

COMPARATIVE PERFORMANCE OF EXCHANGE TRADED FUNDS VIS-À-VIS INDEX FUNDS IN INDIA: AN EMPIRICAL ANALYSIS

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The paper compares the performance of 18 Exchange Traded Funds (ETFs) and 21 Index Funds from their respective inception date till Dec 2014. The paper analyzes the average risk and return level, tracking error, replication strategy and Jensen's alpha. The returns of ETF and index funds were regressed on index return and results show absence of excess return and insignificant alphas. The plausible reason for absence of excess return can be due to transaction cost, management fees, passive investment style and cash rebalancing in the portfolio. Further, it was found that the ETFs are better in replicating the underlying index movements as compared to index funds. However, ETFs experience higher tracking error due to the presence of high bid-ask spread and pricing inefficiency in the ETF trading structure.

Key words: Exchange Traded Funds, Index Funds, Tracking Error, Jensen Alpha

INTRODUCTION

Exchange Traded Funds popularly known as ETFs are a remarkable evolution in the investment industry and are increasingly challenging the dominance of open-ended mutual funds across the globe. ETFs at their core provide the investors with a basket of securities which can be bought or sold over a stock exchange. All day trading makes the ETFs more flexible than their counterpart's open-ended mutual funds and can also be sold short or at margin just like a stock. The inception of the Standard and Poor's Depository Receipts (SPDRs) on the AMEX Exchange in 1993 and the subsequent rapid growth of Exchange Traded Funds (ETFs) with products known as Qubes (QQQ), Diamonds, and iShares, have enhanced investment choices and brought new challenges to the professional portfolio management. ETFs have grown globally at an exponential rate with ETFs assets size approximating \$2.5 trillion in 2015 from 2.2 billion in 2005 (Business Insider, 2015). ETFs are different from Mutual funds as the ETF units are not sold to the public for cash, instead

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the Asset Management Company that sponsors the ETF (Fund) takes the shares of companies comprising the index from various categories of investors like authorized participants, large investors and institutions. In turn, it issues them a large block of ETF units. The price of the ETF tracks the value of the underlying index. This provides an opportunity to investors to compare the value of underlying index against the price of the ETF units prevailing on the Exchange. If the value of the underlying index is higher than the price of the ETF, the investors may redeem the units to the Sponsor in exchange for the higher priced securities. Conversely, if the price of the underlying securities is lower than the ETF, the investors may create ETF units by depositing the lower-priced securities

Exchange-Traded Funds (ETFs) are gradually becoming popular in India primarily due to low cost structure, passive investment strategy, diversification, real time trading and increased level of transparency. In India, ETFs were first introduced in the year 1994 with the launch of Morgan Stanley Growth Fund, but the fund failed to attract investors' attention due to its poor track record as well as large discount to the NAV. Things changed after the launch of Nifty Benchmark Exchange Traded Scheme-Nifty BeES (launched in December 2001), an open-ended, passively managed fund. The fund set the record straight for ETFs in the country. Soon after, the ETF segment has grown slowly but steadily. The Assets under Management risen from ₹660 crore in March 2009 to ₹1607 crore in March 2012 to ₹4528 crore in March 2014 and ₹7317 crore in May 2015 (Monthly AMFI Report).

The instrument has been adopted as a PSU disinvestment tool by Government of India and upon its launch in March 2014, it was a instant hit among investors where Government was able to successfully raise ₹3000 crore and the issue was oversubscribed by ₹1000 crore. The Government is again planning to re-launch the Central Public Sector Enterprises (CPSE) ETF to sell a 10% stake in Coal India for ₹23,700 crore. The present paper attempts to study the pricing efficiency of ETFs, impact of risk control and arbitrage strategies on volume of ETFs and relationship between future returns, contemporaneous premium and lagged premium.

The remainder of the paper is divided into five main areas. Section II presents the literature review. Section III provides a description of the data employed and research methodology. Section IV discusses the results and the paper concludes with Section V.

LITERATURE REVIEW

In the past financial literature, a comprehensive research has been carried out on mutual fund performance, persistence of mutual fund performance and factors affecting the

performance of mutual funds such as fund manager's stock picking ability and market timing ability. The studies on mutual fund performance include Sharpe (1966), Blake, Elton and Gruber (1993), Malkiel (1995), Carhart (1997), Bollen and Busse (2001). In Indian context, seminal work has been done on the above mentioned issues including the work of Barua & Varma(1991), Madhusoodanan (1996),Khorana (2001), Gupta (2000a), Gupta (2000b), Chander (2002), Gupta (2004), Raychaudhari (2005)etc.

Since the advent of Exchange Traded Funds in 1993, massive proliferation has been witnessed across sectors, asset classes, currency and commodities and has challenged the dominance of traditional mutual funds. In order to provide an extensive understanding on exchange traded funds, the literature review provides detail overview on nature, trading characteristics, performance, pricing efficiency, existence and persistence of premium/discount of exchange traded funds. The earliest work in ETFs is of Gastineau (2001) who examines ETFs by tracing their origin in the US markets, describing their main types and the exchanges where they are traded, analyzing their characteristics and the operating mechanism and the benefits derived from ETFs for capital markets participants especially in context of short selling for the determination of assets' size and fund manager's profitability.

Dellva (2001) performs a simulation exercise with one mutual fund and both ETFs that follow the S&P 500. He determined that small investors and short-term investors benefited most by investing in the mutual fund that he chose for his study. Elton, Gruber, Comer and Li (2002) examines Spiders relative underperformance by 18 basis points per day and presence of short-lived deviation between NAV and closing prices that typically disappears in a day. Also, the trading volume is significantly related to size of discount/premium prevailing at the end of day. Poterba and Shoven (2002) examine the differences in returns between the SPDR trust and the Vanguard Index 500 fund. Both of these securities follow the S&P 500 index and have the advantage of being the largest ETF and the largest mutual fund. They show that ETFs perform virtually as well as index funds. Kostovetsky (2003) shows that under any reasonable circumstances, a small investor would prefer an index mutual fund over the corresponding ETF. Also, larger investors normally will benefit from investing in ETFs, especially if their holding period is of sufficient length. The "sufficient length" depends upon the amount invested.

Gallagher & Segara (2004) finds classical ETFs in Australia provide investors with returns that are equivalent to the underlying benchmark before costs. The ETFs experience lower tracking error when compared with traditional index funds. The pricing deviation arising

due to the difference between closing price and NAV is small and lacks persistence. Gardner and Welch (2005) identify two advantages of ETFs over index mutual funds. First, the tradability of ETF shares in a stock exchange does not trigger capital gain distributions. Second, the creation and redemption feature permits a gain or loss to be deferred because ETF shares are exchanged by underlying stocks and vice versa. Rompotis (2005) compares the performance of 16 ETFs and index funds in pairs tracking similar index. The author finds that ETFs follow more accurately index composition in comparison with index funds. ETFs bid-ask prices are less suitable for calculating tracking ability and performance. Also, a positive relation between ETFs performance and annual expense ratio was observed.

Adjei (2009) finds insignificant difference in performance of ETFs and S&P500 index and weak evidence of performance persistence is exhibited in half-yearly and yearly returns. Rompotis (2009) examines the performance of 73 iShares from 2005 to 2006. The performance of iShares does not match the underlying index and the magnitude of subsequent tracking error is dependent on expense ratio and risk embedded in ETF. There exist an inverse relationship between premium and tracking error and a positive relation between trading volume and intraday price volatility. Further, lagged premium negatively impacts return and concurrent premium positively influence the ETF performance. Svetina (2010) finds that ETF underperform their respective benchmark indices but outperform the open-ended index funds. Rompotis (2011) observe the comparative performance of Alpha ETF FTSE ATHEX 20 and actively managed mutual funds and index funds in Greek market. The results show that ETF experienced low tracking error when compared with actively managed funds and index funds peers. Also, the classical mutual funds are expensive but perform better when compared with ETF.

Shanmugham & Zabiulla (2012) observe the pricing efficiency of Nifty BeES in bullish and bearish market conditions. The authors found that significant difference exist in alpha generating abilities, tracking error and average premium in two market conditions. Narend and Welch (2013) finds abnormal returns are higher for ETFs as compared to index funds. The index funds have lower tracking error in comparison to ETFs and tracking error affects fund flow in the following period. Also, age, expense ratio, standard deviation and market concentration are significant determinants in abnormal returns of ETFs. Narend and Thenmozhi (2014) examined the performance of 3 ETFs and 12 index funds tracking S&P BSE Sensex and CNX Nifty from inception of each fund till July 2013. The authors find that tracking error is higher for ETFs when compared to index funds but ETFs provide better alpha (excess return over the market) and active returns.

In India, existing studies, namely, Gayathri & Bhuvaneshwari,2009; Natarajan & Dharani,2010; Athma & Kumar,2011; Khanapuri,2012; Prasanna,2012; Garg & Singh,2013; Narend and Thenmozhi,2013;Swathy,2015 have analyzed the trading characteristics and performance of ETFs. The present study aims to fill the void by using publicly available data for a larger sample of ETFs and index funds and analyzing their replication strategy, tracking error and ability to generate abnormal returns.

OBJECTIVES OF THE STUDY

- To empirically examine the performance of Exchange Traded Funds (ETFs) in India in terms of their risks and returns, replication strategy, tracking ability and performance effectiveness.
- To evaluate the comparative risk-adjusted performance of Exchange Traded Funds and Open-Ended Mutual Index Funds in India.
- To measure the tracking error of Exchange Traded Funds and Open-Ended Mutual Index Funds vis-à-vis the underlying indices.

DATA AND METHODOLOGY

As on 31st May 2015, the Indian equity market has 43 ETFs, out of which 26 are equity ETFs, 14 gold ETFs, 2 international ETFs and 1Debt ETF. For the present study, we propose to examine 18 equity ETFs that have at least three years of existence and minimum assets under management (AUM) of Rs1 crore. In this study, we examine the performance of 18 listed equity ETFs and 21 index funds that track major indices including CNX Nifty, S&P BSE Sensex, CNX Nifty, CNX Nifty Junior Index, CNX Bank Index, CNX PSU Bank Index, CNX Infrastructure Index, CNX Nifty Shariah and CNX Midcap. A brief profile of the selected ETFs is given in Table 1. The index funds that are considered in this study are growth funds and a brief profile of the funds is provided in Table 2. The data was collected from National Stock Exchange, Bombay Stock Exchange, respective fund houses and Value Research website. The daily closing prices of indices and NAV of the funds were analyzed from the inception of each ETF and index fund till Dec2014. Further, the performance of ETF s and index funds were measured by comparing their daily returns with underlying benchmark. The tracking error of ETFs and index funds were examined to observe how closely they replicate the performance of underlying benchmarks. Also, in order to examine whether ETFs and index funds are able to generate excess returns, Jensen's alpha was calculated for each fund.

Table 1: Profile of Exchange Traded Funds

S. No	Name of ETFs	Launch Date	Index	Symbol	AUM as on 30 April 2015 (in crores)	Expense Ratio as on 31 March 2015
1	Goldman Sachs Nifty Exchange Traded Scheme	Jan-02	CNX Nifty Index	NIFTYBBES	Rs. 747	0.54%
2	ICICI Prudential Sensex Spice ETF	Jan-03	S&P BSE Sensex	ISENSEX	Rs5	0.40%
3	Goldman Sachs Nifty Junior Exchange Traded Scheme	Feb-03	CNX Nifty Junior Index	JUNIORBBES	Rs 95	1.10%
4	Goldman Sachs Banking Index Exchange Traded Scheme	May-04	CNX Bank Index	BANKBBES	Rs 1748	0.54%
5	Goldman Sachs PSU Bank Exchange Traded Scheme	Oct-07	CNX PSU Bank Index	PSUBNKBBES	Rs 35	0.51%
6	Kotak PSU Bank ETF	Oct-07	CNX PSU Bank Index	KOTAKPSUBK	Rs 27	0.49%
7	Quantum Index Fund	May-08	CNX Nifty	QNIFTY	Rs 3	0.50%
8	Kotak Sensex ETF	Jun-08	S&P BSE Sensex	KTKSENSEX	Rs8	0.50%
9	Reliance Banking Exchange Traded Fund	Aug-08	CNX Bank Index	RELBANK	Rs 357	0.22%
10	Goldman Sachs S&P CNX Nifty Shariah Index ETF	Jan-09	CNX Nifty Shariah	SHARIABEES	Rs 1	1.00%
11	Kotak Nifty ETF	Jan-10	CNX Nifty	KOTAKNIFTY	Rs 98	0.39%
12	MOST Shares M50	Jul-10	MOST 50 Basket	M50	Rs 27	1.31%
13	Goldman Sachs Infrastructure Exchange Traded Scheme	Sep-10	CNX Infrastructure Index	INFRABEES	Rs 15	1.11%
14	MOST Shares M100	Jan-11	CNX Midcap Index	M100	Rs104	1.00%
15	Religare Invesco Nifty ETF	Jun-11	CNX Nifty	RELGRNIFTY	Rs1	1.00%
16	Birla Sun Life Nifty ETF	Aug-11	CNX Nifty	BSLNIFTY	Rs 2	0.55%
17	IIFL Nifty ETF	Oct-11	CNX Nifty	IIFLNIFTY	Rs.6	0.25%
18	Goldman Sach Hang Seng BeES	10-Mar	Hang Seng	HNGSNGBBES	Rs.7	1%

Table 2: Profile of Index Funds

S. No	Name of the Scheme	Launch Date	Index	AUM as on 30 April 2015	Expense ratio as on 31 March 2015
1	HDFC Index Fund - Sensex Plus Plan	Jul-02	CNX Nifty	Rs124 crore	1.06%
2	Birla Sun Life Index Fund - Growth	Sept-02	CNX Nifty	Rs206 crore	0.69%
3	Tata Index Fund - Sensex Plan - Option A	Feb-03	S&P BSE Sensex	Rs6 crore	1.77%
4	Goldman Sachs S&P CNX 500 Fund - Growth	Jan-09	S&P CNX500	Rs63 crore	1.74%
5	ICICI Prudential Index Fund	Feb-02	CNX Nifty	Rs99 crore	0.74%
6	HDFC Index Fund - Sensex Plan	Jul-02	S&P BSE Sensex	Rs124 crore	1.06%
7	HDFC Index Fund - Nifty Plan	Jul-02	CNX Nifty	Rs 102 crore	0.50%
8	SBI Magnum Index Fund - Growth	Jan-02	CNX Nifty	Rs88 crore	1.62%
9	Tata Index Fund - Nifty Plan - Option A	Feb-03	CNX Nifty	Rs 9 crore	1.77%
10	Franklin India Index Fund - NSE Nifty Plan - Growth	Mar-04	CNX Nifty	Rs 207 crore	1.05%

11	Franklin India Index Fund - BSE Sensex Plan - Growth	Mar-04	S&P BSE Sensex	Merged into Franklin India Index Fund (NSE Nifty Plan) as on Aug 22/2014	
12	Canara Robeco Nifty Index - Growth	Oct-04	CNX Nifty	Merged into Canara Robeco Large Cap + Fund w.e.f April 30/2014	
13	LIC Nomura MF Index Fund - Sensex Plan - Growth	Dec-02	S&P BSE Sensex	Rs11 crore	1.75%
14	LIC Nomura MF Index Fund - Sensex Advantage Plan - Growth	Dec-02	S&P BSE Sensex	Rs 4 crore	1.77%
15	LIC Nomura MF Index Fund - Nifty Plan - Growth	Dec-02	CNX Nifty	Rs13 crore	1.75%
16	PRINCIPAL Index Fund - Growth	Jul-99	CNX Nifty	Rs19 crore	0.01%
17	UTI Nifty Fund - Growth	Feb-00	CNX Nifty	Rs236 crore	0.51%
18	Tata Index Fund - Sensex Plan - Option B	Feb-03	S&P BSE Sensex	Redeemed and closed on Oct01/2012	
19	IDFC Nifty Fund - Growth	Apr-10	CNX Nifty	Rs32 crore	0.27%
20	IDBI Nifty Index Fund - Growth	Jun-10	CNX Nifty	Rs 96 crore	1.62%
21	Taurus Nifty Index Fund - Growth	Jun-10	CNX Nifty	Rs0.53 crore	1.58%
22	ICICI Prudential Nifty Junior Index Fund - Growth	Jun-10	CNX Nifty Junior Index	Rs 30 crore	0.71%
23	Reliance Index Fund - Nifty Plan - Growth	Sept-10	CNX Nifty	Rs 43 crore	0.93%
24	Reliance Index Fund - Sensex Plan - Growth	Sept-10	S&P BSE Sensex	Rs5 crore	0.94%
25	IDBI Nifty Junior Index Fund - Growth	Sept-10	CNX Nifty Junior	Rs30 crore	1.67%

Daily closing prices are converted into log-price relatives as they can be easily interpreted as continuously compounded returns and are time additive (Brooks, 2002). Hence, the daily returns based on closing prices of the index and NAVs of ETF and index funds were computed as follows:

$$\begin{aligned}
 R_p &= \log (P_t/P_{t-1}) \\
 R_{nav} &= \log (NAV_t/NAV_{t-1})
 \end{aligned}
 \tag{1}$$

Where in equation (1),

R_p = Daily closing returns of the index

R_{nav} = Daily returns based on NAVs of ETF and index funds

P_t and P_{t-1} are closing prices of index at time t and $t-1$ and NAV_t and NAV_{t-1} are daily Net Asset Value at time t and $t-1$ of ETFs and index funds.

In case returns based on NAV, no adjustment is made for dividend ad right issue. To be consistent with time series data, in case of missing figures for a particular date, the same has been deleted from the data set for all variables considered.

METHODOLOGY

a) Replication Strategy:

In order to understand the replication strategy of selected ETFs and index funds, the well-known capital asset pricing model has been used. The estimating equation is:

$$R_{pt} - R_f = \alpha_p + \beta_p(R_{bt} - R_f) + \varepsilon_{pt} \quad (2)$$

Wherein, the alpha coefficient (α_p) is the Jensen's alpha and measures the portfolio managers stock selection ability. Beta coefficient (β) describes the sensitivity of fund's returns to index movement, thereby measuring the level of systematic risk to which an ETF is exposed. In our case the value of beta can be used as an indicator of ETFs replication strategy. If the value of beta is equal or close to one then this reflects a full replication strategy wherein the fund manager invests in all components of the underlying benchmark in the same weight. On the other hand, if the value of beta is less than one, then this reflects a selective replication strategy i.e. the fund managers exercises some discretion in picking the stocks of the underlying benchmark and deviated from passive investing strategy (Rompotis, 2006a) ε_{pt} refers to the residual daily return of ETF portfolio 'p' which is not accounted for by the model. Since both index funds and ETFs follow benchmark replication strategy, the value of the intercept should not be statistically significant from zero. The present analysis uses NAV based returns to measure the tracking ability of both index funds and ETFs.

b) Tracking error:

Tracking error measures the difference between the return of a fund and its underlying (benchmark) index. Most portfolio managers with a benchmark use the minimization of tracking error approach to weighting stocks and building a portfolio. In this paper, we follow the methodology adopted by Frino and Gallagher (2001), Gallagher & Segara (2004) and Rompotis (2012) for calculating tracking error. The present study calculates tracking error by three methods:

First, tracking error in day 't' is calculated as the absolute difference in returns of the index portfolio and the benchmark index, where the daily average absolute tracking error of n days ($TE3,p$) is defined as follows:

$$TE1 = \sum_{t=1}^n \frac{|e_p|}{n} \quad (3)$$

where:

$$e_{pt} = R_{pt} - R_{bt}$$

R_{pt} is the return of index portfolio p in period t ; R_{bt} is the return of the benchmark index b in period t ; and n = the number of observations in the period

$|e_p|$ is the absolute return differences between ETF return and index return.

The second method of tracking error measures the standard deviation of the difference in returns between the index portfolio and the underlying benchmark index return ($TE2$).

This measure is expressed as follows:

$$TE2 = \sqrt{\frac{1}{n-1} \sum_{t=1}^n (e_{pt} - \bar{e}_p)^2} \quad (4)$$

The third method (herein referred to as TE1), measures tracking error from the following equation:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \varepsilon_{pt} \quad (5)$$

R_{pt} is the return of ETF in period t ; R_{bt} is the return of the benchmark index; α_p is the alpha whose value is expected to be zero due to passive investment strategy. β_p is the measure of systematic risk of ETF.

EMPIRICAL RESULTS

Table 3: Descriptive Statistics of Exchange Traded Funds (ETFs)

Name of ETFs	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis
Goldman Sachs Nifty BeES	0.000274	0.000528	0.07079	-0.05661	0.006694	-0.24347	12.3579
ICICI Prudential Sensex Spice ETF	0.000249	0.000424	0.06949	-0.0464	0.00665	0.00177	11.8351
Goldman Sachs Nifty Junior ETF	0.00005	0.00092	0.8359	-1.00936	0.03075	-12.8174	820.2195
Goldman Sachs Banking Index ETF	0.000325	0.000364	0.075416	-0.05762	0.00959	0.28349	8.3363
Goldman Sachs PSU Bank ETF	0.000124	0.000369	0.07004	-0.05411	0.009655	0.15735	6.35009
Kotak PSU Bank ETF	0.00008	0.000348	0.11248	-0.05501	0.00999	0.7257	13.6198
Quantum Index Fund	0.00021	0.00028	0.07039	-0.05635	0.006583	0.340069	16.4406
Kotak Sensex ETF	0.000157	0.000242	0.06991	-0.05025	0.00687	0.40713	13.765
Reliance Banking ETF	0.00039	0.000461	0.105326	-0.05767	0.00906	0.89281	16.75756
Goldman Sachs S&P CNX Nifty Shariah Index ETF	-0.00028	-0.00008	0.023116	-0.07168	0.00508	-1.92272	30.8193
Kotak Nifty ETF	0.000134	0.00009	0.016184	-0.01809	0.004859	0.01717	3.7117

MOST Shares M50	9.32E-06	0.000389	0.0159	-0.15066	0.006899	-9.73959	214.312
Goldman Sachs Infrastructure ETF	-0.00009	-0.00022	0.031368	-0.02325	0.00628	0.065058	4.07268
MOST Shares M100	0.00025	0.00051	0.018852	-0.01916	0.00492	-0.19519	3.70129
Religare Invesco Nifty ETF	0.000233	0.00255	0.02011	-0.01808	0.004706	0.103896	4.25236
Birla Sun Life Nifty ETF	0.000225	0.000247	0.01958	-0.01789	0.004634	0.103736	4.19546
IIFL Nifty ETF	0.000297	0.000343	0.02008	-0.01803	0.00449	0.16581	4.45647
Goldman Sach Hang Seng EcES	0.000213	0.00009	0.023566	-0.02314	0.00481	0.019237	4.94041

Table 4: Descriptive Statistics of Index funds

Index Fund	Mean	Median	Maximum	Minimum	Std.Dev	Skewness	Kurtosis
ICICI Prudential Index Nifty Plan	0.000264	0.000473	0.071386	-0.0566	0.00695	-0.02294	11.7386
UTI Nifty Index Fund	0.000282	0.000372	0.113241	-0.05536	0.00756	1.53824	32.1963
Franklin India Fund (NSE Plan)	0.000245	0.00044	0.070594	-0.05487	0.00681	-0.01258	11.5984
IDBI Nifty Index Fund	0.00017	0.00008	0.01602	-0.0181	0.00461	0.00663	3.8427
HDFC Index Fund (Nifty Plan)	0.00023	0.00042	0.07096	-0.05438	0.006776	-0.00358	11.8484
LIC Nomura - Nifty Plan	0.000216	0.000332	0.06844	-0.05579	0.00673	0.02076	12.3336
Birla Sun Life Index Nifty Plan	0.00023	0.00045	0.06961	-0.05718	0.006928	-0.06996	11.2846
Principal Index Fund	0.00023	0.00044	0.06988	-0.05609	0.006824	-0.03942	11.7068
SBI Magnum Index Fund	0.00023	0.000392	0.07042	-0.05491	0.00671	0.02063	11.7225
HDFC Sensex Fund	0.00024	0.000404	0.06607	-0.04864	0.00674	0.03984	10.27101
HDFC Sensex Plus Plan	0.000296	0.00046	0.0622	-0.03655	0.006134	0.14469	9.80779
LIC Nomura- Sensex Plan	0.000225	0.00039	0.06678	-0.04959	0.0068	0.132894	11.3726
LIC Nomura Sensex Advantage	0.00021	0.00035	0.0663	-0.03625	0.00623	0.15028	11.93044
Reliance Index Fund -Nifty Plan	0.00015	0.00009	0.021516	-0.01869	0.004863	0.12488	4.28731
Reliance Index Fund - Sensex Plan	0.000125	0.00014	0.01558	-0.01802	0.004545	0.03932	3.71873
Tata Index Fund Nifty Plan A	0.000287	0.000356	0.112743	-0.07118	0.007885	1.47122	35.3836
Tata Index Fund Sensex Plan A	0.000274	0.000363	0.106227	-0.05996	0.007597	1.417338	30.18224
Taurus Nifty Index Fund	0.000127	0.00008	0.019899	-0.018	0.00466	0.101223	3.96264
Canara Robeco Nifty Index Fund	0.000134	0.00016	0.026346	-0.01786	0.00483	0.16704	4.31936
IDFC Nifty Index Fund	0.000196	0.000176	0.016126	-0.0192	0.004704	-0.02742	3.97224
ICICI Prudential Nifty Junior Fund	0.000163	0.000466	0.017803	-0.0181	0.00499	-0.13176	3.76597

Table5: Descriptive Statistics of Indices

Index	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis
CNX Nifty Index	0.000272	0.000524	0.07094	-0.05669	0.00668	-0.25496	12.5836
S&P BSE Sensex	0.000251	0.000424	0.069985	-0.05039	0.006855	0.08001	11.1732
CNX Nifty Junior Index	0.000416	0.000925	0.074927	-0.05704	0.007843	-0.49218	11.42135
CNX Bank Index	0.00033	0.00049	0.07487	-0.05857	0.009596	0.07023	6.90328
CNX PSU Bank Index	0.000102	0.00037	0.07102	-0.05507	0.009754	0.15767	6.42187
CNX Nifty Shariah	-0.00027	-0.00009	0.023244	-0.07218	0.005103	-1.92943	30.98238
CNX Infrastructure Index	-0.00009	-0.00018	0.031448	-0.02328	0.006268	0.03497	4.056616
CNX Midcap Index	0.00023	0.00049	0.01885	-0.019264	0.004945	-0.20641	3.68967
Hang Seng	0.00004	0.00000	0.02396	-0.025306	0.005201	-0.14071	5.3856

Table 3, 4 and 5 present the descriptive statistics results. The average daily return of ETFs (0.000159) and index funds (0.000216) is positive and too close to zero. The maximum return was observed for UTI Nifty Index fund (0.113241) and Kotak PSU Bank ETF (0.11248). Both the series exhibit low level of standard deviation with ETFs

having slightly variation in return as compared to index funds. Both the return series depart from symmetry and kurtosis value is greater than 3. The high value of kurtosis show that returns are leptokurtic in nature and series has tails heavier than the standard normal distribution. The indices return series also exhibit asymmetry and leptokurtosis.

Table 6: Risk-Adjusted Return (Jensen's Alpha) of Exchange Traded Funds

ETFs	α	β_1	R ²	DW Stats	JB	HET
Goldman Sach Bank Index	(0.000001) -0.013653	0.951978* (153.361)	0.90625	1.89431	5234147	0.002253*
Goldman Sach Nifty Junior	(0.000368) -0.648564	1.023777* (14.1384)	0.06826	2.58289	98376479	0.134952*
Goldman Sach PSU Bank ETF	0.00002 (2.34753)	0.989145* (1136.231)	0.99864	1.90185	2154323	0.169402*
ICICI Prudential Spice ETF	(0.000003) (-0.190521)	0.962048 * (364.427)	0.98189	1.96281	4090000	0.000281*
Goldman Sach Nifty BeES	0.000001 (0.091339)	0.993365 * (417.752)	0.98197	2.26433	9500238	0.055979*
Kotak Nifty ETF	(0.000002) (-0.073386)	0.985344 * (209.0314)	0.97375	2.23488	841369	0.103873*
Kotak Sensex ETF	(0.000015) (-0.197579)	0.892464 * (78.6775)	0.79727	2.62214	669878.9	34.3206
Quantam Index Fund ETF	0.000012* (4.800458)	0.995244 * (2647.246)	0.99978	1.83160	57526.23	3.2035*
Goldman Sach Hang Seng BeES	0.000116 (1.627406)	0.805447* (59.0856)	0.75941	2.07871	941.036	4.4437
Goldman Sach Infra BeES	0.000002 (0.143184)	0.99955* (462.434)	0.99519	2.19650	33333358	0.106775*
Goldman Sach Shariah BeES	(0.000007) (-0.861576)	0.992681* (631.939)	0.99644	1.85100	2905859	0.032565*
Kotak PSU Bank ETF	0.000001 (0.039478)	0.995823* (499.855)	0.99322	1.97897	34144894	0.136659*
MOST Shares M50	(0.000164) (-1.074513)	1.017560* (31.2294)	0.47754	1.93812	32364387	0.097567*
Reliance Banking ETF	0.000021* (3.9508)	0.983671 * (1692.634)	0.99945	1.90022	340993	9.97436
MOST Shares M100	0.000018* (2.17856)	0.993783* (0.0000)	0.99755	2.36319	386747	0.506149*
Religare Invesco Nifty ETF	0.000006 (0.464722)	0.993886 * (389.9284)	0.99464	2.02829	2351323	1.093709*
Birla Sun Life Nifty ETF	0.000012 (0.74162)	0.982105 * (285.9705)	0.99041	2.19127	3450155	0.07796*
IIFL Nifty ETF	0.000022 (1.521086)	0.9936* (0.0000)	0.99244	2.13101	3206030	0.001826*

Note * indicates value significant at 5% level of significance. Value in the parenthesis are t-statistics that are based on standard errors adjusted for autocorrelation and heteroscedasticity using Newey-West (1987) correction. DW: Durbin Watson statistic to test autocorrelation. JB: Jarque-Bera test for normality. HET: White's heteroscedasticity test (1980).

Table 7: Risk-Adjusted Return (Jensen's Alpha) of Index Funds

Index Funds	α	$\beta 1$	R ²	DW	JB	HET
ICICI Prudential Index Nifty Plan	0.000192 (1.936172)	1.007809 * (747.2838)	0.9965	2.6005	8167.911	65.644
UTI Nifty Index Fund	(0.0000142) (0.502336)	0.992606* (0.0000)	0.9996	1.8690	139902.3	187.875
Franklin India Index Fund (NSE Plan)	0.000001 (0.2107140)	0.99078* (0.0000)	0.9992	2.2570	76686.31	80.502
IDBI Nifty Index Fund	(0.000003) (-0.58533)	0.994813* (544.478)	0.9919	2.9196	43199.07	3.009*
HDFC Index Fund (Nifty Plan)	(0.0000239) (-2.06085)	0.96807 * (572.6384)	0.9927	2.6835	5899411	11.944
LIC Nomura - Nifty Plan	(0.0000367) (-0.68854)	0.89548 * (115.4334)	0.8459	2.7912	157703	430.005
Birla Sun Life Index Nifty Plan	(0.0000084) (0.404)	1.03264* (0.0000)	0.9948	2.3869	178573.6	7.605
Principal Index Fund	(0.000018) (-3.082405)*	0.984657* (1171.01)	0.9982	2.0651	244451.9	21.304
SBI Magnum Index Fund	(0.000016) (-1.89363)	0.97032* (784.78)	0.9961	2.1708	440964	86.271
HDFC Sensex Fund	(0.000022) (-2.255026)	0.965811 (0.0000)	0.9950	2.2760	601887.4	43.995
HDFC Sensex Plus Plan	0.000028 (1.362119)	0.86886* (0.0000)	0.9721	1.8547	7260.706	480.141
LIC Nomura - Sensex Plan	(0.000035) (-0.66365)	0.91028* (0.0000)	0.8508	2.7435	136079	487.679
LIC Nomura - Sensex Advantage Plan	(0.000054) (-1.02055)	0.81985* (0.0000)	0.8234	2.6037	944189	388.628
Reliance Index Fund -Nifty Plan	0.000005 (0.433031)	1.0001* (275.78)	0.9691	2.9849	1070008	0.001*
Reliance Index Fund - Sensex Plan	(0.000011) (-1.824806)	0.958163* (494.794)	0.9902	2.1117	6126.72	138.473
Tata Index Fund Nifty Plan A	0.000005 (0.108325)	0.990456* (160.3301)	0.9137	2.9702	1370008	0.04016*
Tata Index Fund Sensex Plan A	(0.000017) (-0.451281)	0.96821* (0.0000)	0.9302	2.9512	1270008	0.02884*
Taurus Nifty Index Fund	(0.00001) (-2.795502)	0.97568* (843.591)	0.9966	2.5075	2216627	129.096
Canara Robeco Nifty Index Fund	(0.000006) (-3.06983)	0.98783* (0.0000)	0.9991	1.9871	21652883	0.205397*
IDFC Nifty Index Fund	0.000008 (1.670829)	0.99670* (646.7227)	0.9942	2.3675	51798714	25.182
ICICI Prudential Nifty Junior	(0.000011) (-3.37944)	0.96074* (1013.08)	0.9976	2.4013	2226241	27.985

Note * indicates value significant at 5% level of significance. Value in the parenthesis are t-statistics that are based on standard errors adjusted for autocorrelation and heteroscedasticity using Newey-West (1987) correction. DW: Durbin Watson statistic to test autocorrelation. JB: Jarque-Bera test for normality. HET: White's heteroscedasticity test (1980).

The estimation results of Jensen's model for ETF and index fund are given in Table 3 and

4. The mean alpha of ETF is negative and equal to 0.000018, wherein negative alphas were observed for seven ETFs and rest eleven ETFs had positive alphas. The results reveal that the alphas were not statistically significant from zero except for Quantam Index Fund ETF, Reliance Bank ETF and Most Shares M50 for which alpha was statistically significant. The average alpha of index funds was also negative and value 0.0001 and fifteen index funds had negative alphas and rest six had positive alphas. Further, all the alphas of index funds were statistically insignificant except Principal Index Fund (alpha value of -0.000018). The probable factors that explain the negative alpha are the passive fund management style, the fees charged and transaction cost involved in buying and selling (Narend, 2014). The results of negative alphas for index funds are in consonance with Rompotis (2005) and Welch (2013) wherein it has been observed that equity mutual funds do not outperform the underlying benchmark. Further, in ETFs the highest alpha was observed for Most Shares M50 (0.0164%) followed by Hang Seng BeES (0.0116%) and Reliance Banking ETF (0.0021%). For index funds, the highest alpha was observed for HDFC Sensex Plus Plan (0.0028%) followed by ICICI Prudential index Nifty Plan (0.00192%) and IDFC Nifty Index Fund (0.0008%).

Besides alpha, the beta value for all ETFs and index funds was found to be statistically significant with mean value of beta for ETFs and index funds being 0.975081 and 0.963803. This high percentage shows that both ETFs and index funds follow defensive investing policy and are highly sensitive to change in index movements or index reconstruction (Rompotis, 2005). The mean value of beta for ETFs is 0.97508 and for index funds is 0.963803. Further, we found that Nifty based ETFs had better beta value (0.994309) as compared to their counterparts index funds with beta value of 0.98556. Similarly, it was found that Sensex based ETFs (beta value 0.949919) outperformed Sensex based index funds (0.904595) in terms of replication strategy. The results are consistent with previous studies of Rompotis (2005), Narend (2014) and Welch (2013) wherein it was observed that ETFs are more faithful in replicating the performance of the index as compared to index funds.

Table 8: Tracking Error of Exchange Traded Funds

Fund	TE1	TE2	TE3	Average (TE1+TE2+TE3)
Goldman Sach Bank Index	0.002936	0.002971	0.000612	0.006519
Goldman Sach Nifty Junior	0.02968800	0.0296830	0.00124100	0.060612
Goldman Sach PSU Bank ETF	0.000356	0.0003720	0.0001110	0.000839
ICICI Prudential Spice ET	0.000896	0.000932	0.0002086	0.002037
Goldman Sach Nifty BeES	0.000899	0.0009	0.0001190	0.001918
Kotak Nifty ETF	0.000756	0.000759	0.000116	0.001631
Kotak Sensex ETF	0.003096	0.0031825	0.0004669	0.006745
Quantam Index Fund ETF	0.000098	0.0001032	0.000488	0.000690
Goldman Sach Hang Seng BeES	0.002359	0.002566	0.0017810	0.006706
Goldman Sach Infra BeES	0.000436	0.000436	0.0000723	0.000944
Goldman Sach Shariah BeES	0.000303	0.000305	0.0000721	0.000680
Kotak PSU Bank ETF	0.000824	0.0008246	0.000095	0.001744
MOST Shares M50	0.004989	0.0049876	0.0013665	0.011343
Reliance Banking ETF	0.000212	0.00026	0.0001262	0.000598
MOST Shares M100	0.000244	0.0002455	0.0000728	0.000562
Religare Invesco Nifty ETF	0.000345	0.0003458	0.0000661	0.000757
Birla Sun Life Nifty ETF	0.000454	0.0004615	0.0001193	0.001035
IIFL Nifty ETF	0.000391	0.0003921	0.0000592	0.000842

Note: TE1 is the standard error from the regression equation: $R_{pt} = \alpha_p + \beta_p R_{bt} + \varepsilon_{pt}$. TE2 is the standard deviation of the difference in returns between the index portfolio and index return. TE3 is the absolute difference in returns of the fund and index.

Table 9: Tracking Error of Index Funds

Fund	TE1	TE2	TE3	Average (TE1+TE2+TE3)
ICICI Prudential Index Nifty Plan	0.000399	0.00003719	0.00022	0.00066
UTI Nifty Index Fund	0.00015000	0.0001604	0.00007539	0.000386
Franklin India Index Fund (NSE Plan)	0.000191	0.0002012	0.0000957	0.00049
IDBI Nifty Index Fund	0.000419	0.000420	0.000083	0.00092
HDFC Index Fund (Nifty Plan)	0.000581	0.00062228	0.0002068	0.00141
LIC Nomura - Nifty Plan	0.002642	0.002739	0.000522	0.00590
Birla Sun Life Index Nifty Plan	0.000501	0.00050149	0.0002532	0.001256
Principal Index Fund	0.000287	0.00030599	0.000133	0.000726
SBI Magnum Index Fund	0.000421	0.00046797	0.0001926	0.001082
HDFC Sensex Fund	0.000478	0.000534	0.000206	0.001218
HDFC Sensex Plus Plan	0.001025	0.001373	0.000868	0.003266
LIC Nomura- Sensex Plan	0.00263	0.002701	0.000558	0.00589

LIC Nomura- Sensex Advantage Plan	0.002619	0.002898	0.001072	0.00659
Reliance Index Fund -Nifty Plan	0.000856	0.000856	0.000104	0.00182
Reliance Index Fund - Sensex Plan	0.000451	0.000492	0.000372	0.00132
Tata Index Fund Nifty Plan A	0.002318	0.002318	0.000231	0.00487
Tata Index Fund Sensex Plan A	0.00208	0.002022	0.000268	0.00437
Taurus Nifty Index Fund	0.000272	0.000295	0.000119	0.000686
Canara Robecco Nifty Index Fund	0.000144	0.000156	0.000828	0.001128
IDFC Nifty Index Fund	0.000357	0.000358	0.000104	0.000819
ICICI Prudential Nifty Junior Fund	0.000243	0.000317	0.000192	0.000752

Note: TE1 is the standard error from the regression equation: $R_{pt} = \alpha_p + \beta_p R_{dt} + \varepsilon_{pt}$. TE2 is the standard deviation of the difference in returns between the index portfolio and index return. TE3 is the absolute difference in returns of the fund and index.

We found the tracking error of the MOST M100 to be lowest at 0.000562, followed by Reliance Banking ETF (0.000598) and Goldman Sach Shariah BeES (0.00068). Further we conducted a t-test to test the significance of the tracking error of selected ETFs. The results of the analysis reveal that the tracking error for all ETFs is insignificant at 5% level of significance, further rejecting the null hypothesis that there is no difference in tracking error of ETFs. The tracking error for ETFs following CNX Nifty is found highest for Most M50 (0.011343) and lowest for Quantam index fund (0.00069). The tracking error for ETFs following BSE Sensex is highest for Kotak Sensex ETF (0.006745) followed by ICICI Prudential Spice ETF (0.002037). Among the sectoral ETFs, highest tracking error is observed for Goldman Sach Nifty Junior (0.0606) followed by Goldman Sach Hang Seng BeES (0.006706) and Goldman Sach Bank Index (0.006519).

The analysis of the index funds tracking Nifty showed that highest tracking error was observed for LIC Nomura-Nifty Plan (0.0059) followed by HDFC index fund (0.00141) and Birla Sun life index Nifty plan (0.00126). The lowest tracking error was observed for UTI Nifty Index Fund (0.000386). For index funds following BSE Sensex, the highest tracking error was observed for LIC Nomura -Sensex Advantage Plan (0.006589) followed by LIC Nomura Sensex Plan (0.005889). Among the BSE tracking index funds, the lowest tracking error was observed for HDFC Sensex Plan (0.0012).

The tracking error analysis of the ETFs and the index funds gave some interesting insight on the comparative performance of the two funds. The average tracking error of ETFs following BSE Sensex is observed as 0.03464, whereas for index funds it is

0.0037. The average tracking error of ETFs benchmarked against Nifty is 0.0026 and for index funds the average figure is 0.00152. Hence, it can be inferred that the tracking error of ETFs is higher than that of index funds. Also, funds tracking Nifty experience lower tracking error as compared to funds tracking BSE Sensex. The reason for ETFs experiencing higher tracking error can be attributable to higher bid-ask spread and low trading volume of ETFs as compared to index funds. The other possible factors that could lead to tracking error are transaction cost, volatility of the underlying index, index composition changes and corporate activity (Chiang, 1998). Our findings that ETFs underperform index funds is line with Elton et al (2002) and Narend and Thenmozhi (2014).

CONCLUSION

This study examined the performance of ETFs and index funds that tracked their respective benchmark index such as CNX Nifty, BSE Sensex and CNX Nifty Junior etc. The study analyses the performance of two funds by comparing the Jensen's alpha and tracking error. The study analyses a sample size of 18 ETFs and 21 index funds from their respective inception date till 31st December 2014. Applying regression analysis, we verify that ETFs and index funds do not produce any excess return than the tracking indexes. The regression's alpha gave mixed results and were not statistically significant different from zero except few funds. The rationale for negative alphas can be attributed to the passive nature of funds, cost involved in buying and selling the stocks, management fees and cash rebalancing.

We found that ETFs perform better in tracking the index as compared to index funds. Further, the analysis revealed that tracking error was minimal and insignificant for the selected funds. The tracking error of ETFs is higher than the index funds. The funds benchmarked against Nifty experience lower tracking error as compared to the Sensex based funds. The plausible cause for tracking error can be attributed to volatility of the benchmark, cash rebalancing, changes in index composition and dividend distribution. Also, in case of ETFs the tracking error is induced by the bid-ask spread in their exchange prices and pricing inefficiency due to deviation of closing price from NAV.

Thus, the analysis reveal that ETFs perform better in replicating the index funds but experience higher tracking error. The findings are similar to the findings reported in Rompotis (2005), Svetina (2010), Welch (2013) and Narend and Thenmozhi (2014).

One of the perplexing issue arising from our research is the limited growth experience and investor participation in ETF instrument in India, particularly keeping in mind the proliferation of ETFs in the international market. Hence, the results of our study have important policy implications for Asset Management Companies (AMC) and regulators such as SEBI and AMFI who can actively promote the growth of the product through awareness camps and online courses. Also, the results have useful implications for individual and institutional investors who are seeking to invest in proxy index instruments and can guide them in making suitable decisions for portfolio management and hedging strategies.

LIMITATIONS OF THE STUDY

1. There may be structural breaks in the time period selected and the same has not been considered in the present study.
2. The study has not analyzed the influence of macro-economic factors such as inflation, money supply, political stability, etc on the performance of both index funds and ETFs.

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