RESEARCH ARTICLE

PERFORMANCE OF NIFTY 50 EXCHANGE TRADED FUNDS

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Manuscript Info	*Abstract*
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The study evaluated the performance of selected Nifty 50 ETFs tracking Nifty 50 Index listed in National Stock Exchange in India during a period of six years starting from 1st April, 2014 to 31st March, 2020. The performance of ETFs is measured using Average Daily Returns, CAGR, HPR, Standard Deviation, Tracking Error, R squared and Beta. It is found that there is difference in the risk-return pattern of Nifty 50 ETFs and its index Nifty 50. Aditya Birla Nifty ETF is the performing fund among the selected ETFs.

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Introduction:-
In recent times, Exchange-traded funds (ETFs) have gained a wider acceptance as financial instruments whose unique advantages over mutual funds have caught the eyes of many investors. These instruments are beneficial for investors that find it difficult to master the tricks of the trade of analyzing and picking stocks for their portfolio. Various mutual funds provide ETF products that attempt to replicate the indices on NSE, so as to provide returns that closely correspond to the total returns of the securities represented in the index.

Exchange Traded Funds are essentially Index Funds that are listed and traded on exchanges like stocks. An ETF is a basket of stocks that reflects the composition of an Index, like Nifty 50. The ETFs trading value is based on the net asset value of the underlying stocks that it represent. There are different types of ETF schemes launched in India. They are ETFs based on
a) Equity
b) Debt
c) Gold
d) World Indices

Literature Review:-
Milonas and Rompotis (2006) studied the performance and the trading characteristics of a sample of 36 Swiss Exchange Traded Funds during the period 2001-2006, using daily data. It is found that Swiss ETFs underperform their underlying indexes and encumber investors with greater risk. The study found that Swiss ETFs do not adopt full replication strategies and the magnitude of tracking error is substantial to an approximate average of 1.02%.

Natarajan and Dharani (2010) studied about Nifty Bees-the first Exchange Traded Funds in the Indian Capital Market and its daily returns are compared to benchmark returns and found out that Nifty Bees over performed its benchmark in terms of returns and risk.

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Krishna Prasanna (2012) examined the characteristics and growth pattern of all the 82 exchange traded schemes floated and traded on Indian Stock markets and evaluated their performance and found that on an average, ETFs grew at 37% annually during the period 2006-2011 in India. These funds consistently outperformed the market index and generated higher returns. ETFs generated excess returns of 3% per annum as against CNX NIFTY Index. The study also revealed that ETFs attracted large investments in the post financial crisis years.

Swathy (2014) studied the performance and trading characteristics of ETFs listed on NSE and also compared the performance of ETFs with Index Funds. It also compared ETFs performance with CNX 500 Index during the period 1st April 2009 to 31st March 2013. It is found from the study that the returns on specific sector ETFs is greater than diversified ETFs and similarly the risk on the former is greater than the latter. It is found that the trading prices of ETFs are dependent on their benchmarks trading price as well as dependent on their net asset values. Results showed that ETF returns are dependent on their Benchmarks returns and there is a strong relation between two consecutive days trading prices of ETF.

Purohit and Malhotra (2015) studied the performance, tracking error, and pricing efficiency of Indian ETFs and their analysis indicated that ETFs do not fully replicate the underlying benchmark. Moreover, there is significant tracking error and the results revealed the presence of discount and pricing inefficiencies.

Research Problem:
Mutual fund schemes that follow passive investment strategy such as index and ETF schemes earned the trust of advisors and investors in 2019. The outperformance of passive large cap mutual funds in 2019 contributed greatly to the increase in popularity of the category.

Even the assets managed by the passive mutual fund category reflected the new found love for the category. At end of 30th June of 2020, there are eighty eight ETFs listed in India.

The Assets under Management of ETFs inclusive of Equity ETFs amounted to 186197.81 crore rupees (7.30% of total AUM of Mutual Funds). Total AUM of mutual funds amounted to 2, 548,848.43 crore rupees (Reports of AMFI, 2020)

Mutual fund advisors believe that this rise in popularity of ETFs because of lack of performance and lower alpha generated by the actively-managed funds.

Large Cap ETFs managed to offer YTD returns of 11.53%, compared to 10.19% offered by actively managed large cap funds in 2019. The AUM rise is solely because of the performance. Many of the passive funds are among the toppers in the performance chart in the large cap category. Passive funds are low cost, so they have an extra edge over actively managed funds. Very few studies are undertaken in India regarding the performance of Exchange traded funds. Hence, the researcher has keen interest to find out the performance of exchange traded funds.

Objectives:-
To find out the risk- return pattern of Nifty 50 ETFs and its bench mark, i.e., Nifty 50 Index.
To find out the best Nifty 50 ETF based on the performance.

Hypotheses:
1. There is significant difference in the returns of Nifty 50 ETFs and its index in terms of average daily returns, CAGR and HPR
2. There is significant difference in the risk- pattern of Nifty 50 ETFs and its index in terms of standard deviation, beta and tracking error
3. There is significant relationship between Nifty 50 ETFs and its index
4. Volatility of Nifty ETFs is dependent on its index

Research Methodology:-
The study is mainly analytical in nature and purely based on secondary data. Six Nifty 50 ETFs are selected from thirteen listed Nifty 50 ETFs in NSE as of 31st March, 2020. The study measures the performance of six ETFs having atleast six years of track record, i.e., for Financial Years starting from 1st April, 2014 to 31st March 2020. Net

Asset Values of ETFs and closing values of Nifty 50 Index are collected from websites of Association of Mutual Funds in India and National Stock Exchange respectively. Hence, 1472 observations for each fund and Nifty Index are taken totaling to 8832 observations.

Profile of Selected Nifty 50 ETFs listed on NSE				
Issuer Name	**Name**	**Symbol**	**Underlying**	**Launch Date**
ICICI Prudential AMC	ICICI Prudential NIFTY ETF	ICICINIFTY	NIFTY 50 Index	20-Mar-13
Kotak AMC	Kotak NIFTY ETF	KOTAKNIFTY	NIFTY 50 Index	2-Feb-10
Quantum AMC	Qunatum Nifty ETF	QNIFTY	NIFTY 50 Index	10-Jul-08
Invesco India AMC	Invesco India NIFTY ETF	IVZINNIFTY	NIFTY 50 Index	13-Jun-11
Aditya Birla Sun Life AMC	Aditya Birla Sun Life NIFTY ETF	BSLNIFTY	NIFTY 50 Index	21-Jul-11
Nippon India AMC	Nippon India ETF NIFTY BeES	NIFTYBEES	NIFTY 50 Index	28-Dec-01

Source: NSE Website

Data Analysis:
The tools used for data analysis are Average Daily Returns, Compounded Average Growth Rate of Returns, Holding Period Returns, Standard Deviation, Tracking Error, R Squared and Beta. MS Office Excel and SPSS are also used for various computations.

Returns:
a) A Rate of Return (ROR) is the gain or loss of an investment over a certain period of time. In other words, the rate of return is the gain (or loss) compared to the cost of an initial investment, typically expressed in the form of a percentage.Rate of Returns =Annual income+ (Ending price-Beginning Price)/ Beginning Price*100
    This Equation is used to calculate average rate of returns on daily basis and holding period returns.
b) Compound Annual Growth Rate of Returns (CAGR): This is a measure of an investment's annual growth rate over time, with the effect of compounding taken into account. It is often used to measure and compare the past performance of investments, or to project their expected future returns. CAGR = (Ending Price/Beginning Price) ^ (1/No of Periods) – 1.

Risk includes the possibility of losing some or all of an original investment. Risk is measured using a) Standard deviation and b) Beta
a) Standard Deviation
        The portfolio's risk (systematic + unsystematic) is measured by standard deviation, variation of the mean return of a portfolio's returns.

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}}$$

        where: x_i =Value of the *ith* point in the data set, x = The mean value of the data set,
        n = The number of data points in the data set.
b) Beta
        A beta coefficient can measure the volatility of an individual stock compared to the systematic risk of the entire market. In statistical terms, beta represents the slope of the line through a regression of data points.
        Beta = Covariance (Rp, Rm) / Variance (Rm)
        where, Rp is the returns of the portfolio, Rm is the returns of the market.

3) R-squared (R^2) is a statistical measure that represents the proportion of the variance   for a dependent variable that's explained by an independent variable or variables in a regression model.
        R^2 = 1-Unexplained Variation/Explained Variation

R-squared values range from 0 to 1 and are commonly stated as percentages from 0% to 100%. An R-squared of 100% means that all movements of a security (or another dependent variable) are completely explained by movements in the index (or the independent variable(s).In investing, a high R-squared, between 85% and 100%,

indicates the stock or fund's performance moves relatively in line with the index. A fund with a low R-squared, at 70% or less, indicates the security does not generally follow the movements of the index.

4) Tracking error is one of the most important measures used to assess the performance of a portfolio, as well as the ability of a portfolio manager to generate excessive returns and beat the market or the benchmark.

Low errors indicate that the performance of the portfolio is close to the performance of the benchmark. Low errors are common with index funds and ETFs that replicate the composition of major stock market indices.

$$\text{Tracking Error} = \omega = \sqrt{\text{Var}(r_p - r_b)}$$

Where: Var – the variance, rp – the return of the portfolio, rb – the return of the benchmark

Scope and Limitations of the study:
The study is limited to six Nifty 50 based ETFs listed in NSE and purely based on secondary data.

Data Analysis Results:-
Table No.1:- Average Daily Returns of Nifty 50 ETFs and Nifty 50 Index for the period FY: 1st April, 2014 to 31st March, 2020.

Nifty 50 Index based ETFs	Mean (%)	Ranks based on Mean		Bench Mark	Mean (%)
Nippon India Nifty ETF	0.0261	3		Nifty 50 Index	0.0223
Quantum Nifty ETF	0.0217	6			
Aditya Birla Nifty ETF	0.0267	1			
Kotak Nifty ETF	0.0245	5			
Invesco Nifty ETF	0.0266	2			
ICICI Nifty ETF	0.0251	4			

Soure: Compiled and processed data from NSE and AMFI.

Interpretation:-
Average daily returns of six Nifty 50 ETFs are compared with average daily returns of its index, i.e., Nifty 50 Index for six years-FY: 1st April, 2014 to 31st March, 2020.

Nippon India Nifty ETF, Quantum Nifty ETF, Aditya Birla Nifty ETF, Kotak Nifty ETF, Invesco India Nifty ETF and ICICI Nifty ETF are having average daily returns of 0.0261% (Rank-3), 0.0217% (Rank-6), 0.0267% (Rank-1), 0.0245% (Rank-5), 0.0266% (Rank-2) and 0.0251 (Rank-4) respectively and the average daily returns of its benchmark- Nifty 50 Index is 0.0223%. All the Nifty 50 ETFs are having higher average daily returns than its index except for Quantum Nifty ETF.

There are differences in the average daily returns of Nifty 50 ETFs and its index Nifty 50 and hence, the null hypothesis is accepted that there are differences in the average daily returns of Nifty 50 ETFs and its index Nifty 50.

Table No. 2:- Compounded Average Growth Rate and Holding Period Returns of Nifty 50 ETFs for the period FY: 1st April, 2014 to 31st March, 2020.

Nifty 50 Index based ETFs	NAV on 01-04-2014	NAV as on 31-03-2020	CAGR (%)	HPR (%)	Ranks
Aditya Birla Nifty ETF	68.67	93.94	5.36	31.80	1
Invesco India Nifty ETF	676.27	922.63	5.31	31.43	2
Nippon India Nifty ETF	674.09	912.16	5.17	30.34	3
ICICI Nifty ETF	68.04	90.75	4.92	28.46	4
Kotak Nifty ETF	674.11	891.64	4.77	27.40	5
Quantum Nifty ETF	699.03	884.09	3.99	21.84	6

Soure: Compiled and processed data from NSE and AMFI

Interpretation: The CAGR and HPR of six Nifty 50 Index ETFs are analyzed for six years- FY: 1st April, 2014 to 31st March, 2020.

Aditya Birla Nifty ETF holds first position with highest CAGR of 5.36% and HPR of 31.80%. Invesco India Nifty ETF occupies the second position with CAGR of 5.31% and HPR of 31.43%. Nippon India Nifty ETF holds the third position with CAGR of 5.17% and HPR of 30.34%. ICICI Nifty ETF comes in the fourth position with CAGR of 4.92% and HPR of 28.46%. Kotak Nifty ETF holds the fifth position with CAGR of 4.77% and HPR of 27.40%. Quantum Nifty ETF occupies the sixth position with CAGR of 3.99% and HPR of 21.84%.

Table No.3:- Compounded Average Growth Rate and Holding Period Returns of Nifty 50 Index for the period FY: 1st April, 2014 to 31st March, 2020.

Benchmark	Value of Index as on 01-04-2014	Value of Index as on 31-03-2020	CAGR (%)	HPR (%)
Nifty 50 Index	6721.05	8597.75	4.19	23.21

Soure: Compiled and processed data from NSE

All the Nifty 50 ETFs mentioned above are having higher CAGR and HPR when compared to index Nifty 50 except for Quantum Nifty ETF. Nifty 50 Index is having CAGR of 4.19% and HPR of 23.21% during the period FY: 1st April, 2014 to 31st March, 2020.

Table No.4:- Standard Deviations of Average Daily Returns of Nifty 50 ETFs and Nifty 50 Index for the period FY:1st April, 2014 to 31st March, 2020.

Nifty 50 Index ETFs	S.D.	Ranks based on least S.D		Benchmark	S.D.
Nippon India Nifty ETF	1.0418	5		Nifty 50 Index	1.0428
Quantum Nifty ETF	1.0652	6			
Aditya Birla Nifty ETF	1.0290	1			
Kotak Nifty ETF	1.0400	2			
Invesco India Nifty ETF	1.0401	3			
ICICI Nifty ETF	1.0403	4			

Soure: Compiled and processed data from NSE and AMFI

Interpretation:
The standard deviations of average daily returns of six Nifty 50 ETFs are analyzed for a period of six years-FY: 1st April, 2014 to 31st March, 2020.

The standard deviation of average daily returns of Nippon India Nifty ETF is 1.0418 (Rank-5), Quantum Nifty ETF is 1.0652 (Rank-6), Aditya Birla Nifty ETF is 1.0290 (Rank-1), Kotak Nifty ETF is 1.040 (Rank-2), Invesco India Nifty 1.0401 (Rank-3), ICICI Nifty ETF is 1.0403 (Rank-4) and standard deviation of average daily returns of its index Nifty 50 is 1.0428.

Quantum Nifty ETF is having higher standard deviation than Nifty 50 Index which means higher investment risk is associated with this fund. All other Nifty 50 ETFs are having lower standard deviations than Nifty 50 Index so that the investment risks associated with these funds are also lower than its index.

Hence, the null hypothesis is accepted that there is difference in the risk pattern of Nifty 50 ETFs and its index Nifty 50 in terms of standard deviation. Among the six Nifty 50 ETFs, Aditya Birla Nifty ETF is having the least standard deviation.

Table No.5:- Tracking Error of Different Nifty 50 ETFs for the period FY: 1st April, 2014 to 31st March, 2020.

Nifty 50 Index based ETFs	Tracking Error	Rank based on T.E
Nippon India Nifty ETF	0.0400	2

Quantum Nifty ETF	0.2086	6
Aditya Birla Nifty ETF	0.0355	1
Kotak Nifty ETF	0.0583	4
Invesco India Nifty ETF	0.0538	3
ICICI Nifty ETF	0.0740	5

Soure: Compiled and processed data from NSE and AMFI

Interpretation:-
Tracking Error of six Nifty 50 ETFs is analyzed for the period of six years- FY: 1st April, 2014 to 31st March, 2020.

Tracking Error of Nippon India Nifty ETF is 0.040 (Rank-2), Quantum Nifty ETF is 0.2086 (Rank-6), Aditya Birla Nifty ETF is 0.0355 (Rank-1), Kotak Nifty ETF is 0.0583 (Rank-4), Invesco India Nifty ETF is 0.0538 (Rank-3) and ICICI Nifty ETF is 0.0740 (Rank-5). Presence of tracking error indicates risk and hence, the null hypothesis is accepted that there is difference in the risk pattern of Nifty 50 ETFs and its index Nifty 50 in terms of tracking error.

Out of six Nifty 50 ETFs, Aditya Birla Nifty ETF is having the least tracking error

Table No.6:- R^2 between Average Daily Returns of Nifty 50 ETFs and Nifty 50 Index for the period FY: 1st April, 2014 to 31st March, 2020.

Nifty 50 ETFs	R^2	p	Ranks based on R^2
Nippon India Nifty ETF	0.999	.000*	1
Quantum Nifty ETF	0.962	.000*	4
Aditya Birla Nifty ETF	0.999	.000*	1
Kotak Nifty ETF	0.997	.000*	2
Invesco India Nifty ETF	0.997	.000*	2
ICICI Nifty ETF	0.995	.000*	3

Soure: Compiled and processed data from NSE and AMFI   * indicates significance level at 1 percent

Interpretation:
Correlation between Nifty 50 ETFs and its index Nifty 50 is analyzed for the period six years -FY: 1st April, 2014 to 31st March, 2020.

Coefficient of determination- R^2 of Nippon India Nifty ETF is 0.999(Rank-1), Quantum Nifty ETF is 0.962 (Rank-4), Aditya Birla Nifty ETF is 0.999 (Rank-1), Kotak Nifty ETF is 0.997 (Rank-2), Invesco India Nifty ETF is 0.997 (Rank-2) and ICICI Nifty ETF is 0.995 (Rank-3).

The R^2 values show that there is very high correlation between Nifty 50 Index ETFs and its Index Nifty 50 and it is significant, hence the null hypothesis is accepted there is significant relationship between the average daily returns of Nifty Index ETFs and its index Nifty 50.

Table No.7:-Beta of Average Daily Returns of Nifty 50 ETFs for the period FY: 1st April, 2014 to 31st March, 2020.

Independent variable Returns of the Index	Dependent variable Returns of Nifty 50 ETFs	C	B	t	p	Ranks based on B
Nifty 50 Index	Nippon India Nifty ETF	0.004	0.998	999.247	0.000*	2
	Quantum Nifty ETF	-0.001	1.002	191.868	0.000*	1
	Aditya Birla Nifty ETF	0.005	0.986	1214.90	0.000*	5
	Kotak Nifty ETF	0.002	0.996	684.330	0.000*	3
	Invesco India Nifty ETF	0.004	0.996	741.776	0.000*	3
	ICICI Nifty ETF	0.003	0.995	538.373	0.000*	4

Soure: Compiled and processed data from NSE and AMFI   * indicates significance level at 1 percent

Interpretation:
The volatility of six Nifty 50 ETFs corresponding to Nifty 50 Index is measured for the period of six years- FY: 1st April, 2014 to 31st March, 2020.

The regression coefficients-beta between the average daily returns of Nifty 50 ETFs and its index Nifty 50 are as follows, Beta of Nippon India Nifty ETF is 0.998 (Rank-2), Quantum Nifty ETF is 1.002 (Rank-1), Aditya Birla Nifty ETF is 0.986 (Rank-5), Kotak Nifty ETF is 0.996 (Rank-3), Invesco India Nifty ETF is 0.996 (Rank-3), and ICICI Nifty ETF is 0.995 (Rank-4).

Quantum Nifty ETF is having beta of 1.002 which means this fund is more volatile than Nifty 50 Index. Five ETFs have beta values nearer to the value 1 which means these funds are closely following its index. All beta values are significant as all the p values are less than 0.01. Hence, the null hypothesis is hypothesis is accepted that the returns of Nifty 50 ETFs are dependent on the returns of Nifty 50 Index

Table No. 8:- Best performing Nifty 50 ETF for the period FY: 1st April, 2014 to 31st March, 2020.

ADR	CAGR	HPR	SD	TE	R2	Beta
Aditya Birla NETF 0.0267% (Rank 1)	Aditya Birla NETF 5.36% (Rank 1)	Aditya Birla NETF 31.80% (Rank 1)	Aditya Birla NETF 1.0290 (Rank-1)	Aditya Birla NETF 0.0355 (Rank -1)	Nippon India NETF and Aditya Birla NETF 0.999 (Rank- 1)	Nippon India NETF 0.998 Rank(1)

The performance of six Nifty 50 ETFs are analyzed and compared for the period of six years- FY: 1st April, 2014 to 31st March, 2020 and performance of top ranked fund in each criteria is highlighted in the above table.

On basis of returns, highest returns are considered. On basis of risk; funds having least risk such as standard deviation and tracking errors are considered. Highest R^2 value and Beta value closer to one (not more than) are taken for performance evaluation.

Among the six Nifty 50 ETFs, Aditya Birla ETF is the best performing ETF based on six performance measures

Conclusion:-
The performance of six Nifty 50 ETFs are analyzed for the period of six years using ADR, CAGR, HPR, SD, TE, R^2 and Beta and compared with its index Nifty 50.The results showed that there is difference in the risk-return pattern of Nifty ETFs and its index Nifty 50. Among the six Nifty 50 ETFs, Aditya Birla ETF is the best performing ETF.

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