growth	12.56%	19.72%	67.72%
DSP Quant Fund-Direct Plan-Growth	14.08%	19.49%	66.43%
TATA Quant Fund -Direct Plan-Growth	30.00%	27.79%	42.21%
ICICI Pru Quant Fund-Direct Plan-Growth	19.09%	25.44%	55.47%
Quant Quantamental Fund-Direct Plan-Growth	76.56%	7.66%%	15.78%
Axis Quant Fund-Direct Plan-Growth	29.95%	18.17%	51.88%
IIFL Quant Fund-Direct Plan-Growth	12.26%	45.46%	42.28%

Table 1: Holding pattern of various quant mutual fund schemes

Source: Data collected from moneycontrol.com

In such a scenario the effectiveness of introducing technologies like AI & ML into portfolio management may be assessed by contrasting the performance of the quant funds vis-à-vis small-cap funds, mid-cap funds, large-cap funds and where possible even the multicap funds. This work would focus on contrasting the performance of Nippon India Quant Fund with that of Nippon India Small Cap Fund, Nippon India Growth Fund, Nippon India Large Cap Fund, Nippon India Multi Cap Fund and Nippon India Vision Fund respectively. All funds selected for study are from the direct-growth scheme.

2. Literature Review

Before proceeding further, it would be a good idea to find out what earlier authors have concluded with respect specifically to the topic under study or the performance of mutual funds in general. This would provide insight and direction for accomplishing the present work.

Treynor (1965) developed a method of assessing the performance of portfolios. He contributed multiple theories and came up with the Treynor index to rank and gauge the performances of different mutual fund schemes. He opined that the return generated by a mutual fund must be compared with the systematic risk that the fund bears.

Sharpe (1966) opined that for correctly evaluating the performance of a portfolio, its yield

must be compared with the total risk it bears. This risk comprises both the systematic as well as the diversifiable risk. He developed the Return to Variability ratio commonly known as the Sharpe ratio. The author also established the relationship between different components of portfolio risks.

Sortino & Price (1994) attempted to improve the Sharpe ratio through their work. They believed that only the downside variability is the real measure of a portfolio's risk. They proposed to compare returns with the downside deviation and coined the term Sortino ratio for the developed index.

One of the works in the direction of contrasting the performance of quantitative funds against discretionary funds was undertaken by Simona Abis, where the author demonstrated that quantitative funds hold a greater number of stocks and specialize in stock picking. Also, they exhibit pro-cyclical performances. On the contrary, discretionary funds switch between market timing and stock-picking strategies. Discretionary funds have counter-cyclical performance and focus on stocks having less overall information (Simona Abis, 2020).

Another researcher in his thesis investigated the performance of hedge funds, quant funds and funds that use the fundamental analysis. The author concluded that there is no statistical difference between value funds and quant funds. Hedge funds exhibit lower risk-adjusted returns. Another interesting fact that was highlighted through this work is that the Efficient Market Hypothesis does exist (Larsson, 2014).

A study found that the quantitatively managed funds outperformed the enhanced index funds. Further, the expense ratio for both the quantitative funds as well as the enhanced index funds was lower than the traditional index funds under study. The study was conducted on US small-cap funds having a benchmark as the Russell 2000 index (Ahmed & Nanda, 2005).

Chincarini examined the qualitative and quantitative hedge funds in several ways. It included their management differences as well as performance differences. The author concluded that the management differences between qualitative and quantitative hedge funds were less. The (AUM) Asset under Management of qualitative funds surpassed that of the quantitative funds under study. The quant funds exhibit more liquidity for their investors. The average number of qualitative hedge funds that are registered on the SEC (US) is far more than that of the quant hedge funds (Chincarini,2010).

While analysing the active fund manager's commitments to the UN's principles of responsible investment commonly known as the Principles of Responsible Investment (PRI), Kim & Yoon found that only the quant funds showed marginal improvements in ESG performance through meticulously picking high ESG performing stocks compared to other funds. Fund houses were found to indulge in greenwashing (Kim & Yoon, 2023).

Similar works are being reported by Manru & Yucan (2018), Gregory -Allen et. al(2009), Khandani & Lo (2008), Fabozzi et.al (2008) and many more.

The performance of equity mutual funds in India was examined by many researchers from time to time. Few of them are worth mentioning. In one such studies based on the ANOVA test the authors concluded that there was no significant difference in the performance of 24 equity schemes selected for the study (Yadav & Kumar, 2023).

Yet another work assessed the performance of ESG funds in India. The authors opined that there has been a gradual uptrend in ESG fund investment in India but the growth is still sluggish as compared to other developed nations. HDFC Housing Opportunities Fund (Growth) has yielded positive returns from its inception but with greater volatility. Quantum India ESG Equity Fund - Regular Plan, on the other hand, has a targeted strategy and outperformed benchmark and peer schemes while maintaining the lowest expense ratio (Singh et. al, 2023).

The timing and selection ability of mutual fund managers was investigated by a researcher. It was found that only 25% of the fund managers selected, showed both excellent timing and selection skills. However, the study failed to identify any negative stock selector (Suvarna, 2022).

Sharma & Joshi gauged the performance of some debt funds and concluded that a sharp fall in NIFTY during 2019 impacted the performance of all selected debt-oriented funds. Except for Axis Corporate Debt Fund and HSBC Debt Fund all other debt funds in a sample of 15 funds performed fairly well in a volatile market. As per CRISIL rating, the debt funds outperformed both Hybrid as well as Equity funds (Sharma & Joshi, 2021).

The question whether different performance metrics prevalent in the industry yielded the same result or not was unearthed through a work. The study showed that the ranking results of mutual funds using different metrics gave contrasting results. In another work, the authors showed that the comparison of actively managed funds with index funds is not logical owing to the small size of the indices in the Indian context. SBI Nifty Index Fund Growth Plan has outperformed all its six counterparts under study (Mishra & Singh, 2016).

Narend opined that the tracking errors of ETFs were more than that of index funds. The author also discovered that the ETFs under study have always outperformed their benchmarks while some of the index funds failed to do so. Negative Jensen alpha values were generated by both the ETFs and index funds under study (Narend, 2014).

Similar works were also undertaken on similar grounds by many other Indian authors like Renu Ghosh (2014), Dr. Vikas Choudhary, Preeti Sehgal Chawla (2014, 2016) and many more.

3. Research Objectives

A close look at the above-mentioned works brings out a very vital research gap. Though in the global scenario, authors have studied quant funds and their performances, similar studies might not be undertaken in the Indian context. Indian researchers on the other hand, have focused their attention on performance evaluation of various categories of mutual funds and on comparing the outcomes of different performance metrics. One significant reason for the lack of research on quant funds in Indian context may be that quant funds in India started gaining ground only during the pandemic both from the AMCs' point of view as well as that of the investors. For a long time (2008-2019) the Indian mutual fund industry knew only about Nippon India Quant Fund as the sole quant fund available in India. The present work was accomplished with the sole objective of gauging the performance of the quant fund launched by the Nippon India Mutual Fund (NIMF) and contrasting its performance against Small Cap Fund, Mid Cap Fund, Large Cap Fund and Multi Cap Fund all from the same fund house. The reason for selecting Nippon India Mutual Fund for the study is that NIMF was the first to introduce quant funds in India (<https://www.livemint.com/mutual-fund/mf-news/india-s-oldest-quant-mutual-fund-revamps-its-model-11579245322162.html>).

The following hypothesis was formulated for the study.

H0: There is no statistically significant difference between the returns generated by a quant fund and the traditional funds.

H1: At least one of the funds generates better yields than the others under the study.

The results of the study revealed interesting facts about whether the use of innovative technologies like Artificial Intelligence (AI) and Machine Learning (ML) has benefited the investors through generation of better returns.

4. Research Methodology

This work is empirical in nature, based on secondary data that has been extracted from Nippon India Mutual Fund's official website and that of (AMFI) Association of Mutual Funds of India. All the funds considered for the study are from the Direct-Growth category.

Monthly returns were computed for all the schemes for a total of thirty-four months spanning from April 01, 2021 to January 31, 2024. The entire analysis is classified under four aspects, namely the analysis of return, risk, vital ratios and finally the test of the hypothesis. After the returns, risk and ratios are computed and analysed the data set is tested for normality using the Shapiro-Wilk test. As the returns were found to be normally distributed, the one-way

ANOVA test is performed. The investor's attitude towards quant fund was also assessed using the growth rate of Asset under management (AUM) of the selected schemes. For ease of interpretation, the selected funds are being codified as enunciated in Table 2.

Table 2: Codification of the mutual fund schemes

S No.	Mutual Fund's Name	Category	Code Assigned
1.	Nippon India Quant Fund-Direct Plan - Growth	Sectoral/ Thematic	Fund 01
2.	Nippon India Growth Fund - Direct Plan - Growth	Mid Cap Funds	Fund 02
3.	Nippon India Vision Fund - Direct Plan - Growth	Large & Mid Cap Funds	Fund 03
4.	Nippon India Large Cap Fund - Direct Plan-Growth	Large Cap Funds	Fund 04
5.	Nippon India Small Cap Fund- Direct Plan-Growth	Small Cap Fund	Fund 05
6.	Nippon India Multi Cap Fund- Direct Plan-Growth	Multi Cap Fund	Fund 06

Source: Author's calculations and www.moneycontrol.com

5. Data & Interpretation

Return Analysis

Monthly Return: Investors usually park their savings with the fund houses with an expectation of earning decent returns that are more than what may be generated through investment in risk-free avenues. The returns generated by a mutual fund over the holding period or a longer period can be measured in the form of percentage returns. The returns are the appreciation in the (NAV) Net Asset Value over the holding period-

Return (%) = [{(NAV_t-NAV_{t-1}) +Dividend}/NAV_{t-1}]x100-----(1)

where NAV_t and NAV_{t-1} stand for NAV at time 't' and 't-1' respectively

As the schemes selected are from the Direct-Growth category hence the dividend component of the above equation becomes zero and thus the equation for computing monthly returns is-

Return (%) = [{(NAV_t-NAV_{t-1})} /NAV_{t-1}] x100-----(2)

The average return yielded by the funds is enunciated in the Table 3 below-

Table 3: Average monthly returns generated by the mutual fund schemes (in %)

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Average Returns	1.85	2.34	1.74	1.89	3.32	2.32

Source: Author's calculations

The above figures show that the algorithm-driven fund has failed to generate any extraordinary returns as compared to the other human-skill-dependent traditional funds. Four out of the five compared traditional funds have even outperformed the quant fund in terms of yield.

Expense Ratio: SEBI has allowed the fund houses to charge some fee for the operation and maintenance of the mutual fund schemes. The (TER)Total Expense Ratio is calculated as a percentage of the scheme's average (NAV) Net Asset Value. The expense ratio in India is fungible, which means that component-wise allocation is not restricted till the TER does not exceed the statutory limit.

Total Expense Ratio = (Total Expenses/ Average AUM) X 100-----(3)

Where AUM stands for the Asset Under Management.

Table 4 depicts the TER for the mutual fund schemes under study

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
TER	0.38	0.94	1.54	0.90	0.69	0.87

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Source: www.moneycontrol.com

A close look at the above figures brings out the fact that at least on this front the quant fund has outperformed all other funds. This is indicative of the fact that owing to the low expense ratio the quant funds do have greater potential to generate high returns.

Omega(Ω): The omega ratio helps the investor to determine the probability of earning a specified rate of return. It helps to determine the likelihood of winning versus losing with a higher ratio indicating a better chance of generating positive returns from the portfolio.

Omega may be computed using the following formula-

Omega Ratio (Ω)= Probability (Return > Threshold) / Probability (Return <Threshold)----(4)

A high Ω is always considered better as it shows chances of better returns. The following Table 5 shows the Omega values calculated for the schemes.

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Omega (Ω)	3.27	4.21	3.02	3.77	2.43	4.44

Table 5: Omega of the mutual fund schemes

Source: Author's calculations

Analysing the omega values also brings to light the fact that the chances of generating positive returns are higher in the case of three traditional funds than in the quant fund.

Risk Analysis

Next, an analysis of the degree of risk involved in investing in the various schemes considered for the study is undertaken. Considering risk is also significant in making investment decisions as it is the risk borne due to which the investor expects a certain level of return from his investment.

Standard deviation(σ): The most significant measure of risk is the uncertainty present in return which is computed using the statistical measure of variability from the average return known as standard deviation. It is calculated using the following formula-

Standard deviation (σ) = $\sqrt{\sum (R-R')^2/(n-1)}$ ------(5)

Where R is the return and R' is the average return of the mutual fund scheme.

A high value of standard deviation indicates that a high degree of uncertainty is associated with the investment

Table 6 depicts the standard deviation arrived at for the schemes during the time horizon under consideration

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Std dev.(σ)	3.69	4.10	3.77	3.64	8.89	3.87

Table 6: Standard deviation of the mutual fund scheme (in %)

Source: Author's calculations

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The risk level of the quant fund in terms of standard deviation is comparable to other funds taken into consideration except for Fund 05 which exhibits substantial levels of risk during that period.

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Beta(β): Another measure of risk is the beta. It measures the sensitivity of the fund's return to market/benchmark movements. It is computed using the below-mentioned formula-

Beta(β) = (Fund return - Risk-free rate) ÷ (Benchmark return - Risk-free rate)----(6)

The above formula is derived from the Capital Asset Pricing Model(CAPM) equation. An investor must use Beta to understand the fund's performance concerning the benchmark. Table 7 exhibits the beta values for the mutual fund schemes under study.

Table 7: Beta values of mutual fund schemes

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Beta(β)	1.00	0.92	0.97	0.99	0.88	0.98

Source: www.moneycontrol.com

The above figures indicate that both the quant fund (Fund 01) and other traditional funds are able to almost mimic their benchmark returns except for Fund 05 which showed greater deviation. Here also it is observed that the traditional funds performed at par with the quant fund (Fund 01).

Downside Risk: Some experts believe that standard deviation which considers scenarios of both upward deviation as well as downward deviation is not the real measure of risk. An investor is concerned only about the downward deviation where he loses his money. Downside risk considers only the negative deviations from the mean return. The following table enumerates the downside risk calculated for the mutual fund schemes under study.

Table 8: Downside risk of mutual fund schemes (in %)

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Downside risk	1.59	1.68	1.75	1.60	4.20	1.48

Source: Author's calculations

The values of downside risk also indicate that here also the quant fund could not register any outstanding figures to prove that it is better than the others, However, Fund 05 proved to be a very risky avenue in the entire group.

Ratio Analysis

The assessment of mutual funds would be incomplete without the analysis of the vital ratios that bring out the risk-return analysis in a holistic way. These ratios are explained below-

Sharpe Ratio: The Sharpe index is computed using the following equation-

Sharpe Index $S = (R' - R_f) / \sigma$ -----(7)

Where R' is the average return from the mutual fund

R_f is the risk-free return for the period under study

and σ is the total risk involved in the fund.

Risk-free return should be taken as the return on Treasury bills. However, as these are not available for the tenor considered under study, the ongoing rate on term deposits of any nationalized bank can be taken as the close substitute for the risk-free return (Mishra & Singh, 2015). The term deposit rate offered by the State Bank of India for a period of 30 days is taken as a substitute for risk-free return. (<https://sbi.co.in/web/interest-rates/deposit-rates/retail-domestic-term-deposits>).

Treynor Ratio: Treynor ratio uses the measure of systematic risk in place of the total risk to assess the risk-adjusted return from a portfolio and is computed using the following equation-

Treynor Ratio $T = (R' - R_f) / \beta$ -----(8)

Where R' is the average return from the mutual fund
 R_f is the risk-free return for the period under study
and β is the systematic risk involved in the fund.

It is argued that the diversifiable risk can be controlled and minimised by holding well diversified portfolio and thus the absolute measure of risk is the β . Here also the risk-free return being the same as considered for the Sharpe ratio.

Sortino Ratio: Frank A. Sortino proposed a ratio to assess the risk-adjusted return from a portfolio using the downside risk. It may be calculated using the below-mentioned formula-

Sortino Ratio $So = (R' - R_f) / \text{Downside risk}$ -----(9)

Where R' is the average return from the mutual fund
 R_f is the risk-free return for the period under study
and Downside Risk is the standard deviation of negative returns involved in the fund.

All the above-explained ratios were computed for the funds and are depicted in Table 9 along with their rankings

	S	Rank _s	T	Rank _T	So	Rank _{so}
Fund 01	0.42	IV	1.55	V	0.98	IV
Fund 02	0.50	II	2.22	II	1.22	II
Fund 03	0.38	V	1.49	VI	0.83	V
Fund 04	0.44	III	1.61	IV	0.99	III
Fund 05	0.34	VI	3.44	I	0.72	VI
Fund 06	0.52	I	2.06	III	1.36	I

Table 9: Assessment ratios along with ranking of mutual fund schemes

Source: Author's calculations

The above values and ranks also support the fact that the quant fund (Fund 01) has failed to generate any extraordinary results and its performance is akin to the traditional funds. In all three ratios the Rank I was bagged by funds where there is no involvement of artificial intelligence (AI) or machine learning (ML) in their management.

AUM (Asset Under Management) Analysis

Market capitalisation in the case of a mutual fund scheme is explained through its AUM. It is the total cumulative invested sum of a mutual fund scheme. It also provides an idea of the scale and size of a mutual fund. Higher AUM would signify that the fund was able to attract greater number of investors in the past which is expected to continue in the future as well. In other words, it may be considered as an index of the fund's popularity in the eyes of the investors.

For assessing the attractiveness of the mutual fund schemes under study, quarterly AUM values have been collected as reported by the fund house to AMFI. From this, the average growth rate of AUM is computed for all schemes during the period under study.

The following table depicts the average growth rate in Quarterly AUM of the schemes under study-

Table 10: Average Quarterly
AUM of the mutual fund
schemes

	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
Average AUM as on 31 st Dec 2023 (Rs in lakhs)	1166.47	237323.86	21443.36	318767.86	948947.49	219394.13
Average AUM Growth rate (in %)	8.49	13.37	5.49	7.05	15.01	13.36

Source: AMFI Reported data and author's calculations

The above figures indicate that so far as the quant fund is concerned there is still scope for improving the investor's attitude. This will only be possible if the quant fund can post extraordinary results in the future and beat the other traditional funds. Another reason for the sluggish growth in AUM could be the lack of awareness amongst Indian investors about AI-aided funds. Another interesting fact worth noting is that though Nippon India Quant Fund comprises of 67.72% Large Cap stocks (Table 01) it is growing at 8.49% however the Nippon India Large Cap Fund is expanding at an amazing rate of 15.01%.

Test of Hypothesis

One-way ANOVA was performed to test the hypothesis as the normality of the data set was confirmed using the Shapiro-Wilk test (Shapiro & Wilk, 1965) from the online platform Statistics Kingdom (Table 11).

Table 11: Shapiro-Wilk test
for mutual fund monthly
returns

Parameters	Fund 01	Fund 02	Fund 03	Fund 04	Fund 05	Fund 06
P-value	0.133	0.7878	0.1539	0.2614	0.1363	0.6855
W	0.9512	0.9805	0.9533	0.9611	0.9515	0.9773
Sample size (n)	34	34	34	34	34	34
Mean ($\bar{x}$)	1.8515	2.3426	1.7429	1.8956	3.3235	2.3206
Median	2.725	2.175	2.42	1.61	3.8	2.275
Sample Std dev. (S)	3.6869	4.0965	3.7716	3.6357	8.8892	3.866
Sum of Squares	448.5792	553.7865	469.4309	436.2092	2607.5774	493.2064
b	20.656	23.3019	21.1541	20.4752	49.8111	21.9546
Skewness	0.03236	-0.03682	-0.0767	0.2495	0.05624	0.01409
Skewness Shape	Pval (0.936)	Pval (0.927)	Pval (0.849)	Pval (0.536)	Pval (0.889)	Pval (0.972)
Excess Kurtosis	-0.6009	-0.5865	-0.7691	-0.7862	-1.1331	-0.548
Kurtosis Shape	Meso (pval=0.446)	Meso (pval=0.457)	Meso (pval=0.329)	Meso (pval=0.318)	Meso (pval=0.15)	Meso (pval=0.487)
Interpretation	Potentially Normal	Potentially Normal	Potentially Normal	Potentially Normal	Potentially Normal	Potentially Normal

Source: www.statskingdom.com

The results of the ANOVA (Table 12) were obtained from the online platform goodcalculator (goodcalculators.com) which is enumerated in the following table-

Data Summary					
Groups	N	Mean	Std. Dev.	Std. Error	
Group 1	34	1.8515	3.6869	0.6323	
Group 2	34	2.3426	4.0965	0.7025	
Group 3	34	1.7429	3.7716	0.6468	
Group 4	34	1.8956	3.6357	0.6235	
Group 5	34	3.3235	8.8892	1.5245	
Group 6	34	2.3206	3.866	0.663	
ANOVA Summary					
Source	Degree of Freedom	Sum of Squares	Mean Square	F-Stat	P-Value
Between Groups	5	58.0524	11.6105	0.45897	0.80643
Within Groups	198	5008.7947	25.2969		
Total	203	5066.8471			

Source: www.goodcalculators.com

The F-value for the data set is 0.45897 and the critical value for the F-distribution was found to be 2.2597 (danielsoper.com) (Table 13).

Critical F - value (F-distribution)
Degree of Freedom 1: 5
Degree of Freedom 2: 198
Probability Level: 0.05
Critical - Value: 2.25969724

Source: www.danielsoper.com

As the calculated F-value is within the limits of the critical value, we fail to reject the null hypothesis. This indicates that there is no statistically significant difference between the returns generated by a quant fund and the traditional funds.

6. Conclusion

To sum up, this work revealed some interesting facts about the Nippon India Quant Fund. It has failed to impress the Indian investors which is evident from the sluggish growth rate of its AUM. Further, except for the expense ratio the fund could not beat the traditional funds considered under the study on any front whether it is returns or the level of risk. This reflects that the AMC has not been able to exhibit extraordinary results through timing decisions or the quality of stock picking. The authors however opine that this may be more due to inefficiency in timing decisions than stock picking as about 60-62% of the portfolio of Nippon

Table 12: One-way ANOVA
for mutual fund returns

Table 13: Critical Value of
F-Distribution

India Quant Fund is akin to that of Nippon India Long Term Fund.

Our results deviated from that of Abis (2020) where the author concluded that, quantitative funds hold a greater number of stocks and specialize in stock picking. This is indicative of the fact that Nippon India Mutual Fund is yet to utilise the power of AI and ML exhaustively.

7. Suggestions

Based on the study the authors extend some suggestions to the fund houses. AMC's need to be more transparent with how their quant funds operate, so that increasing number of investors can trust their process. To accomplish this task, they should aggressively invest in investor education campaigns to raise awareness about quant funds as ignorance amongst prospective investors might be obstructing its growth.

Further, regulators like SEBI could consider issuing guidelines for disclosure of the algorithmic fund strategies at regular intervals that in-turn would enhance the accountability of quant funds along with their comparability with traditional peers. A framework should be developed for stress-testing of the quant strategies in the volatile Indian market conditions.

From an investors' perspective to cut things short, they must look at quant funds as experimental and satellite allocations and diversify across both quant and traditional funds to balance innovation with proven track records.

8. Limitations

While this research provides valuable insights into the comparative performance of traditional mutual funds and quant funds in the Indian context, certain limitations must be acknowledged. Firstly, the study is restricted only to six schemes from a single fund house. Findings may not be generalizable to quant funds that are offered by other AMC's. Further, the analysis covers a relatively short period from April 2021 to January 2024. Longer-term performance results particularly across different market cycles may yield different results. The study does not incorporate qualitative aspects such as investor sentiments, awareness, and behavioural biases towards quant funds. Lastly, quant funds' algorithms are proprietary and opaque. This study evaluates only the outcomes (returns, risk & ratios) without insight into the underlying decision-making models used limiting the explanatory depth.

9. Future possibilities

In their future projects, the authors propose to undertake similar studies concerning other fund houses. This would enable generalising the results.

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