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A STUDY ON THE INDIAN EQUITY EXCHANGE-TRADED FUNDS TRACKING BROAD-BASED MARKET INDICES: WITH SPECIAL REFERENCE TO REPLICATION ACCURACY AND THE IMPACT OF RISK SENSITIVITY

Dr. M. Selvaraj [1], M. Deebika[2]

[1]Director, Guide and Supervisor, Kanchi Mamunivar Government Institute for Postgraduate Studies and Research, Pondicherry University, Puducherry.
[2]PhD, Research Scholar of Commerce, Kanchi Mamunivar Government Institute for Postgraduate Studies and Research, Pondicherry University, Puducherry.

Corresponding Author
Dr. M. Selvaraj,
msrajen64@gmail.com

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ABSTRACT

Exchange Traded Fund (ETF) is a blended investment vehicle which functions with the features of both stock shares and index mutual funds, created and redeemed by Authorized Participants (APs). This paper examines the long-run risk-return performance of 23 Indian equity-tracking broad-based indices over a study period ranging from the inception of each respective ETF to March 2024. The empirical analysis employs risk-sensitivity performance measures such as the Information Ratio (IR) and Probabilistic Sharpe Ratio (PSR) to assess the reliability of risk-adjusted returns in relation to fund managers' ability to outperform the market. Additionally, the study explores the impact of benchmark returns and risk sensitivity on ETF returns.
The Jarque-Bera test applied to the sample returns revealed a non-normal distribution. The results show that 10 out of the 23 ETFs outperformed their benchmarks, demonstrating better risk-adjusted returns based on IR. However, the majority of ETFs exhibited lower PSR values, indicating potential inconsistency in performance. High PSR values for certain ETFs suggest skill-driven returns, while discrepancies between IR and PSR highlight uncertainty in performance stability. This implies that while certain ETFs perform well, the consistency of their performance remains uncertain. Furthermore, the regression analysis reveals that ETF returns are highly influenced by benchmark returns and the IR, indicating that closely tracking the benchmark and managing informational efficiency are key factors in ETF performance. However, the PSR does not have a significant impact on ETF returns.

Keywords: Exchange-Traded Funds, Equity ETFs, Broad-based Market Indices, Information Ratio, and Probabilistic Sharpe Ratio JEL classification numbers: G14, G34

1. INTRODUCTION

In recent times, the Exchange-Traded Funds **(ETFs)** have gained massive popularity and well-associated growth due to regulatory changes, cost-efficiency, diversified one-pot feature, and investment behavior. Generally, an **ETF** is known as the basket of securities launched by Asset Management Companies **(AMCs)** that are traded on Stock Exchanges in real-time like stocks **(Stankeviciene and Petroniene, 2019)[1]**. The functionality of an **ETF** is to track a corresponding benchmark index in order to replicate the risk and return characteristics of it. Further, **(Kurian, 2020)[2]** explain **ETF** as an investment vehicle which enables an individual investor to possess a collection of shares of stocks. Additionally, **ETFs**

have positioned the market investments in a much more inexpensive and flexible way where these types of investments support the idea of diversified personal portfolios for all levels of investors with various asset options which were earlier accessible to privileged large-scale investors **(Laborda et al., 2024)[3].**

Especially, Indian equity **ETFs** is peaking towards breaking its own historical record since their launch on stock exchanges **(Alamelu and Goyal)[4]** Investors from all the sectors have welcomed equity **ETFs** as they have dominated the landscape of Indian **ETF** market in terms of both number of **ETF**s and the total Asset under Management **(AUM)**. As per the reports documented by Association of Mutual Fund Industry **(AMFI)** for the month of March 2024, the market share of Indian **ETF** industry involving Equity **ETFs**, Debt **ETFs**, Commodity **ETFs**, and World Indices **ETFs** recorded to be 12.9%. Even though, **ETFs** are considered as a less-risky and inexpensive investment vehicle, there is a need to assess the level of risk associated with its operation in the market. In particular, **ETFs** are a combination of funds tracking the benchmark index where there is an inclusion fund managers.Therefore, risk measures assessing the efficiency of fund managers and critical evaluation of the impact of the risk measures on the returns of the **ETFs** are vital.

According to **(Yavas and Rezayat, 2016)[5]**, the Indian equity **ETF**returns goes undisturbed with no significant influence from the **US ETF** returns and European **ETF**returns, this lack of effect explains the Indian **ETF**'s market independence and resilience.Notably, the major indices of the **ETF** market fall under the broad-based market which includes indices such as ***NIFTY 50, NIFTY NEXT 50, NIFTY 100,*** and ***NIFTY MIDCAP 100***. For the record, **NIFTYBEES** is the first-ever Indian **ETF** launched on National Stock Exchange **(NSE)** in the year 2002 which tracks ***NIFTY 50*** as its corresponding benchmark index. The principal intent behind this study is to measure the replication of returns between the **ETFs** and the corresponding broad-based market Indices and risk sensitivity of **ETFs** by assessing the efficiency of fund managers. This objective is constructed to answer the following research queries given below:

- How closely do the **ETFs** track their corresponding benchmark indices?
- Do **ETFs** outperform their corresponding benchmark indices?
- How do **ETFs** adjust to the risk associated with their corresponding benchmark indices?
- Do fund managers possess efficient skills?
- How does risk influence the returns of the **ETFs**?

The remaining flow of study is sequenced in the order of literature review, need for the study – Objectives – Hypothesis, Data and Methodology, Empirical results of the Study, and conclusion with the inclusion of scope for future research.

2. LITERATURE REVIEW

There has been an extensive body of work that analyzed the understanding and functional mechanisms of the **ETFs** as far as developed markets such as the USA, Japan, and European Countries are concerned. Majority of the studies have attempted to tap the performance of the **ETFs** using various metrics viz., tracking error, price efficiency, risk factors, and liquidity-volatility concerns. Additionally, few studies involved examining the emerging markets with the same attributes as mentioned above.

When in comparison with index funds few authors such as **(Agapova, 2011)[6]** examined the substitutability of **ETFs** and conventional index funds. The study framed the sampling criteria based on the matched funds and **ETFs** tracking the same indexes. The sample of the study was categorized under the nine indexes including 171 index funds and 11 **ETFs**. The study period covered a period from 2000 to 2004. The study employed Clientele and substitution effect to comprehensively analyze the selected sample. The study used flow of **ETFs** and index funds as the dependent variable, lagged funds return to both types of funds, lagged index return, industry flow, value weighted lagged-current fund returns, and log of aggregated by index TNA of both the funds as the independent variables. The study equipped Seemingly Unrelated Regression (SUR) and Ordinary Least Squares (OLS) regression approaches. The study found that **ETFs** and index funds are substitutes, but are not the perfect ones as **ETFs** hold new characteristics compared to the conventional index funds which added the market completeness for the investors.

(Sharifzadeh and Hojat, 2012)[7] examined the risk-adjusted performance of index funds and **ETFs** to check their statistical significance between these two. The study framed a sample of 230 paired mutual funds according to 12 investment styles involving 34 **ETFs** and 66 index funds with pre-2002 inception dates to match with our selected **ETF** sample covering a period ranging from 2002 to 2010. The study tested the Sharpe ratio and risk-adjusted buy and hold returns using Wilcoxon signed rank test for paired **ETFs** and index funds. The investment styles revealed that out of 12 investment styles, five styles outperformed **ETFs**, three styles outperform index funds, and four styles showed no significant performance. The findings stated that there is no statistical significance between **ETFs** and passive index

mutual fund performances at the fund level, and that investors' choice between the two is related to product characteristics and tax advantages.

(Gaba and Kumar, 2018)[8] investigated the performance of the selected **ETFs** and its index funds on the basis of their annual returns. The study involved a sample based on their CRISIL ranking and asset under management which resulted in four **ETFs** and Index funds tracking *NIFTY 50* in the Indian Stock Market. The study period ranged from 2012 to 2016. The study employed the performance parameters such as risk, annual returns, beta, alpha, Sharpe ratio, and R-square. The study mentioned that the comparative analysis of the funds resulted in different returns despite tracking the same *NIFTY 50* index. The study found that **ETFs** generate better returns but they are highly riskier than the index funds.

(Wu et al., 2020)[9] attempted to analyze the better investment choices for individual investors with reference to the performances of passive investment vehicles viz., index funds and **ETFs** listed on Chinese Stock market tracking the same index. The study included a sample of 285 traditional index funds and 106 **ETFs** collected from the Wind and CSMAR database for a period ranged from February 2005 to December 2018 with an indication of ignoring the turbulent period ranging from January 2015 to January 2016 to divide the analysis in to pre- and post-expenses returns of the selected sample. The standard deviation and average value of both pre-or post-expense returns of the both funds as the dependent variables and the expense ratio, Log of number of funds, turnover, cash ratio, security lending, and the fund size were the independent variables, and these variables were analyzed with the help of Fama- Macbeth Regression model. The findings concluded that **ETFs** outperformed their corresponding index, while the index funds underperformed their following index slightly. The study mentioned that the expenses involved in both the funds played a vital influence on the post-expense return performance.

In cases of ETF-specific studies, (Rompotis, 2011)[10] examines the performance of **ETFs** against the market, focusing on outperformance persistence, tracking error, and predictability. Results show that most **ETFs** beat the **S&P** 500 Index, with tracking error persisting at short-term levels. Factors like expenses, risk, and age contribute to tracking error persistence.

(Osterhoff and Kaserer, 2016)[11] investigated the relationship between the performance of the **ETFs** industry and stock market liquidity's effect on tracking error. The study involved a sample of eight (8) XETRA-listed **ETF** for the period ranged from July 2003 to October 2013. The study used Net Assets Value **(NAV)** returns for examining the **ETFs**' tracking error to its benchmark. The variables tested for the study are daily tracking error, which was a dependent variable and total annual expense ratio, weighted corresponding liquidity cost, cash holding relative to total assets under management, dividend to yield to **NAV**, distribution to **ETF** shareholders relative to **NAV**, and net creation of **ETFs** shares as the independent variables by employing regression model The study concluded that the tracking ability of the **ETFs** were significantly and favorably impacted by the liquidity cost of the corresponding stocks. The study further stated that the tracking error is positively significant as it is influenced by daily redemption/creation, dividend yield, and cash holding of **ETF** shares.

(Mendoza-Rivera et al., 2020)[12] examined the exposure of the risk-performance of the most reputed energy **ETFs**. The study covered a period of nearly five years from June 2015 to April 2020 with a sample of popularly traded leveraged **ETFs** viz., GUSH, DRIP, DGAZ, and UGAZ. The study classified the principal investment factors such as market beta (β), volatility, and return by using a window mean-standard deviation model on varying horizons of two market regimes viz., bull and bearish markets. The study concluded that the dynamics of the risk-return of bull and bear energy **ETFs** enabled new characterisation with accurate risk compensation measures.

(Chandrasekaran and Acharya, 2020)[13] examined the leverage and spillover effect from the volatility and returns of the **ETFs** to its corresponding index in India. The study constructed the sample of 14 **ETFs** and their corresponding Indices based on the inception date of the **ETFs** to December 2016. The prices and returns of the **ETFs** and Index funds recognized for the analysis were collected from the prowess database and NSE. The study employed Auto Regressive Moving Average-Generalized Autoregressive Conditional Heteroskedasticity (ARMA-GARCH) and Auto Regressive Moving Average- Exponential Generalized Autoregressive Conditional Heteroskedasticity (ARMA-EGARCH) for the analysis of volatility spillover effect between **ETFs** and index funds with a focus on asymmetric relationship of volatility. The study concluded that the index funds and **ETFs** return positively impacted the current Conditional Variance (CV) as the finding of the study resulted in lagged CV. The study further stated that the benchmark index and **ETF** returns have volatility persistence with asymmetric volatility.

(Kaur et al., 2021)[14] examined the tracking ability along with benchmark indices of the Indian equity **ETFs** across the two market conditions. The study covered a sample period of 16 equity **ETFs** which hold a minimum tracking record of five (5) years as on 31st march 2019 listed on National Stock Exchange (NSE). The daily data prices and returns for the analysis with reference to Total Return Index (TRI) values were collected from the Thomson Reuters Database (TRD).

The study identified the bullish and bearish market conditions by Bry and Boschan-Pagan and Sossunnov method to capture the peaks and troughs of the market regimes. The study used the Dual Beta Model (DBM) to conclude that the tracking error is higher during the bullish regime. However, the responsiveness of **ETFs** to its corresponding indices was higher during the bearish market regime. The study justified that the tracking error is lower during bearish market conditions.

(Hilliard and Le, 2022)[15] investigated the **ETFs** that were invested in the emerging European markets such as Asian, Latin American, and Indonesian countries and examined the tracking errors and their factors influencing the flows of the **ETFs**. The study covered a period ranged from August 2005 to December 2019 involving a total sample of 375 **ETFs** where 11 were from emerging countries and 364 **ETFs** were from developed countries. The study consists of nine fund characteristics that provided the description for equity investing viz., return, age, size, price-NAV, tracking error, Expense Ratio, number of stock holdings, exchanges, and number of funds. The determinants of the fund flows are majorly considered to be tracking error and fund volatility. The study employed Ordinary Least Squares (OLS) regression model between the developed and emerging countries **ETFs** to examine the tracking errors and the determinants. The study concluded that the emerging Europe **ETFs** were smaller and younger with lower correlation as per their returns compared to developed**ETFs**. The flows of the emerging Europe **ETFs** were not significantly affected by the changes in the volatility indices of the developed countries. However, the flows of the developed **ETFs** were negatively affected by the U.S. market volatility.

In view with developed markets, **ETFs** are highly explored and studied in the aspects of their performance and in relation with liquidity, volatility, and pricing etc. However, in the cases of emerging markets such as India, Malaysia and Mexico etc., the existing studies are limited to shorter sample and time period analysis. From the above-mentioned studies, the risk-adjustment measures were concentrated on using Sharpe ratio, Treynor-Jenson ratio, etc., whose assumptions hold on to normal distribution of returns. However, stock returns practically are of non-normal distribution. In accordance with the state, in particular with the Indian **ETF** market, it is fundamental and mandatory to measure the risk-return analysis of the **ETFs** on par with their corresponding benchmark indices and fund manager's efficiency.

3. NEED FOR THE STUDY– OBJECTIVES – HYPOTHESIS

While the performance and risk factors of **ETFs** have been extensively studied in developed markets, there is a limited understanding of how Indian **ETFs** perform in comparison to their benchmark indices. This study seeks to fill this gap by exploring replication accuracy and the impact of risk sensitivity on Indian **ETFs**. Also, specifically, caters the objectives, to study the magnitude of replication between the returns of the Indian **ETFs** and their corresponding benchmark indices; to measure the risk sensitivity in relation to fund managers' efficiency of the Indian **ETFs**; and to analyze the impact of corresponding benchmark return and risk sensitivity on the **ETFs** return. Further, the study intends to test the null hypothesis (**H_0^1**): "There is no significant impact of broad-based benchmark Indices return and risk sensitivity on the Indian **ETFs** return."

4. DATA AND METHODOLOGY

4.1 DATA

The historical daily prices of the **ETFs** tracking broad-based market indices has been taken from NSE and NIFTY INDICES websites from the date of inception of each respective **ETFs** to March 2024. The sample of the study includes 23 **ETFs** tracking *NIFTY 50*, *NIFTY NEXT 50*, *NIFTY 100*, and *NIFTY MIDCAP 100* indices are compiled in Table I. And, the variables of the study includes;

i. Daily returns of the ETFs
ii. Daily returns of the corresponding benchmark indices
iii. Annual Risk-free rate

The daily returns of the **ETFs** and the corresponding benchmark indices are derived the daily adjusted closing prices; the formula for computing the daily return is as follows:

$$D_{RT} = \left(\frac{DCC_1}{DCP_2}\right) - 1$$

Where $\boldsymbol{D_{RT}}$ are the daily returns, $\boldsymbol{DCC_1}$ is the closing price of the current day; $\boldsymbol{DCP_2}$ is the closing price of the previous day, and is the subtraction of 1 denoted percentage conversion factor from ratio.

Table I

Sample Selected for the Study

BENCHMARK	ETFs SYMBOL	LAUNCH DATE	STUDY PERIOD
NIFTY 50	NIFTYBEES	08-Jan-2002	April 2002 to March 2024
	QNIFTY	18-Jul-2008	April 2008 to March 2024
	KOTAKNIFTY	11-Feb-2010	April 2010 to March 2024
	MOM50	30-Jul-2010	April 2010 to March 2024
	BSLNIFTY	27-Jul-2011	April 2011 to March 2024
	IVZINNIFTY	17-Jun-2011	April 2012 to March 2024
	NIFTYI**ETF**	26-Mar-2013	April 2015 to March 2024
	UTINIFT**ETF**	03-Sep-2015	April 2015 to March 2024
	HDFCNIFTY	16-Dec-2015	April 2016 to March 2024
	LICN**ETF**N50	27-Jul-2015	April 2016 to March 2024
	S**ETF**NIF50	30-Nov-2015	April 2016 to March 2024
	IDFNIFTYET	18-Oct-2016	April 2017 to March 2024
	AXISNIFTY	07-Jul-2017	April 2018 to March 2024
	NIFTY**ETF**	26-Nov-2018	April 2019 to March 2024
NIFTY NEXT 50	JUNIORBEES	06-Mar-2003	April 2003 to March 2024
	S**ETF**NN50	25-Mar-2015	April 2016 to March 2024
	UTINEXT50	08-Aug-2017	April 2018 to March 2024
	NEXT50I**ETF**	30-Aug-2018	April 2019 to March 2024
	ABSLNN50ET	21-Dec-2018	April 2019 to March 2024
NIFTY 100	NF100BEES	28-Mar-2013	April 2013 to March 2024
	NF100I**ETF**	26-Aug-2013	April 2014 to March 2024
	LICNFNHGP	28-Mar-2016	April 2017 to March 2024
NIFTY MIDCAP 100	MOM100	04-Feb-2011	April 2011 to March 2024

5. METHODOLOGY

5.1 EVALUATING THE RISK SENSITIVITY BASED On The Returns

A. INFORMATION RATIO

The Information Ratio **(IR)** is a measure used in finance to evaluate the performance of an **ETF**, particularly in terms of how much excess return is generated relative to the amount of risk taken. The "excess return" also referred to as additional return is the difference between the **ETF**'s return and the return of the corresponding benchmark index. The **IR** adjusts the additional return by dividing it by the **ETF**'s Tracking Error.

$$IR = \frac{ETF_{Return} - Benchmark_{Return}}{Tracking\ Error}$$

The IR should not be seen as a static indicator; its fluctuation between time frames and fund categories indicates that consistency is critical when evaluating fund managers **(Villaverde, 2010)**[16]. A well-calibrated IR can be a trustworthy performance measure, but it must be combined with other metrics to assess fund management effectiveness comprehensively **(Bossert et al., 2010)**[17].

B. PROBABILISTIC SHARPE RATIO

Probabilistic Sharpe Ratio **(PSR)** is an extension of the traditional Sharpe Ratio that adjusts for estimation errors and the non-normality of return distributions. **PSR** helps determine the probability that the observed Sharpe Ratio reflects genuine skill rather than luck, hence it's also known as the **"probability of skill."** The mechanism of the **PSR** formula addresses the risk of underperformance relative to the **ETFs**' benchmark indices.

$$PSR = \Phi\left(\frac{\widehat{SR} - SR_{benchmark}}{\widehat{SR} \times \sqrt{\frac{1 + \widehat{SR}^2/2}{n-1}}}\right)$$

Where, $\widehat{SR}$is the computed Sharpe Ratio of the **ETF**; $SR_{benchmark}$ is the computed Sharpe Ratio of the corresponding benchmark index; ***n***is the total number of trading days; Φis the cumulative distribution function of the standard normal distribution.

Therefore, it is proposed to include an extra risk assessment parameter called the probabilistic Sharpe ratio, which combines the risk-adjustment factor and the skill efficiency of managers into a single metric.

The **PSR** takes into consideration the inherent uncertainty in investment returns, especially in cases where conventional wisdom (such as normalcy) is challenged. By assessing the likelihood of reaching a particular performance level, it offers a more detailed picture of investment competence **(Bailey and Prado, 2012)**[18].

5.2 EXAMINING THE IMPACT OF RISK SENSITIVITY AND BENCHMARK RETURNS ON THE ETF RETURNS

A. REGRESSION ANALYSIS

$$ETF_{Ret} = \alpha + \beta(BI_{Ret} + IR_{ETF} + PSR_{ETF})$$

Where, $ETF_{Ret}$is the daily return of the **ETF**; $BI_{Ret}$is the daily return of the corresponding Benchmark Index; $IR_{ETF}$is the Information Ratio of the **ETF**; $PSR_{ETF}$is theProbabilistic Sharpe Ratio of the **ETF**;$\alpha$is the intercept term; $\beta$is the measure of sensitivity of coefficient.

6. EMPIRICAL RESULTS OF THE STUDY

6.1. DESCRIPTIVE STATISTICS

The results of descriptive statistics are shown in **Table II**, the values of the parameters reveal that the ***ETFs*** and the corresponding ***BIs*** exhibit equal average mean returns. In terms of standard deviation, the ***ETFs*** exhibit the comparatively higher volatility when compared to the ***BIs***, however the difference in deviations seem minimal.

The skewness of both **ETFR** and **BIR** data is positive, with **ETFR** having a higher skewness, indicating a longer right tail. This shows that the **ETFR** generates more severe positive returns. The high kurtosis values (both substantially greater than three) for **ETFR** and **BIR** suggest that both distributions have fat tails, with **ETFR** having a significantly higher kurtosis. This suggests higher extreme returns (both positive and negative) for **ETFR**. Overall, descriptive statistics indicate that **ETFR** has higher volatility and more extreme return values than **BIR**.

Table II

Results of Descriptive Statistics on the returns of ETFR and BIR

Descriptive Statistics	ETFR	BIR
Mean	0.001	0.001
Median	0.000	0.001
Maximum	0.037	0.009
Minimum	-0.018	-0.003
Standard Deviation	0.009	0.002
Skewness	2.753	1.465
Kurtosis	13.107	5.142
Observations	23	23
Jarque-Bera test	193.69*	33.57*
p-value	*0.0000*	*0.0000*

Source: Author Computations
*Note: * at 1% level*

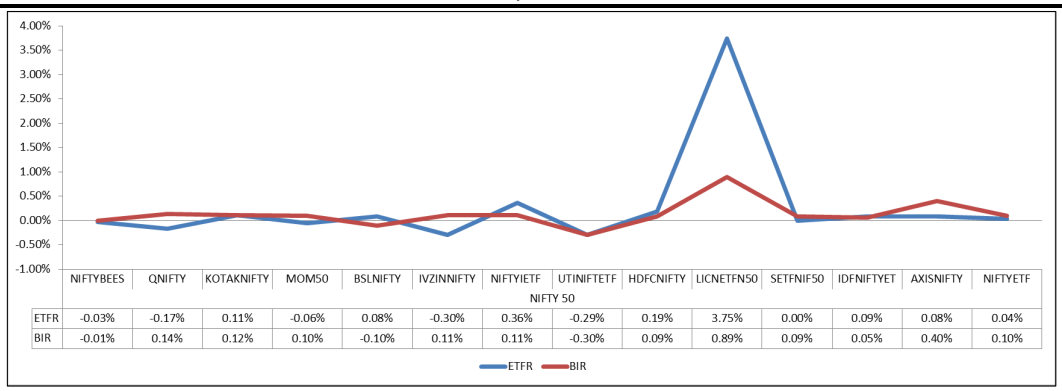
The Jarque-Bera test results show that both **ETFR** and **BIR** deviate significantly from normality (p-value = 0.0000). This shows that neither dataset has a normal distribution, which could impair the reliability of parametric tests that assume normality.The test's non-normality indicates the necessity to employ nonparametric approaches or robust procedures to further examine the data.

6.2 EVALUATING THE MAGNITUDE OF REPLICATION OF THE ETF RETURNS AND BENCHMARK RETURNS

The magnitude of replication of the **ETFs** Returns (**ETFR**) and the corresponding benchmark *'NIFTY 50'* Index Return (**BIR**) is shown in Figure IV.A. The return-performances of the respective **ETFs** yield negative returns for **'NIFTYBEES '-0.03%''**, **'QNIFTY '-0.17%''**, **'MOM50 '-0.06%''**, **'IVZINNIFTY '-0.30%''**, and **'UTINIFTETF '-0.29%''**, and positive returns for the **ETFs**, viz., 'KOTAKNIFTY '0.11%'', **'BSLNIFTY '0.08%''**, **'NIFTYIETF '0.36%''**, **'HDFCNIFTY '0.19%''**, **'IDFNIFTYET '0.09%''**, **'AXISNIFTY '0.08%''**, and **'NIFTYETF '0.04%''**. And, it is to be noted that **'LICNETFN50 '3.75%''** records the highest return, whereas, **'SETFNIF50 '0.00%''**, reports no return throughout the tracking period.

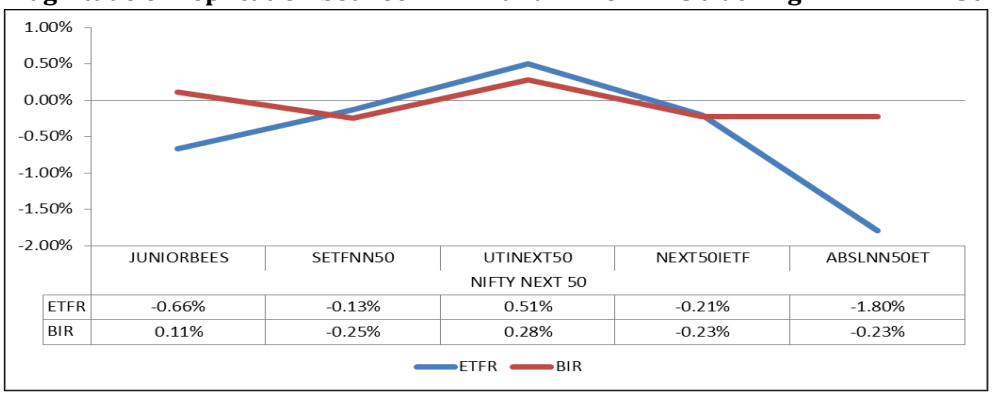
Figure IV.A

Magnitude of Replication between ETFR and BIR of ETFs tracking *NIFTY 50*



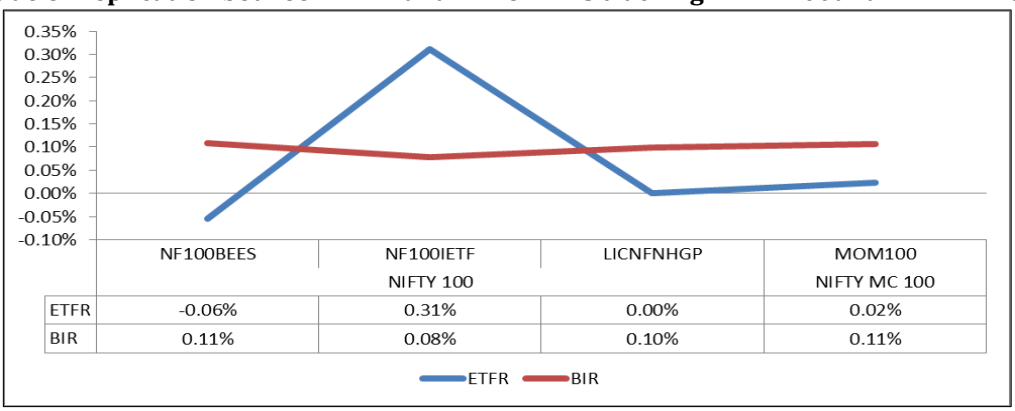
The difference in the returns of both the **ETFs** and *NIFTY 50* reflects closer replication, except for **'LICNETFN50'**. However, there seems a gradual similarity of increased return compared to the remaining **ETFs**. Especially, **'NIFTYBEES'** being the first **ETF** launched in India, witnesses a negative return in its historical tracking period irrespective of its long withstanding tracking period of 22 years.

Figure IV.B
Magnitude of Replication between ETFR and BIR of ETFs tracking *NIFTY NEXT 50*



The magnitude of replication of the **ETFs** Returns **(ETFR)** and the corresponding benchmark *'NIFTY NEXT 50'* Index Return **(BIR)** is shown in Figure IV.B. The return-performance of the respective **ETFs**, viz., **'UTINEXT50'** yields a positive return of **'0.51%'** similar to the **BIR**. In line with it, **'SETFNN50', 'NEXT50IETF',** and**'ABSLNN50ET'** record a negative return of **'-0.14%', '-0.21%',** and **'-1.80%'** respectively similar to the **BIR**. However, in contrast, **'JUNIORBEES,'** the **ETF** recorded a negative return **'-0.66%'** while the **BIR** recorded a positive return during the study period.

Figure IV.C
Magnitude of Replication between ETFR and BIR of ETFs tracking *NIFTY 100*and*NIFTY MIDCAP 100*



The replication magnitude of the **ETF Return (ETFR)** and the corresponding benchmark indices *'NIFTY 100'* and *'NIFTY MIDCAP 100'* returns **(BIR)** is shown in Figure IV.C. The return-performance of the three **ETFs**, viz., **'NF100BEES', 'NF100IETF',** and **'LICNFNHGP'** tracking *'NIFTY 100'* index yield a negative return of **'-0.06%'**, positive return of **'0.31%'**, and no return **'0.00%'** respectively. However, the returns of the benchmark *'NIFTY 100'* record positive returns against the corresponding **ETFs**. While, **'MOM100'** tracking *'NIFTY MIDCAP 100'* index reports a minimal yet a positive return of **'0.02%'** similar to its **BIR** of **'0.11%'** during the study period.

6.3 EVALUATING THE PERFORMANCE BASED ON RISK SENSITIVITY

The results of the computations of **IR** and **PSR** of the selected sample **ETFs** of the study are shown in Table III.

TABLE – III
Computed results of IR and PSR

BENCHMARK	ETFs SYMBOL	IR	PSR
NIFTY 50	NIFTYBEES	-0.08%	49%
	QNIFTY	-1.65%	55%
	KOTAKNIFTY	-0.02%	49%
	MOM50	-0.88%	46%
	BSLNIFTY	**0.40%**	48%
	IVZINNIFTY	-1.11%	43%
	NIFTYI**ETF**	**1.84%**	45%
	UTINIFT**ETF**	**0.08%**	44%
	HDFCNIFTY	**0.28%**	49%
	LICN**ETF**N50	**8.36%**	46%
	S**ETF**NIF50	-0.94%	43%
	IDFNIFTYET	**0.11%**	48%
	AXISNIFTY	-0.66%	50%
	NIFTY**ETF**	-0.73%	45%
NIFTY NEXT 50	JUNIORBEES	-2.50%	51%
	S**ETF**NN50	**0.94%**	52%
	UTINEXT50	**0.35%**	44%
	NEXT50I**ETF**	**0.08%**	48%
	ABSLNN50ET	-2.42%	47%
NIFTY 100	NF100BEES	-0.56%	52%
	NF100I**ETF**	**0.71%**	47%
	LICNFNHGP	-0.27%	55%
NIFTY MC 100	MOM100	-0.39%	59%

Source: Author Computations

In the case of **IR**, out of the 14**ETFs** tracking the benchmark *'NIFTY 50'* index, six **ETFs** generate excess returns beating the market risk. Especially, **'LICNETFN50'** reports an **IR** of **'8.39%'**which clearly explains its ability to yield highest annual return of **'3.57%'**. Additionally, **'NIFYIETF', 'BSLNIFTY', 'HDFCNIFTY', 'IDFNIFTYET',** and **'UTINIFTETF'** continues to generate excess returns adjusting to the market risk relative to its benchmark where the **IR** goes **'1.84%', '0.40%', '0.28%', '0.11%',** and **'0.08%'** respectively. On the other hand, the rest of the **ETFs** tracking *'NIFTY 50'* fail to yield additional returns, viz., **'NIFTYBEES'** with **'-0.08%', 'QNIFTY'** with **'-1.65%', 'KOTAKNIFTY'** with **'-0.02%', 'MOM 50'** with **'-0.88%', 'IVZINNIFTY'** with **'-1.11%', 'SETFNIF50'** with **'-0.94%', 'AXISNIFTY'** with **'-0.66%',** and **'NIFTYETF'** with **'-0.73%'**.

Out of the five **ETFs** tracking the benchmark *'NIFTY NEXT 50'* index, 3**ETFs** generated excess returns beating the market risk. Here, **ETFs**, such as **'SETFNN50'** with an **IR** of **'0.94%'**, **'UTINEXT50'** with an **IR** of **'0.35%'**, and **'NEXT50IETF'** with an **IR** of **'0.08%'** generate excess returns in comparison to its benchmark. The effect of **IR** is witnessed in the returns of the above-mentioned **ETFs** in **Figure IV.B**, where the **ETFs** outperformed the benchmark *'NIFTY NEXT 50'* index. However, the remaining two **ETFs**, viz., 'JUNIORBEES' with an **IR** of **'-2.50%'** and **'ABSLNN50ET'** with an **IR** of **'-2.42%'** has shown a significant struggle to beat the risk, yet fail to produce excess return

One out of three **ETFs** tracking the benchmark '*NIFTY 100*' index generates excess returns compared to its benchmark, i.e., 'NF100I**ETF**' with an **IR** of **'0.71%'**. However, the rest of the two **ETFs**, i.e., **'NF100BEES'** and **'LICFNHGP'** fail to generate excess returns and report negative **IR** of **'-0.56%'** and **'-0.27%'**.Lastly, 'MOM100' tracking the benchmark '*NIFTY MIDCAP 100*' index also fails to generate excess returns for the level of risk taken relative to its benchmark, hence reports an **IR** of **'-0.39%'**.

This indicates that 10 out 23 **ETFs** tracking the broad-based market indices suggest better performance by the portfolio manager in generating returns above the benchmark, relative to the amount of risk taken.

In the case of **PSR**, the majority of the **ETFs**, i.e., 12 out of 14 **ETFs** the benchmark '*NIFTY 50*' index report a lower **PSR**, i.e., less than 50%. Similarly, three out of five **ETFs** tracking the benchmark *'NIFTY NEXT 50'* index report a lower **PSR** as well. This indicates that the portfolio managers are creating and redeeming the **ETFs** by chance rather than skill, as they fail to adjust the risk in the market. However, two out of three **ETFs** tracking the benchmark *'NIFTY 100'* index, viz., **'NF100BEES'** and **'LICFNHGP'** and **'MOM100'** tracking the benchmark *'NIFTY MIDCAP 100'* indexexhibit a higher **PSR** of **'52%', '55%',** and **'59%'** respectively, which indicates that the investment's performance is more likely driven by genuine skill rather than random chance and suggests that the observed returns are more likely to continue in the future, making the investment more attractive.

As per the computed values, the **IR** and **PSR** tend to contradict; higher **IR** and **PSR** signify a well-adjusted risk performance. However, there exists a condition of low **IR** but high **PSR** or vice versa; it may indicate that while the **ETF** appears to perform well on a risk-adjusted basis, there is considerable uncertainty about the stability of this performance. For example, **UTINIFTETF (0.08% IR, 44% PSR)** shows a positive **IR** but a low **PSR**, indicating potential risks in the consistency of its performance.

6.4 REGRESSION RESULTS ON THE IMPACT OF BIR AND RISK SENSITIVITY ON ETFR

The result of regression analysis, where the impact of benchmark indices returns **(BIR)** and risk sensitivity measures viz., Informational Ratio **(IR)**, and Probabilistic Sharpe Rate **(PSR)** is summarized in table III. The independent variables viz., (**BIR** and **IR**), are found positively significant at 1% level with a p-value of **(1.65E-05)** and **(1.5E-09)** respectively.

TABLE IV

REGRESSION RESULTS ON THE IMPACT OF BIR AND RISK SENSITIVITY ON ETFR

Variables	Coefficients	Standard Error	t-statistic	Prob. Value
ETFs Returns	-0.0006	0.0054	-0.1229	0.9035
Benchmark Indices Returns	1.4721	0.2532	5.8136	**1.65E-05***
Information Ratio	0.3232	0.0288	11.2086	**1.5E-09***
PSR	0.0009	0.0112	0.0854	0.9328
R	0.9785			
R-square	0.9575			
Adjusted R Square	0.9481			
F-statistic	**4.27E-12***			
Source: Author Computations				
Note: 1% level of significance*				

The F-Statistics reflects a significant impact by reporting a value of **'4.27E-12'** at 1% level of significance. Similarly, the correlation coefficient, i.e., **'R,'** with a value of **'0.9785'** indicates a significant positive relationship between the independent variables and dependent variables. Furthermore, the adjusted **R^2 '0.9481'** exhibits that the **'BIR', 'IR',** and **'PSR'** impacted **'ETFR'** to the extent of **94.81%**, and the remaining **5.19%** is influenced by other various unabsorbed variables.

Thus, the null hypothesis stating "There is no significant impact of corresponding benchmark index returns and risk sensitivity on **ETF** returns" is rejected for **BIR** and **IR** at the **1%** significance level. However, the hypothesis cannot be rejected for **PSR**.

7. CONCLUSION

The study initiates to assess the risk-return analysis of the Indian equity **ETFs** tracking broad-based market indices by analyzing the efficiency of fund managers in terms of beating the market risks and the generation of excess returns compared to the corresponding benchmark indices. Also, the impact of risk-measures on the returns of the **ETFs** is examined to understand the sensitivity of their long-term performance. The measures included the **IR**, which evaluates a manager's effectiveness in producing excess returns over a benchmark while taking tracking error into account; and **PSR**, which evaluates a manager's consistency in producing dependable risk-adjusted returns (Sharpe Ratio), which serves as a gauge of competence and dependability.

The **IR** analysis shows that several **ETFs** tracking the *NIFTY 50* and *NIFTY NEXT 50* indices are able to generate excess returns relative to their benchmarks, suggesting that these **ETFs** effectively adjust for market risk. **ETFs** like LICN**ETF**N50, NIFTYI**ETF**, and S**ETF**NN50 have high IR values, indicating strong performance beyond market risk.

Conversely, **ETFs** with negative IR values, such as NIFTYBEES and JUNIORBEES, struggle to outperform their benchmarks, aligning with **(Rompotis, 2012)**[19] observation that **ETFs** can be prone to higher risk compared to their corresponding indices.

The **PSR** analysis reveals that most **ETFs**, particularly those tracking the *NIFTY 50* index, report a lower **PSR** (below 50%), indicating that their risk-adjusted performance may be influenced more by chance than skill. This observation is consistent with the findings of **(Shank and Vianna, 2016)**[20], who suggest that increased trading volume and market deviations can amplify volatility, even in **ETFs** designed to be stable. High **PSR** values in **ETFs** tracking *NIFTY 100* and *NIFTY MIDCAP 100*, such as MOM100, suggest that these **ETFs** are more likely driven by genuine skill rather than randomness.

When investing in **ETFs**, investors should take a long-term view and refrain from making decisions based just on performance in the near term. Long-term profits require concentrating on **ETFs** with a track record of consistent, skill-driven success (shown by greater **PSR**). Investors shouldn't think that past performance indicates what will happen in the future. It is crucial to regularly assess the performance of **ETFs**, especially in times of market stress or economic transition.

While **ETFs** are typically perceived as passively managed, data reveals that fund managers nevertheless play a vital role in assuring tracking accuracy, managing expenses and liquidity, and improving risk-adjusted performance. This is particularly crucial in developing economies like India, where market conditions and liquidity might not always match the benchmark, necessitating the expertise of a qualified fund manager to guarantee effective fund management. Many **ETFs** successfully meet or surpass their benchmark returns, according to the integrated analysis, but others have serious problems because of higher risk and volatility. The results are consistent with previous research that highlights the necessity of cautious **ETF** management in order to strike a balance between expenses, risk, and performance. When deciding which **ETFs** to invest in, investors should weigh both IR and **PSR** with more general market conditions.

CONFLICT OF INTERESTS

None

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