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great by  
deeds, not by  
birth"

-Chanakya

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Sensex and Nifty indices - Are they the right Benchmarks for mutual funds in India?

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# IIMK WORKING PAPER

## **Sensex and Nifty indices - Are they the right Benchmarks for mutual funds in India?**

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**Abstract:** Recently two significant developments took place in the Indian capital markets -(1) SEBI's decision making it mandatory for all mutual funds to disclose the scheme returns against a common benchmark index like Nifty or Sensex and (2) Employee Provident Fund Organization (EPFO) is permitted to invest a part of their funds in to stock market through the exchange traded fund (ETF) route particularly SBI Sensex and SBI Nifty ETF's. Both the developments are tied by a common concept that stock market indices like Nifty and Sensex are passive without any statistically significant alpha. In the fund management industry, alpha is a measure of the risk adjusted excess returns from a portfolio that can be attributed to the stock picking skills of a fund manager. In this paper an attempt is made to examine to check for the presence of significant alphas in the returns of both the indices. The results of the study indicate that both the indices have statistically significant excess returns raising questions on their suitability to act as reference and/or benchmarks for evaluating performance of mutual funds in India. Further, the study examined the returns of SBI Sensex ETF and observed a statistically significant alpha. The results of the study have important implications not only for the index construction companies but also to the policymakers who are advocating investment of considerable amounts of provident fund money in to stock market through exchange traded funds linked to Sensex and Nifty. Index maintenance companies have to re-design the indices so that they remain passive and the EPFO Administration may rethink their decision to invest in the existing ETFs linked to the Sensex and Nifty indices and should consider constructing a well-diversified stock portfolio that is truly passive so that their mandate to get exposure only to market risk is fulfilled.

**Introduction:**

Sensex and Nifty 50<sup>i</sup> index (Nifty henceforth) are the keenly followed stock market indices in India and are generally considered as the leading indicators of the Indian economy. Sensex is the short form of S&P BSE SENSEX aimed at measuring the performance of the thirty large, liquid and financially sound companies across key sectors of the Indian economy that are listed at Bombay Stock Exchange (BSE). Its base date is Apr 3 1979 and is currently calculated based on the float adjusted market capitalization weighted methodology. While Nifty is the short form of Nifty 50 index owned by India Index Services Limited. Nifty index is based on the prices of 50 stocks listed on NSE with Nov 3 1995 as the base date. Initially the role of indices was rather limited and narrow - to help gauge the general direction of the market. But in the past few decades indices are serving other purposes like acting as benchmarks for performance evaluation of mutual funds and acting as underlying asset for index based derivatives and index funds. In this paper an attempt is made to examine whether the two leading indices are worth enough to act as benchmarks for equity mutual funds in India. A benchmark portfolio is a collection of unmanaged securities that can be used to evaluate the performance of an investment portfolio.

Although mutual funds as an investment vehicle entered the Indian markets with the advent of Unit Trust of India (UTI) their growth was rather subdued for a long time. Of late mutual funds became a preferred investment vehicle for investors in India. As at the end of Sep 2015 the assets under management (AUM) stands at Rs. 13,15,760 Cr and in particular the AUM under the equity category stands at Rs 3,46,990 Cr. A large part of the equity mutual funds in India consider Nifty and Sensex indices as their reference/benchmark index and the performance of the fund will be evaluated against the performance of the underlying index.

Of late SEBI is insisting that Indian mutual fund houses have to disclose the scheme returns against the common benchmark along with the benchmark chosen for the scheme by the fund house, SEBI suggests the Sensex and the Nifty indices as common benchmarks. This is a welcome move as it will stop the fund houses from misleading the investors by comparing the scheme's performance with benchmarks that might be irrelevant. As such misinformation may not depict the correct or full picture about the performance of the scheme. Further, it is easy for investors to evaluate a given scheme's performance against Nifty or Sensex because these indices represent well-diversified portfolios with betas equal to one. SEBI might be premising that Sensex and Nifty indices provide the best estimate of a fund manager's value

added relative to a passive strategy. The underlying assumption being Sensex and Nifty indices themselves should not yield any alphas, that are defined as risk adjusted measure of an investment's performance. This is basically the amount by which a portfolio exceeded (or underperformed) its benchmark index. For instance, if an investor's portfolio comprises only large-cap stocks, then the Nifty index is a suitable benchmark. If Nifty was up 5% over a given period of time, and the portfolio being considered was up 8%, then the portfolio's alpha would be +3. If, on the other hand, the portfolio was only up 3%, then alpha would be -2. Therefore, alpha is basically the amount by which portfolio's return beats or lags an index with a similar risk profile. Investment literature attributes the alphas or excess returns to the superior stock picking skills of the fund manager. If an index like Nifty or Sensex generate insignificant alphas, then only any significant alpha of a given mutual fund can be attributed solely to the fund manager's performance. If the indices themselves have alphas then using them to judge the performance of other mutual funds is faulty. It is this question that is addressed in this study.

Another major development is the recent decision of the Employees' Provident Fund Organisation (EPFO), the state-run pension fund with a retirement corpus of around Rs 8.5 lakh crore, to invest a part of the funds in the stock market with Rs 5,000 crore in this fiscal year. This money will be routed through the exchange traded funds (ETFs) and the limit for the current year will be 5 per cent of the incremental deposits. The EPFO funds will be invested through SBI Nifty exchange-traded fund (ETF) and SBI Sensex ETF both schemes managed by SBI Mutual Fund. Approximately 75% of the EPFO funds will be invested in Nifty ETF and the balance 25% in Sensex ETF. So, it is not only the equity investors who consciously chose to get exposure to Indian equity markets by investing in mutual funds, but also contributors to EPFO will get exposure to equity markets through the ETFs. One reason for the EPFO to invest in ETFs linked to Nifty and Sensex could be probably to get only market returns as ETFs are passive funds and fund manager's mandate is to replicate a market, not to try to beat it hence, index ETFs tailor the portfolios only to mimic the index. Index funds offer the advantage of being a low cost product because they don't require a fund managers who needs to be paid. And they also don't incur all the trading costs that go into some of the more active strategies. The investment motive behind index investing is the desire to limit exposure only to market risk i.e., beta and not to alpha (excess returns over returns commensurate with risk). Therefore a true index fund should not yield any alpha.

Given the above developments, and the near absence of studies evaluating whether the country's mostly followed indices Sensex and Nifty index are truly passive and can they serve as good benchmarks for evaluating fund performance assumes importance. This study aims to fill in this lacunae and attempts to provide answer to the question - Does the Nifty and Sensex indices are passive without any have statistically significant alphas?

**Data and methodology:** Jensen's (1968) time-series returns based approach is an often used methodology in mutual fund performance evaluation literature. This study uses the same methodology by estimating the following model:

$$R_{It} - R_{ft} = \alpha + \beta_{Mkt}(R_{mt} - R_{ft}) + \varepsilon_t \dots\dots\dots(1)$$

$R_{It}$  = daily index return =  $\left(\frac{I_t - I_{t-1}}{I_{t-1}}\right)$  where  $I_t$  is the index (Nifty or Sensex) on day 't',  $R_{Mkt}$  is return on the market portfolio;  $\alpha$  is the measure of excess returns - a statistically significant  $\alpha$  indicates that the index is not passive and may be inappropriate to serve as a benchmark for evaluating mutual fund performance.

Empirical evidence on stock returns shows that there is a negative relationship between market capitalization and stock returns i.e., small companies tend to deliver higher returns than large companies and this is popularly known as *size effect*. Similarly, there is a positive relationship between Book to market ratios and stock returns typically called as *value effect*. Accordingly Fama and French (1993) augmented the single index model (1) by including the size and value premiums. Consequently the analysis is repeated by estimating the Fama and French (1993) three factor model (equation 2) as well as Carhart (1997) four factor model (equation 3) that includes a momentum factor which accounts for the effect of the past winners/losers continues to perform well/poorly (Jegadeesh and Titman (1993)).

$$R_{It} - R_{ft} = \alpha + \beta_{Mkt}(R_{mt} - R_{ft}) + \beta_{Size}(R_{sct} - R_{bct}) + \beta_{value}(R_{vt} - R_{gt}) + \varepsilon_t \dots\dots\dots(2)$$

$$R_{It} - R_{ft} = \alpha + \beta_{Mkt}(R_{mt} - R_{ft}) + \beta_{Size}(R_{sct} - R_{bct}) + \beta_{value}(R_{vt} - R_{gt}) + \beta_{mom}(R_{wt} - R_{lt}) + \varepsilon_t \dots\dots\dots(3)$$

where  $R_j$  is the excess returns defined as the daily returns from market portfolio minus the risk free interest rate.

In general  $(R_m - R_f)$  is termed as the market risk premium (MRP) representing the compensation for bearing market risk or reward for investing in a risky asset versus investing in risk-free asset;  $(R_{sc} - R_{bc})$  is known as the size premium denoted by SMB which stands for the difference in returns between small (market) capitalization stocks and large capitalization stocks;  $(R_v - R_g)$  known as the value premium (HML) stands for the difference in returns from high book-to-market ratio stocks to low book-to-market ratio stocks and  $(R_w - R_l)$  is denoted as the momentum premium (WML) capturing the difference between returns of winning stocks and the losing stocks. These factors are calculated with combinations of portfolios composed by ranked stocks and available historical market data. More precisely SMB is a zero-investment portfolio that is long on small capitalization (cap) stocks and short on big cap stocks. Similarly, HML is a zero-investment portfolio that is long on high book-to-market stocks and short on low book-to-market stocks. WML is a zero-cost portfolio that is long previous n-month return winners and short previous n-month (generally over the past 12 months) loser stocks. For all models the intercept ('alpha')  $\alpha$  and in particular the t-statistic of alpha ( $t_\alpha$ ), are the measures of risk adjusted abnormal performance or excess returns.

Time series data on all the factors (MRP, SMB, HML and WML) was obtained from Agarwalla et al (2013) and the Nifty index returns data was obtained from NSE's website and Sensex returns data was made available by BSE up on request from the researcher. Generally studies of this nature consider a broad based index as proxy for the market portfolio, but since Agarwalla et al (2013) computes the market risk premium by considering all the firms listed on BSE, subject to a liquidity filter, the study is free from the problem of choosing a wrong index to proxy the market. This study uses the total returns data on the indices so that dividends and cash distributions are deemed as reinvested. The study is conducted using the daily data over the period 3 Jan 2000 to 26 Sep 2014<sup>ii</sup>. The ETFs SBI sensex fund and SBI Nifty ETF are launched only recently i.e., in Feb 2013 SBI Sensex fund was launched and in July 2015 SBI Nifty fund was launched. Hence the study considered only SBI Sensex ETF and Nifty BEES another Nifty linked ETF with a long trading track record commencing from Jan 2002 to draw inferences about index linked ETF performance. The results of the study are presented in the next section.

## **Results and Discussions:**

Table 1 presents the regression results for the CAPM model denoted as equation (1) in the methodology section. It can be noted that for both indices alpha is found to be statistically

significant and so is the market risk premium ( $\beta_{mkt}$ ). A statistically significant alpha for an index means that the index is no more passive and returns from the index are not commensurate with the market risk. For both the indices the estimated betas equals to one and are statistically significant. Table 2 and 3 represent the results from estimating the models 2 and 3.

Table 1: Regression results from the CAPM model

Dependent Variable: Nifty				Dependent Variable: Sensex			
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>		<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>
Alpha	-0.02591	-196.206	0.0000	Alpha	-0.02576	-190.519	0.0000
MRP	1.006875	116.7855	0.0000	MRP	1.010976	114.5302	0.0000
R Square	0.787606	Observations	3680	R Square	0.781008	Observations	3680
<i>F</i>	13638.84	<i>P value</i>	0.0000	<i>F</i>	13117.16	<i>P value</i>	0.0000

Table 2: Regression results from the Three Factor Model

Dependent Variable: Nifty				Dependent Variable: Sensex			
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>		<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.02567	-194.602	0.0000	Intercept	-0.02584	-198.751	0.0000
SMB	-0.1574	-10.3168	1.28E-24	SMB	-0.13257	-8.81537	1.81E-18
HML	-0.09878	-7.94507	2.56E-15	HML	-0.0717	-5.85038	5.33E-09
MRP	0.974386	105.7556	0.0000	MRP	0.976279	107.4933	0.0000
R Square	0.792611	<i>F</i>	4683.051	R Square	0.79512	<i>F</i>	4755.407
Observations	3680	<i>P-value</i>	0.0000	Observations	3680	<i>P-value</i>	0.0000

Table 3: Regression results from the Four Factor Model

Dependent Variable: Nifty				Dependent Variable: Sensex			
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>		<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.02582	-198.591	0.0000	Intercept	-0.02564	-194.503	0.0000
SMB	-0.13425	-8.93555	6.28E-19	SMB	-0.15931	-10.4571	3.06E-25
HML	-0.0724	-5.91587	3.6E-09	HML	-0.09959	-8.02422	1.36E-15
WML	-0.03944	-3.46381	0.000539	WML	-0.04508	-3.90412	9.63E-05
MRP	0.971691	106.0231	0.0000	MRP	0.969143	104.2835	0.0000

R Square	0.795787	<i>F</i>	3580.225	R Square	0.793468	<i>F</i>	3529.706
Observations	3680	<i>P-value</i>	0.0000	Observations	3680	<i>P-value</i>	0.0000

Regression results from the different models indicate that the alphas for both the indices are statistically significant and reinforcing the inferences derived from the model (1). Slope coefficient for the market risk premium is positive and is statistically significant for all the models indicating that market risk premium is priced in the Indian market. As the Nifty index and Sensex indices are designed to include large capitalization stocks the coefficient of SMB is expected to be negative and the results conform the same. A negative and a statistically significant HML coefficient means that the stocks comprising these indices are growth oriented stocks. An important finding is regarding the WML coefficient, since Nifty and Sensex indices are unmanaged indices that are not rebalanced according to any momentum strategy the slope coefficient ought to be statistically insignificant. The results indicate that both indices have a statistically significant slope coefficient for the momentum factor. The regression results indicate that Nifty and Sensex indices are not fully diversified portfolios and are not representative of market portfolios. Hence these are not passive indices consequently they are not ideal to serve as benchmarks for evaluating the performance of mutual funds.

In order to gain better understanding of the behaviour of alphas, the analysis is repeated by estimating the alphas on a rolling basis using three years of daily data starting with the year 2003. All the alphas estimated on rolling basis are found to be statistically significant indicating that the inferences are robust enough. Figure 1 presents the rolling alphas estimated for the Sensex index from the four factor model. It may be observed that the alphas are continuously negative indicating that the indices failed to deliver the market returns. If a fund's performance is evaluated using Sensex or Nifty index as the benchmark index, the mutual fund's performance will get overstated because these indices continuously underperformed the overall market during 2000 -2014 period.

Next a similar exercise was carried out to evaluate for the presence/absence of alpha in SBI Sensex ETF<sup>iii</sup> and the regression results are presented below:

Table 4: Regression results for the ETFs from the Four Factor Model

Dependent variable: SBI Sensex ETF	Dependent variable: Nifty BEES ETF
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	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>		<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.03332	-130.408	0.0000	Intercept	-0.0243	-141.575	0.0000
WML	0.122229	4.473027	0.0000	WML	-0.0649	-3.46822	0.000531
SMB	-0.16552	-5.37257	0.0000	SMB	-0.04297	-2.08351	0.03729
HML	-0.13277	-5.1871	0.0000	HML	-0.08543	-4.9237	0.0000
MRP	1.052017	31.12169	0.0000	MRP	0.953313	74.33178	0.0000
R Square	0.8016	Observations	375	R Square	0.702718	Observations	2989
F	373.8932039	p- value	0.0000	F	1763.402	p- value	0.0000

Figure 1: Alphas estimated from rolling regressions for the Four Factor model for Sensex index

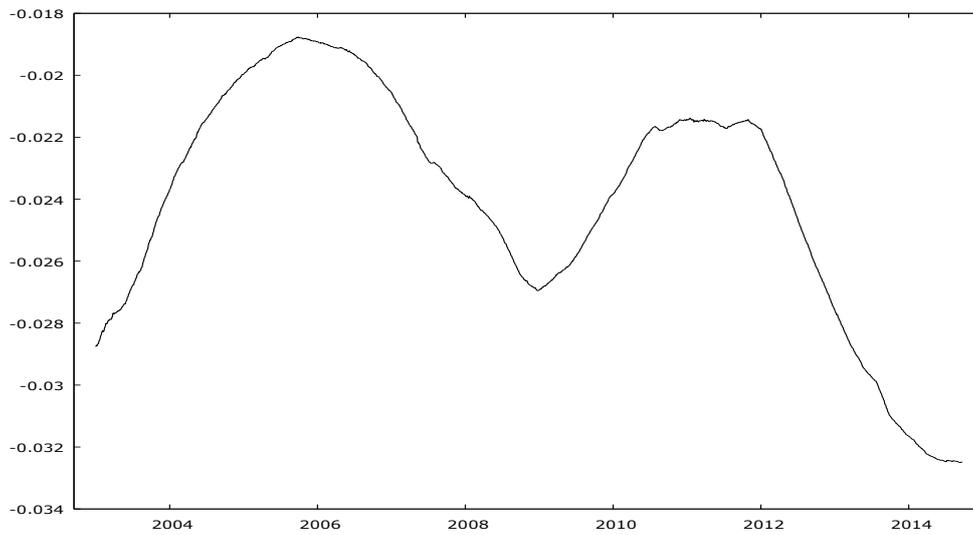
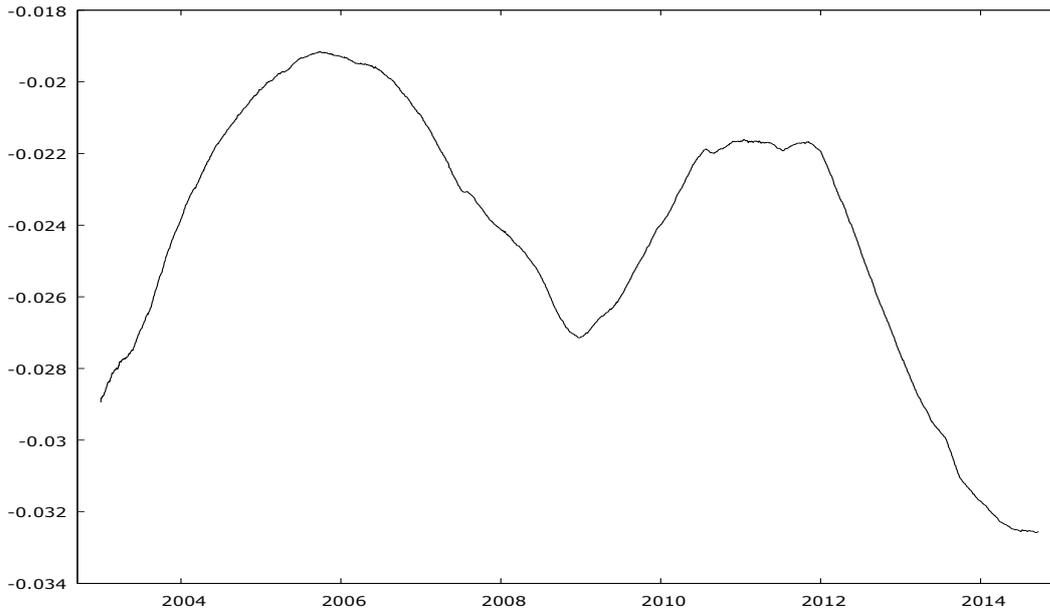


Figure 2: Alphas estimated from rolling regressions for the Four Factor model for Nifty index



The regression results are similar to those of the indices with all the risk factors namely MRP, SMB, HML and WML all being priced and a significant alpha. A statistically significant alpha implies that the fund is not simply going to mimic the market portfolio that is well-diversified but still possess some unsystematic risk. In order to find out the reason for the significant alphas in ETFs the regressions are repeated by substituting the market risk premium (MRP) with excess returns of the respective index the ETF is supposed to track. The results from this regression are presented below:

Table 5: Regression results for the ETFs from the Four Factor Model (market portfolio substituted with excess returns from underlying index)

Dependent variable: SBI Sensex ETF				Dependent variable: Nifty BEES ETF			
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>		<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.0003	-0.83172	0.406106	Intercept	-0.00168	-7.70411	1.78E-14
WML	-0.00405	-0.39499	0.693078	WML	-0.03691	-2.83176	0.00466
SMB	0.0094	0.762955	0.445976	SMB	0.066164	4.571728	5.03E-06
HML	0.000545	0.058998	0.952986	HML	0.01944	1.625661	0.104127
Sensex excess returns	0.99393	93.758	6.1E-260	MRP	0.92658	120.554	0.0000
R Square	0.97102	Observations	375	R Square	0.855592	Observations	2989

F	3099.307	p- value	0.0000	F	4419.913	p- value	0.0000
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Once the market portfolio is replaced with the excess returns from respective index, the following inferences can be made (1) the alpha value is not significant for SBI Sensex ETF and only one independent variable is statistically significant i.e., excess returns of Sensex (2) for Nifty BEES ETF the alpha value is still significant but the under-performance reflected by alpha (intercept term) came down drastically from -0.0243 to -0.00168 and other risk factors are still statistically significant. A general inference that could be made is that ETF returns faithfully track their underlying index returns and the presence of significant alphas in ETF returns is more to do with the underlying index not being a fully diversified market portfolio and hence the ETFs are also not remaining passive portfolios.

The underlying reasons for choosing only index linked ETFs for channelling the funds of EPFO may perhaps be that (1) the markets are efficient hence attempting to over perform the market on a consistent basis could not be possible (2) confining investments only to broad market indices is to assume only market risks without getting exposure to unsystematic risks. But a significant alpha means that the investments are prone to unwanted risks. It is also imprudent to invest EPFO funds in newly launched ETFs because performance analysis of new funds couldn't be undertaken due to lack of trading history, however EPFO might had conducted some internal back testing of the selected ETFs before mandating their investments. Hence, it is imminent on the administration of EPFO to be aware of the risks being assumed by the investments in index related ETFs and if their mandate is only to assume only market risk but not any other risks then they may consider developing a portfolio that is truly passive and well-diversified which will be devoid of any risks but for only the market risks.

**Conclusions:**

Performance evaluation of any mutual fund involves estimating the excess returns from the given fund and confirming that the excess returns are statistically significant. If the excess returns are significant the same can be attributed to the stock selection skills of the fund manager. The same analysis is conducted for the popularly followed indices of Indian markets- Nifty 50 and Sensex indices. The results indicate that these indices generate statistically significant excess returns or alphas raising doubts on using these indices as possible benchmarks to evaluate the performance of the mutual funds. The results from multi-

factor models indicate that the indices are portfolios of large and growth oriented stocks. The indices have betas close to unity, consistent with standard asset pricing theories, with reference to market risk premium but the negative betas of momentum factors is quite unusual and indicate that momentum does play an important role even in unmanaged indices. Further, the recent permissions granted to provident funds and the pension funds to invest in the index funds linked to Nifty and Sensex indices on the notion that these indices are passive in nature and exposure to these funds will lead to only assuming market risk. But since these indices have statistically significant alphas, investment in these ETFs is not advisable as these investments may under (over) perform the market. In the study period it was observed that the indices have negative alphas meaning the returns from these indices are not commensurate with the riskiness of the underlying portfolios. Based on the results of the study it is recommended that there is a need to relook at the stock market indices of the country especially as they are being increasingly used for investment purposes. Another suggestion that emerges from this study is that the EPFO should come up with an ETF of their own that is really passive and represents only the beta risk without any significant alphas. Since the current index linked ETFs are not truly passive while investors may be wrongly assuming that these indices are a close representation of a fully diversified portfolio and the investors are exposed to only market risk.

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<sup>i</sup> From Nov 9 2015 onwards Nifty index is renamed as Nifty 50 index.

<sup>ii</sup> When the study was commenced this was the maximum time period for which the data on the four factors is available.

<sup>iii</sup> Since SBI Nifty ETF and SBI Sensex ETFs are newly introduced and have limited time series data the analysis is conducted for SBI Sensex fund and to make the inferences robust the analysis is conducted with Nifty BEES ETF an ETF with a long trading track record, although this is not being utilized for EPFO investments.

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