Evaluating the Tracking Performance of Index Mutual Funds and Exchange Traded Funds in India

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Though a difference exists in the way Exchange Traded Funds (ETFs) and index mutual funds are formed, both the funds follow the passive style of investing, wherein the fund manager tries to mimic the returns of the chosen market index. Using a sample of 16 index mutual funds and 14 ETFs, from inception of the funds to March 31, 2017, this paper investigates the ability of the index mutual funds and ETFs in India to track their chosen market index. The study reveals that index mutual funds exhibit significantly higher tracking error than its counterpart. The results of regression analysis further reveal that ETF fund managers have been able to construct a portfolio that is more commensurate with the chosen index than its counterpart.

Introduction

The announcement by the labor ministry that Employees' Provident Fund Organization would invest 5% of its corpus in Exchange Traded Funds (ETFs) has put index funds in the limelight and has also intrigued the market regulators, investors and researchers. The origin of index fund, as a tool of investment vehicle, can be traced back to the 1970s. Indexing is a passive investment strategy, which has gained immense momentum in both Indian and overseas markets. Index funds are funds which comprise a portfolio which constitutes a market index in the same proportion, with the intent to mimic performance of the market index. Popularity of index funds has substantially increased mostly due to major studies based on performance of actively managed mutual funds, which conclude that except for a few from the actively managed mutual funds, the remaining persistently underperform market index due to efficient capital market as well as higher expense ratio that diminishes its returns (Elton *et al.*, 1995; Carhart, 1997; Goel *et al.*, 2012; and Muruganandan, 2013).

A stock market index or index is used to give information about price movements in the financial, commodities or any other markets. Stock market indices are meant to capture the overall behavior of the equity markets. An index is created by selecting a group of stocks that are representative of the whole market or a specified sector or segment of the market. Each index has its own calculation methodology and is expressed in terms of change from a base value. An index is a compilation of stocks constructed in a manner to track the performance

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of a particular market, sector, commodity, bond, or other assets. For example, the S&P CNX Nifty is an index that tracks the performance of 50 companies across various sectors of the Indian economy and offers investment managers exposure to the Indian market in one portfolio. Similarly, S&P BSE Sensex constitutes 30 stocks representing well-established and financially sound companies across key sectors.

Index, as a tool, is used by investors and financial managers to describe the market and to compare the return on specific investments. The market indices provide a historical perspective to the performance of stock markets, providing investors with more insight into their investment decisions. A market index is a mathematical construct and as such it may not be invested in directly, but many index funds attempt to track the performance of an index. Index funds are necessarily either index mutual funds or ETFs, which replicate the performance of the chosen index to provide returns similar to that index before expenses. This form of investing gives investors the opportunity to do as well as the markets and not significantly underperform the market.

An index mutual fund is a type of mutual fund with a portfolio constructed to track or match the components of a chosen market index. Index mutual funds accept cash deposit from investors and channel those funds to the purchase of stocks that constitute the chosen index in an attempt to mimic a benchmark index. ETFs are unit investment trusts designed to mimic a chosen market index. An ETF is a basket of stocks that reflects the composition of an index. Each ETF share is a claim on a trust that holds a specified pool of assets. ETF shares are created when an authorized financial institution deposits a portfolio of securities with the trust and receives ETF shares in return, which in turn are sold to other investors in the secondary market.

Open-ended index mutual funds are traded at the end of the day at Net Asset Value (NAV), unlike ETFs which are traded throughout the market hours at a price close to the actual NAV of the scheme. The objectives and characteristics of ETF are similar to index mutual fund managed by asset management companies. The difference between these two asset classes is that ETFs are traded on the stock exchanges and hence investors can derive benefit of trade in ETF just like any ordinary stocks. ETFs are more tax-efficient than index mutual funds due to their in-kind creation and redemption process, which also facilitates arbitrage and pricing efficiency. ETFs are more transparent as compared to index mutual funds as its holdings are declared every day, unlike mutual funds whose holdings are declared after every six months. Most ETFs charge lower annual expenses than index mutual funds. However, as with stocks, one must pay a brokerage to buy and sell ETF units, which can be a significant drawback for those who trade frequently or invest regular sums of money.

At the global level, index funds have done exceedingly well by offering whole new opportunities to retail and institutional investors. The first index fund was introduced in the year 1972, in the US, since then it has escalated to sizable portion throughout the world market. Although the growth of index funds was sluggish initially, the subsequent growth has been phenomenal. Globally, at the end of March 2017, there were around 5,000 ETFs and Exchange Traded Products (ETPs), with assets worth $4,000 bn. In India, the Nifty Benchmark

Exchange Traded Scheme (Nifty BeES) was the first ETF to be introduced in 2001, which was subsequently taken over by Goldman Sachs Asset Management Company. At present, there are over 60 index funds listed in India and a majority of the funds are still passively managed. In the year 2014, the Government of India had used ETFs as a tool for disinvestment of public sector undertakings; the issue which was oversubscribed by ₹1,000 cr. The index fund industry in India got further boost with the Central Government's consent to Employee's Provident Fund Organization to invest up to 5% of its incremental income in ETFs and to allow exempted Provident Funds to invest from 5 to 15% in ETFs. It is important to note that ETFs as well as index mutual funds in India track the benchmark indices. Given that ETFs and index mutual funds both track similar indices in India, it would be riveting to perform a comparative performance analysis on both the classes of the index fund.

The related literature shows that most of the studies on the performance of index funds are restricted to developed markets, and studies are still at infancy in India. The present study makes an attempt to study the performance of the index funds in India based on performance and tracking error.

Literature Review

At a global level, indexing is a popular investment strategy and various studies have been undertaken in order to analyze the performance of index funds. Elton *et al.* (2002) studied the performance of Spider and compared Spider with other methods of indexing using returns and concluded that Spider underperforms the S&P index and other low cost index funds. Poterba and Shoven (2002) reported the pre-tax and after tax return on select index funds and concluded that pre-tax and after tax returns on the index funds were slightly greater than those on the ETFs. Kostovetsky (2003) examined investors' choice between ETFs and index mutual funds by constructing one-period and multi-period models and found that small investors prefer index mutual funds to ETFs. The study also indicates that ETFs become more economical as compared to index mutual funds based on longer holding period. Chen and Huang (2009) examined the performance of Taiwan equity index funds using Jensen's model. The findings indicate that it is relatively easier for fund managers to mimic the small index fund portfolios than the larger ones.

Wong and Shum (2010) studied the performance of 15 ETFs of different countries across bearish and bullish market from 1999 to 2007. The study indicates that ETFs always provide higher returns in a bullish market and also shows that ETF returns are not proportional to the market returns. The study also indicates that ETFs tracking same index do not perform exactly the same and highlights the role of active fund management. Blitz *et al.* (2012) evaluated the performance of index mutual funds and ETFs that are listed in Europe by analyzing the fund performance by comparing the return of index funds and their benchmark indices. The study found that European index funds underperform their benchmarks by 50 to 150 basis points per annum. Kenneth *et al.* (2013) evaluated the performance of ETFs in the emerging markets using risk and return measures and tracking error, and found that there are significant

variations involved in the tracking process of the ETFs, and ETFs are sensitive to their characteristics such as geographic location and economic features.

Rompotis (2013) examined the performance of an ETF and index mutual fund tracking the Athens Stock Exchange index using tracking error. The result showed that mean tracking error of ETF is equal to 0.228 and that of index mutual fund is 0.209, which is more favorable for the index mutual fund. Garg and Singh (2013) evaluated the performance of ETFs and index mutual funds in India that track the same benchmark index. The sample includes a set of five ETFs and index mutual funds from the period ranging from June 2006 to December 2009. The performance of index funds was evaluated based on risk and return comparison of funds and indices, replication strategy and tracking error of the funds. The study found that ETF fund managers have been able to provide better performance than their index mutual fund counterparts. The study indicated better portfolio replication strategy adopted by ETF managers, lower levels of tracking errors, and effectiveness in performance over long-term investment period. Narend (2014) evaluated the performance of ETFs and index mutual funds in India using tracking error, active returns and Jensen's alpha. The data comprised three ETFs and 12 index mutual funds from inception of the funds up to July 31, 2013. The study revealed that index funds have done better than ETFs in terms of a higher Jensen's alpha and a lower tracking error, while ETFs have outperformed index mutual funds with respect to active returns. Chen *et al.* (2017) examined the tracking performance and tracking error of New Zealand's ETFs. Regression models and Johansen's cointegration test were used to examine the tracking performance, and tracking error was measured based on the standard deviation of the differences between the return on the ETF and its underlying index. The study shows that ETFs have substantially different exposure to their underlying indices, and also shows considerable variations in the tracking error.

Objective

The present study aims to examine:

- The tracking performance of select index funds in India; and
- The tracking error of select index funds in India.

Data and Methodology

This study examines the index mutual funds and ETFs listed in India that track either the BSE Sensex or the Nifty 50 index. As the index funds aim to mimic the performance of the chosen market index, tracking performance and tracking error are calculated against total returns index which shows the returns on the index portfolio, inclusive of the dividend. As such, only growth funds were considered for the study. This left us with a sample of 16 index mutual funds and 14 ETFs (Table 1).

The study considers secondary data. The NAV of the funds were sourced from the website of Association of Mutual Funds in India (AMFI) and respective fund houses. The historical closing total returns index values of the chosen market index were sourced from the website of National Stock Exchange of India Ltd. (NSE) and Bombay Stock Exchange (BSE). The

Table 1: Profile of the Select Index Funds in India			
Fund Name	**Underlying Index**	**Fund House**	**Launch Date**
Index Mutual Funds			
Aditya Birla Sun Life Index Fund-Growth	Nifty 50	Birla Sun Life AMC Ltd.	17-09-2002
Franklin India Nifty Index Fund-Growth	Nifty 50	Franklin Templeton Mutual Fund	04-08-2000
HDFC Index Fund Nifty-Growth	Nifty 50	HDFC AMC Ltd.	17-07-2002
HDFC Index Fund Sensex-Growth	S&P BSE Sensex	HDFC AMC Ltd.	17-07- 2002
IDBI Nifty Index Fund-Growth	Nifty 50	IDBI Asset Management	25-06-2010
IDFC Nifty Fund-Growth	Nifty 50	IDFC Mutual Fund	30-04-2010
LIC MF Index-Nifty Plan-Growth	Nifty 50	LIC Mutual Fund AMC Ltd.	28-11-2002
LIC Sensex Index Fund-Growth	S&P BSE Sensex	LIC Mutual Fund AMC Ltd.	28-11-2002
Principal Index Fund Nifty 50-Growth	Nifty 50	Principal PNB AMC Private Ltd.	27-07-1999
Reliance Nifty Index Fund-Growth	Nifty 50	Reliance Mutual Fund	28-09-2010
Reliance Index Fund – Sensex Plan-Growth	S&P BSE Sensex	Reliance Mutual Fund	28-09-2010
SBI Nifty Index Fund-Growth	Nifty 50	SBI Mutual Fund	4-02-2002
Tata Nifty Index Fund-Growth	Nifty 50	Tata Mutual Fund	25-02-2003
Tata Sensex Index Fund-Growth	S&P BSE Sensex	Tata Mutual Fund	25-02-2003
Taurus Nifty Index Fund-Growth	Nifty 50	Taurus Mutual Fund	19-06-2010
UTI Nifty Index Fund-Growth	Nifty 50	UTI Mutual Fund	01-01-2013
Exchange Traded Funds			
Aditya Birla Sun Life Nifty ETF	Nifty 50	Aditya Birla Sun Life Mutual Fund	22-7-2011
Edelweiss Exchange Traded Scheme – Nifty	Nifty50	Edelweiss Mutual Fund	08-05-2015

Table 1 (Cont.)

Fund Name	Underlying Index	Fund House	Launch Date
GS Nifty BeEs	Nifty 50	Goldman Sachs Asset Management	28-12- 2001
ICICI Prudential Nifty iWIN ETF	Nifty 50	ICICI Prudential Mutual Fund	20-03-2013
Kotak Nifty ETF	Nifty 50	Kotak Mahindra Mutual Fund	02-02-2010
Kotak Sensex ETF	S&P BSE Sensex	Kotak Mahindra Mutual Fund	06-06-2008
MOST Shares m50 ETF	Nifty 50	Motilal Oswal Mutual Fund	28-07-2010
Quantum Index Fund ETF	Nifty 50	Quantum Mutual Fund	10-06-2008
R* Shares Nifty ETF	Nifty 50	Reliance Mutual Fund	22-11-2013
Reliance ETF Sensex	S&P BSE Sensex	Reliance Mutual Fund	19-09-2014
SBI-ETF Nifty 50	Nifty 50	SBI Mutual Fund	20-07-2015
SBI-ETF Sensex	S&P BSE Sensex	SBI Mutual Fund	08-03-2013
UTI Nifty ETF	Nifty 50	UTI Mutual Fund	26-08-2015
UTI Sensex ETF	S&P BSE Sensex	UTI Mutual Fund	26-08-2015

data for the study was collected from the inception of the funds or depending on availability of data till March 2017.

Tracking Performance

Tracking performance is the ability of the index fund to provide returns that are commensurate with the returns of the market index, and highlights the ability of the fund manager to construct a portfolio which replicates the chosen market index. The returns provided by index fund are dependent on the returns of chosen market index. To understand the tracking performance of the index funds, a regression analysis was used: the index fund returns were regressed with the index returns based on the following null hypothesis:

H_{01}: *There is no significant replication of chosen market index by the index fund.*

The daily NAV return of index fund and the return of its chosen benchmark index are expressed by Equations (1) and (2), respectively.

$$R_{if} = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} \quad ...(1)$$

$$R_i = \frac{Index_t - Index_{t-1}}{Index_{t-1}} \quad ...(2)$$

where R_{if} is return on index fund and R_i represents return on chosen benchmark index.

Tracking Error

Tracking error is defined as the annualized standard deviation of the difference in returns between the index fund and its target index. It measures the difference between returns from index fund to that of the index. The lower the tracking error, the closer are the returns of the fund to that of the index and vice versa. The studies in the developed markets have found that index mutual fund and ETFs have similar tacking error records (Rompotis, 2013). According to Frino and Gallagher (2001), the main factors driving tracking error of index fund are transaction costs, fund cash flows, benchmark volatility and index composition changes. These factors lead to increase in the tracking error and highlight the performance of the fund manager in minimizing it. Tracking error is measured similar to the methodology used by Pope and Yadav (1994), Frino and Gallagher (2001) and Narend and Thenmozhi (2016).

$$TE = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(e_{fund} - e_{index})^2} \quad ...(3)$$

where e_{fund} represents the returns of the index fund, and e_{index} represents the returns of the fund's underlying benchmark index. The daily tracking error was computed and then annualized for the index funds.

The study also makes use of Augmented Dickey-Fuller (ADF) test to check for the presence of unit root in the time series. In statistics, a unit root test examines whether the time series is non-stationary and possesses a unit root. If the time series has a unit root, it shows a systematic pattern that is unpredictable. The ADF test has the following null hypothesis:

H_{02}: *Index fund return has a unit root.*

Results and Discussion

The study performed ADF test to check for presence of unit root. The results, as reflected in Table 2, indicate data to be stationary as the null hypothesis gets rejected at 1% level of significance in the case of selected index funds. The ADF test results are favorable in the context of the present study.

Table 3 shows the result of regression analysis where index fund returns is the dependent variable and index returns is the independent variable. In regression analysis, regression coefficient measures how much the dependent variable is expected to increase when the independent variable increases by one unit. As the *p*-values are significant at 1%, the null hypothesis H_{01} is rejected and hence we ascertain that index funds in India are able to significantly replicate the performance of the underlying index. Table 3 also shows

Table 2: Results of Unit Root Test		
Index Mutual Funds	**ADF *t*-Statistics**	***p*-Value**
Aditya Birla Sun Life Index Fund-Growth	–43.78143	0.00***
Franklin India Nifty Index Fund-Growth	–59.60088	0.00***
HDFC Index Fund Nifty-Growth	–48.47989	0.00***
HDFC Index Fund Sensex-Growth	–48.17862	0.00***
IDBI Nifty Index Fund-Growth	–37.69849	0.00***
IDFC Nifty Fund-Growth	–38.59391	0.00***
LIC MF Index-Nifty Plan-Growth	–48.53774	0.00***
LIC Sensex Index Fund-Growth	–47.77013	0.00***
Principal Index Fund Nifty 50-Growth	–47.50793	0.00***
Reliance Index Fund Sensex-Growth	–29.43184	0.00***
SBI Nifty Index Fund-Growth	–43.60582	0.00***
Tata Nifty Index Fund-Growth	–43.54910	0.00***
Tata Sensex Index Fund-Growth	–48.84131	0.00***
Taurus Nifty Index Fund-Growth	–37.61931	0.00***
UTI Nifty Index Fund-Growth	–50.68054	0.00***
Exchange Traded Funds		
Aditya Birla Sun Life Nifty ETF	–34.23484	0.00***
Edelweiss Exchange Traded Scheme-Nifty	–20.45295	0.00***
GS Nifty BeEs	–43.98302	0.00***
ICICI Prudential Nifty iWIN ETF	–27.03402	0.00***
Kotak Nifty ETF	–32.20259	0.00***
Kotak Sensex ETF	–33.73218	0.00***
MOST Shares m50 ETF	–36.96929	0.00***
Quantum Index Fund ETF	–42.75023	0.00***
R* Shares Nifty ETF	–24.14929	0.00***
Reliance ETF Sensex	–23.10208	0.00***
SBI-ETF Nifty 50	–19.40744	0.00***
SBI-ETF Sensex	–22.97196	0.00***
UTI Nifty ETF	–18.77253	0.00***
UTI Sensex ETF	–18.57170	0.00***
Note: *** denotes significant at 1%.		

Table 3: Results of Regression Analysis					
Fund Name	**Underlying Index**	**Regression Coefficient**	**Durbin-Watson Test Stat.**	**R^2 (%)**	***p*-Value**
Index Mutual Funds					
Aditya Birla Sun Life Index Fund-Growth	Nifty 50	0.985	2.963284	83	0.0000***
Franklin India Nifty Index Fund-Growth	Nifty 50	0.952	2.947482	92	0.0000***
HDFC Index Fund Nifty-Growth	Nifty 50	0.962	2.766459	98	0.0000***
HDFC Index Fund Sensex-Growth	S&P BSE Sensex	0.829	2.714466	87	0.0000***
IDBI Nifty Index Fund-Growth	Nifty 50	0.986	3.160985	98	0.0000***
IDFC Nifty Fund-Growth	Nifty 50	0.994	2.411028	99	0.0000***
LIC MF Index-Nifty Plan-Growth	Nifty 50	0.945	2.84996	93	0.0000***
LIC Sensex Index Fund-Growth	S&P BSE Sensex	0.952	2.662246	93	0.0000***
Principal Index Fund Nifty 50-Growth	Nifty 50	0.955	2.760203	88	0.0000***
Reliance Index Fund Sensex-Growth	Nifty 50	0.995	2.044594	99	0.0000***
SBI Nifty Index Fund-Growth	S&P BSE Sensex	0.971	1.789978	99	0.0000***
Tata Nifty Index Fund-Growth	Nifty 50	0.961	3.022446	96	0.0000***
Tata Sensex Index Fund-Growth	Nifty 50	0.977	2.372900	69	0.0000***
Taurus Nifty Index Fund-Growth	S&P BSE Sensex	0.979	2.782151	98	0.0000***
UTI Nifty Index Fund-Growth	Nifty 50	0.975	2.719524	99	0.0000***
Principal Index fund Nifty 50-Growth	Nifty 50	0.776	1.903987	60	0.0000***
Exchange Traded Funds					
Aditya Birla Sun Life Nifty ETF	Nifty 50	0.981	2.092972	99	0.0000***
Edelweiss Exchange Traded Scheme – Nifty	Nifty 50	0.997	2.014566	99	0.0000***
GS Nifty BeEs	Nifty 50	0.816	2.838286	64	0.0000***
ICICI Prudential NifyiWIN ETF	Nifty 50	0.977	1.884247	98	0.0000***
Kotak Nifty ETF Fund	Nifty 50	0.976	2.705824	95	0.0000***
Kotak Sensex ETF	S&P BSE Sensex	0.994	1,.989039	99	0.0000***
MOST Shares m50 ETF Fund	Nifty 50	1.026	1.892853	92	0.0000***
Quantum Index Fund ETF	Nifty 50	0.995	1.869373	99	0.0000***
R* Shares Nifty ETF	Nifty 50	0.992	2.396457	99	0.0000***
Reliance ETF Sensex	S&P BSE Sensex	0.995	1.915321	99	0.0000***

Table 3 (Cont.)

Fund Name	Underlying Index	Regression Coefficient	Durbin-Watson Test Stat.	R^2 (%)	*p*-Value
Exchange Traded Funds					
SBI-ETF Nifty 50	Nifty 50	1.00	1.99927	99	0.0000***
SBI-ETF Sensex	S&P BSE Sensex	0.996	1.966288	99	0.0000***
UTI Nifty Exchange Traded Fund	Nifty 50	0.988	1.882532	99	0.0000***
UTI Sensex Exchange Traded Fund	S&P BSE Sensex	0.988	2.053167	99	0.0000***
Note: *** denotes significant at 1%.					

Durbin-Watson statistic test results which tests the presence of autocorrelation. In Durbin-Watson test, a value close to 2 signifies no autocorrelation in the sample and the regression is not a spurious. R^2 measures how close the data is to the fitted regression line, hence the higher the R^2, the better the model fits the data.

Table 4 shows the number of observation and tracking error of select index funds. Tracking error highlights the accuracy with which the index fund manager is able to adjust for the factors that deviate index fund returns from its underlying index. It can be seen from the table that R* Shares Nifty ETF and Quantum Index Fund ETF have the lowest tracking error of 0.0001. On the other hand, the Reliance Nifty Index Fund shows the minimum tracking error of 0.0003.

Table 4: Tracking Error of Select Index Funds in India

Fund Name	Underlying Index	No. of Observations	Tracking Error
Index Mutual Funds			
Aditya Birla Sun Life Index Fund-Growth	Nifty 50	3446	0.0065
Franklin India Nifty Index Fund-Growth	Nifty 50	4125	0.0045
HDFC Index Fund Nifty-Growth	Nifty 50	2706	0.0018
HDFC Index Fund Sensex-Growth	S&P BSE Sensex	2684	0.0054
IDBI Nifty Index Fund-Growth	Nifty 50	1665	0.0014
IDFC Nifty Fund-Growth	Nifty 50	1706	0.0006
LIC MF Index-Nifty Plan-Growth	Nifty 50	2662	0.0039
LIC Sensex Index Fund-Growth	S&P BSE Sensex	2664	0.0038
Principal Index Fund Nifty 50-Growth	Nifty 50	4293	0.0051
Reliance Nifty Index Fund-Growth	Nifty 50	1597	0.0003
Reliance Index Fund – Sensex Plan-Growth	S&P BSE Sensex	1042	0.0004
SBI Nifty Index Fund-Growth	Nifty 50	3696	0.0026
Tata Nifty Index Fund-Growth	Nifty 50	3440	0.0098

Table 4 (Cont.)

Fund Name	Underlying Index	No. of Observations	Tracking Error
Index Mutual Funds			
Tata Sensex Index Fund-Growth	S&P BSE Sensex	2705	0.0016
Taurus Nifty Index Fund-Growth	Nifty 50	1673	0.0009
UTI Nifty Index Fund-Growth	Nifty 50	2864	0.0101
Exchange Traded Funds			
Aditya Birla Sun Life Nifty ETF	Nifty 50	1369	0.0002
Edelweiss Exchange Traded Scheme-Nifty	Nifty 50	466	0.0004
GS Nifty BeEs	Nifty 50	1703	0.0066
ICICI Prudential NifyiWIN ETF	Nifty 50	883	0.0010
Kotak Nifty ETF Fund	Nifty 50	1220	0.0019
Kotak Sensex ETF	S&P BSE Sensex	2161	0.0010
MOST Shares m50 ETF Fund	Nifty 50	1642	0.0030
Quantum Index Fund ETF	Nifty 50	2134	0.0001
R* Shares Nifty ETF	Nifty 50	719	0.0001
Reliance ETF Sensex	S&P BSE Sensex	614	0.0002
SBI-ETF Nifty 50	Nifty 50	414	0.0006
SBI-ETF Sensex	S&P BSE Sensex	986	0.0005
UTI Nifty Exchange Traded Fund	Nifty 50	385	0.0001
UTI Sensex Exchange Traded Fund	S&P BSE Sensex	386	0.0002

Table 5 shows the average tracking error of the selected index mutual funds and ETFs. The index mutual funds have an average tracking error of 0.003669 as compared to 0.001136 of ETFs. The ETF fund managers have shown a better ability to mimic index returns as compared to their counterpart.

Table 5: Mean Tracking Error of Select Index Funds

Index Fund	Mean Tracking Error
Index Mutual Funds	0.003669
Exchange Traded Funds	0.001136

Conclusion

The study examines how well the index mutual funds and ETFs tracking S&P Nifty 50 and BSE Sensex in India are able to mimic the chosen market index based on tracking performance and tracking error. Indexing is a passive investment strategy and unlike active funds does not aim to outperform the market index. Index funds being passive in nature charge lower expenses

as compared to active mutual funds, so that investors earn returns similar to that of market index before expenses. Though, all index funds in India track similar indices ETFs have shown slightly better replication ability and lesser mean tracking error (0.001) as compared to index mutual funds (0.003). It is pertinent to note that R* Shares Nifty ETF and Quantum Index Fund ETF have the lowest tracking error amongst the chosen sample. The regression analysis further reveals superior portfolio replication ability of ETFs as compared to index mutual funds. In terms of R^2 too, ETFs have shown higher R^2 values as compared to its counterpart. In India, though ETFs have shown slightly better performance over index mutual funds, both the investment vehicles have shown superior portfolio replication ability. Individual and institutional investors tend to diversify their investments across different markets, thus the result of the study would be crucial for investors interested in portfolio diversification. Both index mutual fund and ETF serve different purposes and can be utilized based on the clientele effect (Agapova, 2011).

Limitations and Scope for Future Studies: The study is limited only to index funds tracking S&P Nifty 50 and BSE Sensex, the popular indices of India, and does not consider funds tracking other indices. Hence, there is scope for studying the performance of funds tracking other different indices. A study may also be conducted to analyze the impact of determinants like buffer cash, transaction costs and fund flows on the magnitude of tracking error.❖

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