

Construction of Appropriate Benchmark Index for Mutual Funds: Specific Reference to Tax Saver Funds

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Abstract

Evaluating the performance of mutual funds in the light of increased competition has become more significant in the capital market. Proper identification of investment style and performance measurement of mutual funds have been analysed to facilitate the investment decisions of investors. The performance of mutual funds are analysed by considering various risk-related characteristics and also evaluated against the performance of a benchmark index that typically represent the investment style of the mutual funds. If the fund performance is evaluated against an inappropriate benchmark index then the augmentation derived from the analysis may not be appropriate. Hence, the prominent objective is to determine the appropriate Benchmark Index that consists of appropriate asset classes of securities pave the way for precise estimation. The study considers Tax Planning (Equity Linked Savings Scheme-ELSS) funds and selected indices of National Stock Exchange and Bombay Stock Exchange. The methodology focuses on estimating the risk adjusted abnormal return generated by the fund that exhibits the predictive ability (Jensen's Alpha) of the fund manager through Capital Asset Pricing Model (CAPM) and estimating the Tracking Error Volatility (TEV) of excess daily returns between fund and benchmark. The study revealed that broad based indices that consist of Large cap, Mid cap, and Small cap asset classes would be a appropriate benchmark for evaluating the performance of ELSS funds.

Keywords: CAPM, ELSS, Fund performance, Jensen's Alpha, TEV.

JEL Codes: G12, G11, G14, G17, G32

1. Introduction

Mutual funds predominantly play a vital role in mobilising household savings for catering to the requirements of capital markets. Mutual funds are prospective investment avenues for investors who would like to diversify their risks and avail services of professional fund managers. Mutual funds involve the pooling of retail investors' investments in schemes, which have well-defined investment objectives to be met through investments in the capital markets. Broadly, mutual funds invest in various instruments such as Equities, Bonds, and Money market securities in accordance with the investment style that caters the requirements of the investors. Since, mutual fund investments are managed by professional fund managers, risk exposure can be diversified into various asset classes. Despite, actively managing the portfolio and precautionary measures the global capital markets turmoil led to misappropriation of retail investment in the capital markets hence mutual fund investment too was waned. On account of stringent regulatory and monitoring system, Indian mutual fund industry showed a remarkable improvement and proved that mutual funds investments are ideal investment vehicle.

1.1 Indian Mutual Fund Industry Review

The gross mobilisation of resources by all mutual funds during 2009-10 indicated an increase of 84.7% over the previous year. Redemption also rose by 82.2%. The assets under management by all mutual funds increased by 47.2% at the end of March 2010 compared at the end of March 2009. Unlike the previous year, private sector

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Index	Scheme Type								
	Equity	Balanced	ELSS	Liquid	Income	Gilt	FOF	G.ETF	O.ETF
S&P CNX Nifty Shariah Index	02	–	–	–	–	–	–	–	01
FTSE Gold Mines	–	–	–	–	–	–	02	–	–
CRISIL MIP Blended Index	03	15	–	–	01	–	03	–	–
CRISIL Balanced Fund Index	–	28	–	–	–	–	04	–	–
CRISIL Bond Fund Index	–	–	–	–	–	–	–	–	–
CRISIL Liquid Fund Index	–	03	–	58	13	–	10	–	–
CRISIL Composite Bond Fund Index	–	01	–	–	57	–	20	–	–
CRISIL Short-term Bond Fund Index	–	01	–	–	42	–	–	–	–
CRISIL Debt Hybrid 60:40 Index	–	03	–	–	–	–	–	–	–
CRISIL Debt Hybrid 75:25 Index	–	02	–	–	–	–	–	–	–
CRISIL Gilt Index	–	–	–	–	–	01	–	–	–
DAX Global Agri-Business Index	–	–	–	–	–	–	01	–	–
MSCI India	01	–	–	–	–	–	–	–	–
MSCI World	–	–	–	–	–	–	05	–	–
MSCI World Energy Index	01	–	–	–	–	–	01	–	–
MSCI Asia Standard Index	02	–	–	–	–	–	–	–	–
MSCI India Consumption Index	01	–	–	–	–	–	–	–	–
MSCI China Consumption Index	01	–	–	–	–	–	–	–	–
HSBC Gold Mining	–	–	–	–	–	–	01	–	–
MSCI India Energy & Material Index	–	–	–	–	–	–	01	–	–
MSCI ACWI Industrials	–	–	–	–	–	–	01	–	–
MSCI ACWI Real Estate	–	–	–	–	–	–	01	–	–
MSCI Brazil 10/40 Index	–	–	–	–	–	–	01	–	–
MSCI Emerging Market Index	–	–	–	–	–	–	03	–	–
S&P Citigroup world Property Index	–	–	–	–	–	–	01	–	–
MSCI EM Latin America 10/40	–	–	–	–	–	–	01	–	–
D.Jones World Basic Materials Index	–	–	–	–	–	–	01	–	–
DOW Jones world Oil & Gas Index	–	–	–	–	–	–	01	–	–
MSCI EMEA	–	–	–	–	–	–	01	–	–
MSCI South East Asia Index	–	–	–	–	–	–	01	–	–
MSCI Golden Dragon Index	–	–	–	–	–	–	01	–	–
MSCI China Index	–	–	–	–	–	–	01	–	–
Gold India Index	01	–	–	–	01	–	07	12	–
UTI Transportation & Logistics Index	01	–	–	–	–	–	–	–	–
CCIL MIBOR	–	–	–	01	–	–	–	–	–
I.Sec Mi-Bex	–	–	–	–	–	03	–	–	–
I.Sec Li-Bex	–	–	–	–	–	15	–	–	–
I.Sec Si-Bex	–	–	–	–	–	14	–	–	–
I.Sec Sovereign Bond Index	–	–	–	–	–	02	–	–	–
I.Sec Composite Gilt Index	–	–	–	–	–	17	–	–	–
10 Year Rated GOI Securities	–	–	–	–	–	01	–	–	–
Hang Seng	–	–	–	–	–	–	–	–	01
NASDAQ	–	–	–	–	–	–	–	–	01
MOST 50 Index	–	–	–	–	–	–	–	–	01

Source: Fund Fact sheets from respective Asset Management Companies, www.mutualfundsindia.com

the investment style of the active portfolio of the scheme (Presumed that the fund's composition of assets is approximately closer to the benchmark's composition). There are two possible issues needed to be addressed, say, i) if the fund manager constantly evaluating the fund's performance by considering a single index may not be valid in the long run because the investment style would have been restructured ii) if the fund manager contemplates to construct a peer benchmark index that relatively consists of a bundle of indices, the relative weightage of each index would have deviated in the long run substantially, leads to inappropriate performance evaluation. Thus, consistent change in the benchmark index is essential at regular intervals.

2. Review of Literature

Jensen (1968) constructed a measure of absolute performance on a risk adjusted basis and evolved a definite standard against which the performance of various funds could be measured. This standard provides a basis to measure the portfolio manager's predictive ability, i.e. his ability to earn higher returns through prediction of security prices given the risk profile of the portfolio. This study led to the conclusion that mutual funds on average were not able to predict security prices well enough to outperform the market. Not even an individual fund was able to do significantly better than that expected from a mere random chance.

Sharpe (1988) enumerated that style analysis is the determination of a manager's 'effective asset mix' of 'asset class returns', hence he elucidated an asset class factor model. The prime objective of effective mix analysis is to develop a set of weights that when multiplied by asset class or Index returns will closely replicate the observed portfolio returns. Effective mix implies that the observed portfolio may or may not be composed of elements of the asset classes involved. His effective-mix methodology assumes a general factor model formulation that portrays a portfolio's return as a set of exposures to style indexes.

Sharpe (1992) analysed Delaware Investment advisors portfolio and considered a set of asset class factor portfolios included U.S. Indexes, International equity indexes, Fixed income instruments, and International Bonds. He found that the effective mix solution for Delaware Investment Advisors portfolio included a substantial weight on International Bonds and astonishingly Delaware

Investment Advisors is a U.S. equity value manager and has not had an International bond in its portfolio for years. Hence, the effective mix presented the researcher with a result that was simply not true.

Musto (1999) enumerated that a weekly database of retail money fund portfolio statistics is uneconomical for retail investors to observe, so it allows direct comparison of disclosed and undisclosed portfolios. This makes possible a more direct and unambiguous test for "window dressing" than elsewhere in the literature. The analysis exhibited that funds allocating between government and private issues hold more in government issues around disclosures than at other times, consistent with the theory that intermediaries prefer to disclose safer portfolios. Cross-sectional comparisons locate the most intense rebalancing in the worst recent performers.

Dor, Jagannathan, Meier (2003) provided an introduction to the use of return based style analysis of Sharpe (1992) in practice. They demonstrated the importance of selecting the right style benchmarks and how the use of inappropriate style benchmarks may lead to wrong conclusions. When style analysis is applied to sector oriented funds such as healthcare, precious metals, energy, technology, etc., the set of benchmarks should include sector or industry indexes. They exhibited how to analyze the investment style of hedge fund managers by including the returns on selected option based strategies as style benchmarks. They considered return based style analysis provides insights not available through commonly used 'peer' evaluation alone.

Dor, Dynkin and Gould (2006), emphasised that hedge funds play an increasingly important role in institutional portfolios as an alternative to investments in traditional asset classes. Yet, the minimal disclosure requirements hedge funds face, coupled with an investment mandate that typically allows the use of leverage, short selling, derivatives and highly illiquid securities, present serious challenges for investors. These challenges include, among others, correctly assessing risk/return characteristics, accurately measuring left-tail risk of funds with relatively short return histories as well as comparing performances of funds within the same style. They addressed these issues through the use of return-based style analysis. It demonstrates how investors can use its results to better understand the nature of risks and exposures of various strategies, and the extent to which investments in various individual funds are correlated. They also examined the

common practice of classifying hedge funds into styles based on their self-reported investment strategy. A simple technique that can help identify inconsistencies between the actual and self-proclaimed style of a fund based on a measure of distance between the return time-series of the two is presented.

Morey and O'Neal (2006) examined portfolio credit quality holding and daily return patterns in a large sample of bond mutual funds and document evidence of window dressing. Using portfolio credit quality holdings data, they found that bond funds on average hold significantly more government bonds during disclosure than nondisclosure, presumably to present a safer portfolio to shareholders. Multiple-index market models estimated with daily returns data corroborate these findings. They detected differences in factor loadings on days surrounding disclosure dates that indicate systematic tilting of the portfolio toward higher quality instruments.

Dor, Budinger, Dynkin and Leech (2008) studied whether single index benchmark or constructing peer benchmark index serve as a tool to evaluate the mutual fund performance. They have selected multi sector bond funds to analyse how style analysis can be used to construct peer manager style benchmarks that allow proper measurement of a fund's risk relative to its competitors. Primarily they focused to state that a single index may not serve as an adequate passive benchmark for certain mutual fund categories, even if the index includes all relevant asset classes. They used 38 multisector bond funds and the study period was from January 1999 to July 2006. They found that this technique was sensitive to the asset class specification, which should span the investment universe of the funds in question and inappropriate or inadequate choice of asset classes may lead to wrong inferences.

Kumar and Kumar (2011) studied the implications of stock market performance on the performance of mutual funds. In fact, does variation in the indices performance 'Cause' variation in the Mutual funds NAV and vice-versa. Most often, the researchers have tried understanding the direction of momentum of two explanatory variables and used particular definition as "Granger Causation", in which the direction of causation is in existence with lead and lag relationship. The study revealed that one fund exhibited unidirectional causality, few funds exhibited bilateral causality and few funds exhibited insignificance. It throws a light that for mutual fund performance the

market performance may be one of the factor but not the only factor.

3. Objective of the Study

The primary objective is to determine appropriate benchmark index for Tax Planning (Equity Linked Savings Scheme – ELSS) schemes.

4. Data and Methodology

The sample data for the study period from January 2006 to December 2010 (5 years) have been obtained from NSE, BSE, respective AMC's and Association of Mutual Funds in India. In terms of selecting the Indices, only major Indices have been selected and Industry specific Indices, Bond Indices, as well as International Indices have not been considered for the study. The selected indices are SENSEX, BSE100, BSE200, BSE500, BSE Midcap Index, BSE Small cap Index, NIFTY, S&P CNX 100, S&P CNX 500, and S&P CNX Midcap Index. The present study covers mutual fund schemes as per the following criteria,

1. Funds must be categorised as Tax Planning (Equity Linked Savings Scheme) by Association of Mutual funds in India.
2. Funds must have incepted before the year 2006.
3. Funds atleast have five years of return history in order to allow most precise estimation.

This initial search has grounded to 21 funds out of 48 funds. The prime reason to sample the tax saver fund because,

- (i) Its main objective is to generate long-term capital appreciation from a well managed and diversified portfolio.
- (ii) It offers tax benefits to the unit holders.
- (iii) Its investment style is typically like an equity fund.

The selected schemes are Baroda Pioneer ELSS 96 (BPELSS'96), Birla Sunlife Tax Relief'96 (BSLTR'96), BNP Paribas Tax advantage plan (BNPPTAP), Canara Robeco Equity Tax Saver fund (CRETS), Escorts Tax Plan (ETP), Franklin India Templeton Tax Shield (FITTS), HDFC Tax Saver fund (HDFCTS), ICICI Prudential Tax Plan (ICICITP), ING Tax savings (INGTS), Kotak Tax Saver Fund (KTSF), L&T Tax Saver (L&TTS), LIC Tax Plan (LICTP), Principal Personal Tax Saver fund (PPTS),

Principal Tax Savings Plan (PTS), Reliance Tax Saver fund (RTS), Sahara Tax Gain fund (STG), SBI Magnum Tax Gain'93 (SBITG'93), Sundaram Tax Saver fund (STS), Tata Tax Savings fund (TTS), Taurus Tax scheme (TTSH) and UTI Long Term Advantage fund (UTILAF).

4.1 Daily Actual Return Estimation

The absolute returns of all mutual fund schemes and the indices have been ascertained through the following equation.

$$R_{i,t} = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} \times 100 \quad (1)$$

$R_{i,t}$ = Daily return of respective mutual fund

NAV_t = Current date NAV of respective mutual fund

NAV_{t-1} = Prior date NAV of respective mutual fund

Since, the present study addresses only the ELSS growth schemes; the dividend component has not been incorporated to ascertain the returns of respective mutual funds.

4.2 Determination Expected Return through CAPM and Measuring Outperformance

This enumeration is being done to accentuate an actively managed portfolio does outperform a passive benchmark portfolio and thus facilitate to choose an appropriate passive benchmark index for efficient comparative analysis and also to understand the predictive ability of the fund manager. In a completely efficient market in equilibrium, no one can expect the abnormal returns because the required rate of return derived through CAPM will be equal to the actual holding period return.

$$E(R_{i,t}) = R_f + \beta(R_M - R_f) \quad (2)$$

$$R_{i,t} = \alpha_1 + R_f + \beta(R_M - R_f) \quad (3)$$

or

$$AR_t(\alpha_i) = R_{i,t} - E(R_{i,t}) \quad (4)$$

$E(R_{i,t})$ = Required rate of return of active port folio

R_f = Risk free rate of return

R_M = Return of passive market index

β = Systematic risk (Exposure from a passive market index)

$AR_t(\alpha_i)$ = Abnormal Return (Jensen' Alpha)

$R_{i,t}$ = Actual holding period Return of active portfolio, eq (1)

This research paper is structured as follows: We primarily exhibit the sample data follows normal distribution and validate for randomness of actual holding period return on Net Assets Value (NAV) and passive market index. Following, illustrates the correlation and its significance between actual return of the active portfolio and passive market index. Then, we demonstrate the exposure of passive market index on the return of active portfolio and measuring the proportion of variance in active portfolio explainable by the passive market index and apparently measuring the active portfolio's required rate of return by CAPM and determination of abnormal return.

4.3 Testable Hypotheses

(a) Normality

H_0 : The daily return [NAV, BSE30-SENSEX, BSE100, BSE200, BSEMIDCAP, BSESMLCAP, S&P CNX NIFTY, S&P CNX100, S&P CNX500, S&P CNX MIDCAP] of active portfolio (Fund) and passive market index are drawn from the normally distributed data.

H_1 : The daily return [NAV, BSE30-SENSEX, BSE100, BSE200, BSEMIDCAP, BSESMLCAP, S&P CNX NIFTY, S&P CNX100, S&P CNX500, S&P CNX MIDCAP] of active portfolio (Fund) and passive market index does not fit normal distribution.

(b) Randomness: (To Exhibit Strong Form of Efficient Market Hypothesis)

H_0 : The daily [NAV, BSE30-SENSEX, BSE100, BSE200, BSEMIDCAP, BSESMLCAP, S&P CNX NIFTY, S&P CNX100, S&P CNX500, S&P CNX MIDCAP] price movements of active portfolio and passive market index are purely occurred by chance and it does not significantly follow any pattern.

H_1 : The daily [NAV, BSE30-SENSEX, BSE100, BSE200, BSEMIDCAP, BSESMLCAP, S&P CNX NIFTY, S&P CNX100, S&P CNX500, S&P CNX MIDCAP] price movements of active portfolio and passive market index are not random and it significantly follows pattern.

(c) Degree of Relationship

H_0 : There is no significant correlation between active portfolio and passive market index.

H_1 : There is a significant correlation between active portfolio and passive market index.

(d) Market Index's Exposure

H_0 : The impact factor (Systematic risk) of active portfolio on passive market index is zero ($\beta = 0$).

H_1 : The impact factor (Systematic risk) of active portfolio on passive market index is not equal to zero ($\beta \neq 0$).

5. Results and Discussions

5.1 Descriptive Statistics and Test for Normality

Table III enumerates average daily NAV return, total risk of daily NAV return, departure from symmetrical distribution and test for normality of selected funds and indices. The average daily NAV returns of the funds ranges from -0.0252 to 0.0943 and was apparent that HDFC Tax saver fund has generated highest daily NAV return and Birla Sunlife Tax Relief'96 has generated lowest daily NAV returns in the study period. The daily returns of indices ranges from 0.0549 to 0.0821. The SENSEX generated highest daily returns and BSE Small Cap Index has generated lowest daily returns. The measure of total risk (Standard Deviation) revealed that Birla Sunlife Tax Relief'96 has highest variation to the extent of 2.7% and ICICI Tax Plan has lowest variation in the daily NAV returns to the extent of 1.61% among the selected funds. The SENSEX exhibited highest variation (1.95%) and S&P CNX Mid-Cap Index had lowest variation (1.8%) during the study period. The measure of Skewness emphasises the structure of frequency distribution to enumerate whether the sample data lack in symmetrical distribution or follows normal distribution. The analysis shows that most of the selected Tax Saver funds were negatively skewed except L&T Tax Saver fund, LIC Tax Plan, Sahara Tax Gain, Sundaram Tax Saver fund, Taurus Tax Shield, and UTI long term advantage fund typically emphasises that few daily NAV returns were extremely low from the majority of daily NAV returns in turn would certainly caused high amount of variation. Most of the selected indices daily returns were positively skewed

except BSE 500, BSE Mid Cap Index, BSE Small Cap Index, and S&P CNX Mid Cap Index. In order to add value to the lack of symmetry, we have tested the null hypothesis i.e. the daily NAV returns of the funds and daily returns of indices follow symmetrical distribution and no internal as well as external variables do not cause much variation against the alternate hypothesis that the data do not follow normal distribution. Thus, we have applied two testing of hypothesis tools namely Kolmogorov-Smirnov Test and Shapiro-Wilk test. The results proved that we failed to accept the null hypothesis at 5% level of significance; hence the daily NAV returns of all portfolio and all indices returns do not follow normal distribution during the study period 2006 to 2010 ($P: 0.05 > 0.000$). This analysis lays strong foundation for further analysis that though plenty of precautionary measures taken by the fund managers in order to time the market and exhilarating stock selection, the funds were unable to outperform the benchmark (Sharpe, 1966).

5.2 Test for Randomness of Daily NAV Returns and Indices Return

Table IV shows Run test statistics for emphasizing the daily NAV returns and daily indices returns are purely random (supports the strong form of Efficient Market Hypothesis) and do not follow any significant pattern at 1% and 5% level of significance. The algorithm goes as follows. i) Since, the data distribution were mixed structure of data distribution (Partial negatively skewed and partial positively skewed), the appropriate test constraint would be median daily returns ($M_{e(R_i \& R_M)}$) because in a mixed data distribution median daily returns will lie between mean daily return ($X_{(R_i \& R_M)}$) and mode daily returns ($M_{o(R_i \& R_M)}$). ii) Determination of daily return movements from the median daily returns to know the upward and downward trend known as RUNS and grouped them accordingly and the sampling distribution of V statistic,

$$\text{Mean of V Statistic} = \mu_V = \frac{2n_1n_2}{n_1 + n_2} + 1 \quad (5)$$

$$\text{Variance of V Statistic} = \sigma_V^2 = \frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)} \quad (6)$$

$$Z = \frac{V - \mu_V}{\sigma_V} \quad (7)$$

n_1 = No. of responses (Upward daily return group)

n_2 = No. of responses (Downward daily return group)

Table 3 Descriptive Statistics and Test for Normality (Reference Section-E.1)

Fund & Indices	NAV Mean	Standard	Skewness	Kolmogorov-Smirnov Test			Shapiro – Wilk Test		
	Return (%)	Deviation		Statistic	df	Sig.	Statistic	df	Sig.
BPELSS'96 (N=1222)	0.0409	1.86	-1.024	0.098	1222	0.000*	0.873	1222	0.000*
BSLTR'96 (N=1033)	-0.0252	2.70	-3.503	0.148	1033	0.000*	0.737	1033	0.000*
BNPPTAP (N=1039)	0.0575	1.99	-0.931	0.092	1039	0.000*	0.912	1039	0.000*
CRETS (N=1219)	0.0316	2.09	-2.781	0.138	1219	0.000*	0.771	1219	0.000*
ETP (N=1039)	0.0616	1.78	-0.817	0.108	1039	0.000*	0.878	1039	0.000*
FITTS (N=1038)	0.0924	1.85	-0.031	0.095	1038	0.000*	0.929	1038	0.000*
HDFCTS (N=1043)	0.0943	1.8	-0.353	0.092	1043	0.000*	0.921	1043	0.000*
ICICITP (N=1225)	0.0701	1.61	-0.495	0.097	1225	0.000*	0.909	1225	0.000*
INGTS (N=1043)	0.0607	2.00	-0.844	0.111	1043	0.000*	0.889	1043	0.000*
KTSF (N=1043)	0.0420	2.30	-4.734	0.135	1043	0.000*	0.733	1043	0.000*
L&TTS (N=1230)	0.0576	1.86	0.19	0.095	1230	0.000*	0.915	1230	0.000*
LICTP (N=1211)	0.0547	1.93	0.269	0.094	1211	0.000*	0.913	1211	0.000*
PPTS (N=1216)	0.0248	1.99	-3.573	0.12	1216	0.000*	0.778	1216	0.000*
PTS (N=1226)	0.0462	1.7	-0.57	0.094	1226	0.000*	0.916	1226	0.000*
RTS (N=1230)	0.0702	1.62	-0.39	0.084	1230	0.000*	0.929	1230	0.000*
STG (N=1230)	0.0830	1.64	0.056	0.8	1230	0.000*	0.93	1230	0.000*
SBIMTG'93(N=1214)	0.0085	1.99	-3.277	0.128	1214	0.000*	0.775	1214	0.000*
STS (N=1226)	0.0803	1.69	0.219	0.091	1226	0.000*	0.919	1226	0.000*
TTS (N=1229)	0.0429	1.74	-0.382	0.095	1229	0.000*	0.904	1229	0.000*
TTSH (N=1229)	0.0744	1.88	0.08	0.085	1229	0.000*	0.918	1229	0.000*
UTILAF (N=1225)	0.0536	1.64	0.109	0.087	1225	0.000*	0.929	1225	0.000*
SENSEX (N=1239)	0.0821	1.95	0.642	0.085	1239	0.000*	0.937	1239	0.000*
BSE100 (N=1239)	0.0809	1.94	0.149	0.089	1239	0.000*	0.933	1239	0.000*
BSE200 (N=1239)	0.0795	1.91	0.079	0.090	1239	0.000*	0.932	1239	0.000*
BSE500 (N=1239)	0.0733	1.88	-0.016	0.091	1239	0.000*	0.930	1239	0.000*
BSEMIDC (N=1239)	0.0612	1.81	-0.646	0.097	1239	0.000*	0.923	1239	0.000*
BSEMLC (N=1239)	0.0549	1.82	-0.751	0.089	1239	0.000*	0.937	1239	0.000*
S&P NIFTY (N=1239)	0.0811	1.94	0.252	0.079	1239	0.000*	0.933	1239	0.000*
S&P CNX100 (N=1239)	0.0814	1.94	0.165	0.085	1239	0.000*	0.933	1239	0.000*
S&P CNX500 (N=1239)	0.0737	1.87	0.008	0.092	1239	0.000*	0.927	1239	0.000*
S&P CNXMIDC (N=1239)	0.0794	1.80	-0.523	0.091	1239	0.000*	0.936	1239	0.000*

* Significant at 5% level.

$\sigma_V =$ Standard deviation of V Statistic

$V =$ No. of total responses

The analysis revealed mixed responses from both funds as well as indices. The funds, BNP Tax saver, Canara Rebeco Equity Tax saver fund, Escorts Tax Plan, Franklin India Tax shield, HDFC Tax Saver fund, Kotak Tax Saver, L&T Tax Saver, LIC Tax Plan, SBI Magnum Tax gain'93, UTI long term advantage fund exhibited that daily NAV

returns were random (i.e. daily Net Assets Value of the specified funds were very quick enough to correct and availability of any public information would not be used to generate superior returns) and other funds were not random at 1% as well as 5% level of significance. In terms of indices randomness is concerned, the BSE Mid Cap Index, BSE Small Cap Index and S&P CNX Mid Cap Index, daily returns were not random at 1% and 5% level of significance and these indices were significantly

Table 4 Test for Randomness of daily NAV returns and Indices return (Reference Section-E.2)

<i>Fund & Indices</i>	<i>Test</i>	<i>No. of Runs (V)</i>	<i>Z</i>	<i>Asymp. Sig. (2 Tailed)</i> <i>& Monte Carlo Sig.</i>
BPELSS'96 (N=1222)	0.16	567	-2.576	0.01** (0.009*)
BSLTR'96 (N=1033)	0.18	483	-2.148	0.032** (0.031**)
BNPPTAP (N=1039)	0.23	498	-1.397	0.163 (0.178)
CRETS (N=1219)	0.20	579	-1.805	0.071 (0.073)
ETP (N=1039)	0.20	491	-1.831	0.067 (0.069)
FITTS (N=1038)	0.17	501	-1.180	0.238 (0.259)
HDFCTS (N=1043)	0.18	503	-1.208	0.227 (0.243)
ICICITP (N=1225)	0.19	541	-4.145	0.000* (0.000*)
INGTS (N=1043)	0.25	489	-2.076	0.038** (0.040**)
KTSF (N=1043)	0.22	505	-1.084	0.278 (0.292)
L&TTS (N=1230)	0.17	595	-1.198	0.231 (0.241)
LICTP (N=1211)	0.17	587	-1.121	0.262 (0.276)
PPTS (N=1216)	0.20	571	-2.18	0.029** (0.03**)
PTS (N=1226)	0.18	567	-2.686	0.007* (0.009*)
RTS (N=1230)	0.19	565	-2.91	0.004* (0.004*)
STG (N=1230)	0.20	569	-2.681	0.007* (0.007*)
SBIMTG'93(N=1214)	0.17	583	-1.436	0.151 (0.155)
STS (N=1226)	0.15	577	-2.114	0.034** (0.036**)
TTS (N=1229)	0.17	567	-2.768	0.006* (0.008*)
TTSH (N=1229)	0.19	557	-3.339	0.001* (0.001*)
UTILAF (N=1225)	0.15	591	-1.286	0.198 (0.209)
SENSEX (N=1239)	0.14	613	-0.426	0.67 (0.689)
BSE100 (N=1239)	0.19	611	-0.540	0.589 (0.612)
BSE200 (N=1239)	0.18	603	-0.995	0.32 (0.34)
BSE500 (N=1239)	0.20	595	-1.449	0.147 (0.157)
BSEMIDC (N=1239)	0.24	555	-3.723	0.000* (0.000*)
BSESMLC (N=1239)	0.27	521	-5.656	0.000* (0.000)*
S&P NIFTY (N=1239)	0.13	613	-0.426	0.67 (0.689)
S&P CNX100 (N=1239)	0.16	615	-0.313	0.755 (0.77)
S&P CNX500 (N=1239)	0.19	599	-1.222	0.222 (0.232)
S&P CNXMIDC (N=1239)	0.27	541	-4.519	0.000* (0.000*)

* Significant at 1% level ** Significant at 5% level.

following a pattern hence contradicts efficient market hypothesis.

5.3 Correlation Matrix and Testing the Evidence for Significant Correlation

Table V enumerates the degree of relationship that the fund exhibits with respective indices. All funds had high degree of positive correlation with all indices during the

study period. Significant correlations have been witnessed at 1% level ($P: 0.01 > 0.000$) and we fail to argue that the funds do not have significant correlation with various Indices. Even we look at haute couture angle, one can not precisely arrive which would be the appropriate benchmark index for validating the funds performance. Hence, we need to regress the model and understand the level of impact on dependent variable (Fund performance)

Table 5 Correlation Matrix and Testing the Evidence for Significant Correlation (Reference Section-E.3)

Fund	Indices									
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSEMLC	NIFTY	CNX100	CNX500	CNXMIDC
BPELSS'96 N=1222	$\rho = +0.88$ Sig.=0.000**	$\rho = +0.899$ Sig.=0.000**	$\rho = +0.905$ Sig.=0.000**	$\rho = +0.908$ Sig.=0.000**	$\rho = +0.87$ Sig.=0.000**	$\rho = +0.807$ Sig.=0.000**	$\rho = +0.886$ Sig.=0.000**	$\rho = +0.896$ Sig.=0.000**	$\rho = +0.905$ Sig.=0.000**	$\rho = +0.87$ Sig.=0.000**
BNPPTAP N=1039	$\rho = +0.908$ Sig.=0.000**	$\rho = +0.935$ Sig.=0.000**	$\rho = +0.945$ Sig.=0.000**	$\rho = +0.951$ Sig.=0.000**	$\rho = +0.932$ Sig.=0.000**	$\rho = +0.878$ Sig.=0.000**	$\rho = +0.918$ Sig.=0.000**	$\rho = +0.932$ Sig.=0.000**	$\rho = +0.949$ Sig.=0.000**	$\rho = +0.932$ Sig.=0.000**
BSLTR'96 N=1033	$\rho = +0.759$ Sig.=0.000**	$\rho = +0.774$ Sig.=0.000**	$\rho = +0.779$ Sig.=0.000**	$\rho = +0.782$ Sig.=0.000**	$\rho = +0.747$ Sig.=0.000**	$\rho = +0.696$ Sig.=0.000**	$\rho = +0.759$ Sig.=0.000**	$\rho = +0.768$ Sig.=0.000**	$\rho = +0.776$ Sig.=0.000**	$\rho = +0.744$ Sig.=0.000**
CRETS N=1219	$\rho = +0.787$ Sig.=0.000**	$\rho = +0.806$ Sig.=0.000**	$\rho = +0.81$ Sig.=0.000**	$\rho = +0.812$ Sig.=0.000**	$\rho = +0.768$ Sig.=0.000**	$\rho = +0.711$ Sig.=0.000**	$\rho = +0.791$ Sig.=0.000**	$\rho = +0.801$ Sig.=0.000**	$\rho = +0.81$ Sig.=0.000**	$\rho = +0.767$ Sig.=0.000**
ETP N=1039	$\rho = +0.819$ Sig.=0.000**	$\rho = +0.856$ Sig.=0.000**	$\rho = +0.87$ Sig.=0.000**	$\rho = +0.88$ Sig.=0.000**	$\rho = +0.906$ Sig.=0.000**	$\rho = +0.865$ Sig.=0.000**	$\rho = +0.835$ Sig.=0.000**	$\rho = +0.853$ Sig.=0.000**	$\rho = +0.88$ Sig.=0.000**	$\rho = +0.898$ Sig.=0.000**
FITTS N=1038	$\rho = +0.97$ Sig.=0.000**	$\rho = +0.981$ Sig.=0.000**	$\rho = +0.982$ Sig.=0.000**	$\rho = +0.981$ Sig.=0.000**	$\rho = +0.901$ Sig.=0.000**	$\rho = +0.819$ Sig.=0.000**	$\rho = +0.966$ Sig.=0.000**	$\rho = +0.974$ Sig.=0.000**	$\rho = +0.975$ Sig.=0.000**	$\rho = +0.913$ Sig.=0.000**
HDFCTS N=1043	$\rho = +0.933$ Sig.=0.000**	$\rho = +0.952$ Sig.=0.000**	$\rho = +0.958$ Sig.=0.000**	$\rho = +0.961$ Sig.=0.000**	$\rho = +0.917$ Sig.=0.000**	$\rho = +0.854$ Sig.=0.000**	$\rho = +0.935$ Sig.=0.000**	$\rho = +0.947$ Sig.=0.000**	$\rho = +0.958$ Sig.=0.000**	$\rho = +0.928$ Sig.=0.000**
ICICITP N=1225	$\rho = +0.883$ Sig.=0.000**	$\rho = +0.91$ Sig.=0.000**	$\rho = +0.922$ Sig.=0.000**	$\rho = +0.933$ Sig.=0.000**	$\rho = +0.941$ Sig.=0.000**	$\rho = +0.909$ Sig.=0.000**	$\rho = +0.887$ Sig.=0.000**	$\rho = +0.905$ Sig.=0.000**	$\rho = +0.932$ Sig.=0.000**	$\rho = +0.937$ Sig.=0.000**
INGTS N=1043	$\rho = +0.867$ Sig.=0.000**	$\rho = +0.905$ Sig.=0.000**	$\rho = +0.919$ Sig.=0.000**	$\rho = +0.931$ Sig.=0.000**	$\rho = +0.958$ Sig.=0.000**	$\rho = +0.913$ Sig.=0.000**	$\rho = +0.877$ Sig.=0.000**	$\rho = +0.898$ Sig.=0.000**	$\rho = +0.93$ Sig.=0.000**	$\rho = +0.955$ Sig.=0.000**
KTSF N=1043	$\rho = +0.794$ Sig.=0.000**	$\rho = +0.818$ Sig.=0.000**	$\rho = +0.825$ Sig.=0.000**	$\rho = +0.83$ Sig.=0.000**	$\rho = +0.81$ Sig.=0.000**	$\rho = +0.749$ Sig.=0.000**	$\rho = +0.801$ Sig.=0.000**	$\rho = +0.814$ Sig.=0.000**	$\rho = +0.827$ Sig.=0.000**	$\rho = +0.81$ Sig.=0.000**
L&TTS N=1230	$\rho = +0.945$ Sig.=0.000**	$\rho = +0.967$ Sig.=0.000**	$\rho = +0.974$ Sig.=0.000**	$\rho = +0.978$ Sig.=0.000**	$\rho = +0.942$ Sig.=0.000**	$\rho = +0.873$ Sig.=0.000**	$\rho = +0.952$ Sig.=0.000**	$\rho = +0.964$ Sig.=0.000**	$\rho = +0.977$ Sig.=0.000**	$\rho = +0.939$ Sig.=0.000**
LICTP N=1211	$\rho = +0.957$ Sig.=0.000**	$\rho = +0.974$ Sig.=0.000**	$\rho = +0.978$ Sig.=0.000**	$\rho = +0.979$ Sig.=0.000**	$\rho = +0.913$ Sig.=0.000**	$\rho = +0.837$ Sig.=0.000**	$\rho = +0.963$ Sig.=0.000**	$\rho = +0.972$ Sig.=0.000**	$\rho = +0.977$ Sig.=0.000**	$\rho = +0.917$ Sig.=0.000**
PPTS N=1216	$\rho = +0.806$ Sig.=0.000**	$\rho = +0.822$ Sig.=0.000**	$\rho = +0.828$ Sig.=0.000**	$\rho = +0.831$ Sig.=0.000**	$\rho = +0.791$ Sig.=0.000**	$\rho = +0.725$ Sig.=0.000**	$\rho = +0.807$ Sig.=0.000**	$\rho = +0.818$ Sig.=0.000**	$\rho = +0.832$ Sig.=0.000**	$\rho = +0.793$ Sig.=0.000**
PTS N=1226	$\rho = +0.887$ Sig.=0.000**	$\rho = +0.912$ Sig.=0.000**	$\rho = +0.922$ Sig.=0.000**	$\rho = +0.93$ Sig.=0.000**	$\rho = +0.921$ Sig.=0.000**	$\rho = +0.87$ Sig.=0.000**	$\rho = +0.893$ Sig.=0.000**	$\rho = +0.908$ Sig.=0.000**	$\rho = +0.928$ Sig.=0.000**	$\rho = +0.916$ Sig.=0.000**

Continued

Fund	Indices									
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSEMLC	NIFTY	CNX100	CNX500	CNXMIDC
RTS	$\rho = +0.889$ Sig.=0.000**	$\rho = +0.92$ Sig.=0.000**	$\rho = +0.931$ Sig.=0.000**	$\rho = +0.94$ Sig.=0.000**	$\rho = +0.943$ Sig.=0.000**	$\rho = +0.897$ Sig.=0.000**	$\rho = +0.9$ Sig.=0.000**	$\rho = +0.917$ Sig.=0.000**	$\rho = +0.94$ Sig.=0.000**	$\rho = +0.942$ Sig.=0.000**
N=1230										
STG	$\rho = +0.903$ Sig.=0.000**	$\rho = +0.935$ Sig.=0.000**	$\rho = +0.946$ Sig.=0.000**	$\rho = +0.953$ Sig.=0.000**	$\rho = +0.947$ Sig.=0.000**	$\rho = +0.895$ Sig.=0.000**	$\rho = +0.915$ Sig.=0.000**	$\rho = +0.932$ Sig.=0.000**	$\rho = +0.953$ Sig.=0.000**	$\rho = +0.948$ Sig.=0.000**
N=1230										
SBIMTG'93	$\rho = +0.786$ Sig.=0.000**	$\rho = +0.803$ Sig.=0.000**	$\rho = +0.806$ Sig.=0.000**	$\rho = +0.809$ Sig.=0.000**	$\rho = +0.763$ Sig.=0.000**	$\rho = +0.704$ Sig.=0.000**	$\rho = +0.787$ Sig.=0.000**	$\rho = +0.798$ Sig.=0.000**	$\rho = +0.805$ Sig.=0.000**	$\rho = +0.762$ Sig.=0.000**
N=1214										
STS	$\rho = +0.91$ Sig.=0.000**	$\rho = +0.937$ Sig.=0.000**	$\rho = +0.945$ Sig.=0.000**	$\rho = +0.951$ Sig.=0.000**	$\rho = +0.926$ Sig.=0.000**	$\rho = +0.865$ Sig.=0.000**	$\rho = +0.924$ Sig.=0.000**	$\rho = +0.937$ Sig.=0.000**	$\rho = +0.951$ Sig.=0.000**	$\rho = +0.922$ Sig.=0.000**
N=1226										
TTS	$\rho = +0.895$ Sig.=0.000**	$\rho = +0.922$ Sig.=0.000**	$\rho = +0.931$ Sig.=0.000**	$\rho = +0.937$ Sig.=0.000**	$\rho = +0.917$ Sig.=0.000**	$\rho = +0.857$ Sig.=0.000**	$\rho = +0.905$ Sig.=0.000**	$\rho = +0.92$ Sig.=0.000**	$\rho = +0.936$ Sig.=0.000**	$\rho = +0.918$ Sig.=0.000**
N=1229										
TTSH	$\rho = +0.819$ Sig.=0.000**	$\rho = +0.861$ Sig.=0.000**	$\rho = +0.876$ Sig.=0.000**	$\rho = +0.888$ Sig.=0.000**	$\rho = +0.921$ Sig.=0.000**	$\rho = +0.885$ Sig.=0.000**	$\rho = +0.833$ Sig.=0.000**	$\rho = +0.857$ Sig.=0.000**	$\rho = +0.888$ Sig.=0.000**	$\rho = +0.918$ Sig.=0.000**
N=1229										
UTILAF	$\rho = +0.956$ Sig.=0.000**	$\rho = +0.973$ Sig.=0.000**	$\rho = +0.977$ Sig.=0.000**	$\rho = +0.979$ Sig.=0.000**	$\rho = +0.925$ Sig.=0.000**	$\rho = +0.854$ Sig.=0.000**	$\rho = +0.961$ Sig.=0.000**	$\rho = +0.97$ Sig.=0.000**	$\rho = +0.977$ Sig.=0.000**	$\rho = +0.931$ Sig.=0.000**
N=1225										

* Significant at 5% level, ** Significant at 1% level.

through the independent variable (Respective Index). We have not intended to construct a composition of indices as benchmark because of two reasons:

- (i) Multi collinearity among the independent variables (High degree of positive correlation among Indices misleads the validity of the model)
- (ii) The relative weights that perhaps obtained through the model can not be sustained over a long span of time because proportion of asset classes in the fund would have constantly revived.

5.4 Systematic Risk Evaluation and Model Fitness

Table VI portrays the systematic risk (Beta) attached to all funds, coefficient of determination and beta coefficient's significance. We have regressed through a single index model to obtain the beta coefficient and model fitness through R-Squared. All funds were associated with low systematic risk ($\beta < 1$) except LIC Tax Plan on S&P CNX 500 ($\beta > 1$: $1.001 > 1$). In order to understand the significance of the beta coefficient, we set the null hypothesis that the systematic risk coefficient is not significantly different from zero ($\beta = 0$) and apparently analysis proved that the systematic risk is significantly different from zero ($\beta \neq 1$) at 5% level of significance and signifies that daily indices returns have significantly impacted the daily NAV returns. This led to answer a challenging question that to what extent the daily indices return can explain the variance of daily NAV returns. The values marked in parenthesis emphasis R-Squared that facilitates to understand the proportion of variance in daily NAV returns could be explainable by the daily indices return. In order to have appropriate model, the R-Squared should be atleast 90%. Franklin India Tax shield, HDFC Tax Saver, L&T Tax Saver, and LIC Tax plan's R Squared values were 95%, 92%, 91% and 95% respectively and describes that only 5%, 8%, 9% and 5% variance of daily NAV returns can not be explainable by the referring benchmark indices. Astonishingly, analysis exhibits funds like Birla Sunlife Tax Relief'96, Canara Rebeco Tax saver, Kotak Tax Saver, and Principal Personal Tax savings fund's R Squared value were considerably low, indicates high amount of unsystematic risk. Other funds R Squared values were ranging from 70% to 89%. Precisely, benchmark index suppose to have more explanation power on variance of daily NAV returns

but we found contradicting results during the study period i.e. the other indices which have not been considered as benchmark had more power in explaining the variance of daily NAV returns caused by indices and hence left a strong evidence for continuously transforming the fund's benchmark index at regular intervals which would ultimately pave way to maximise the performance of an active portfolio.

5.5 Determination of Required Rate of Return through CAPM and Jensen's Alpha

Table VII describes the daily expected return derived through the Capital Asset Pricing model and Jensen's Alpha. The CAPM decomposed of three vital elements i) Risk free rate of return (Treasury bill rate), ii) Return of a benchmark index iii) Nature of relationship among the fund return and benchmark return. We have averaged the Treasury bill rates during the study period (2006: 7.245%, 2007:7.19%, 2008: 7.35%, 2009:5.45%, 2010: 3.97%, Average T. Bill rate 6.241% P.A, Daily T. Bill rate 0.0171%) and the risk premium has been ascertained by finding the difference between the daily index return and risk free return ($R_M - R_f$). Then, precisely using the beta obtained from panel D, the required rate of return of the funds (active portfolio) was arrived. Jensen's Alpha is a risk adjusted absolute return and portrays that successful prediction of asset prices would facilitate the portfolio manager to earn higher returns than a lay investor could expect to earn at a given level of risk. If a portfolio manager select a inappropriate benchmark index for comparative analysis to measure the performance of fund, will definitely lead to hamper the fund performance. Indeed, the study also proved in the case of Franklin India Tax shield and HDFC Tax saver fund were able to generate highest Jensen's Alpha through the prevailing benchmark indices ($\alpha_{FITS, CNX 500}$: 0.0147% and $\alpha_{HDFCTS, CNX500}$: 0.0141%) but the other funds were exhibited contradicting results. Intuitively, if the fund managers have used '#' marked indices, probably the fund would have earned highest excess returns. In the rally of providing excess return, the S&P CNX Mid Cap Index has taken lead followed by S&P CNX 500, BSE Mid Cap and BSE 500. Especially, the prevailing benchmark indices of the respective portfolio have taken a way behind positions in terms of generating highest excessive returns during the study period, proves that continuous transformation of benchmark index is mandate.

Table 6 Systematic Risk Evaluation and Model Fitness (Reference Section-E.4)

FUND	Indices – β & R ² Squared											Sig.
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSESMLC	NIFTY	CNX100	CNX500	CNXMIDC		
BPELSS'96	0.831 ⁺ (77%)	0.851 (81%)	0.869 (82%)	0.888 (82%)	0.879 (76%)	0.815 (65%)	0.842 (78%)	0.85 (80%)	0.892 (82%)	0.886 (76%)	0.000*	
BNPPTAP	0.835 (82%)	0.859 (87%)	0.879 ⁺ (89%)	0.9 (90%)	0.899 (87%)	0.837 (77%)	0.857 (84%)	0.866 (87%)	0.908 (90%)	0.909 (87%)	0.000*	
BSLTR'96	0.941 (58%)	0.959 (60%)	0.976 ⁺ (61%)	0.996 (61%)	0.971 (56%)	0.892 (48%)	0.956 (58%)	0.961 (59%)	1.000 (60%)	0.976 (55%)	0.000*	
CRETS	0.835 (62%)	0.858 ⁺ (65%)	0.875 (66%)	0.894 (66%)	0.873 (59%)	0.806 (51%)	0.846 (63%)	0.854 (64%)	0.897 (66%)	0.878 (59%)	0.000*	
ETP	0.673 (67%)	0.703 (73%)	0.724 (76%)	0.744 (78%)	0.781 (82%)	0.734 (75%)	0.697 ⁺ (70%)	0.708 (73%)	0.753 (78%)	0.782 (81%)	0.000*	
FITTS	0.827 (94%)	0.835 (96%)	0.847 (97%)	0.86 (96%)	0.806 (81%)	0.723 (67%)	0.836 (93%)	0.839 (95%)	0.864 ⁺ (95%)	0.824 (83%)	0.000*	
HDFCTS	0.776 (87%)	0.79 (91%)	0.805 (92%)	0.822 (92%)	0.8 (84%)	0.735 (73%)	0.789 (87%)	0.795 (90%)	0.828 ⁺ (92%)	0.818 (86%)	0.000*	
ICICITP	0.723 (78%)	0.747 (83%)	0.768 (85%)	0.791 (87%)	0.824 (89%)	0.793 (83%)	0.73 ⁺ (79%)	0.743 (82%)	0.795 (87%)	0.826 (88%)	0.000*	
INGTS	0.802 (75%)	0.836 ⁺ (82%)	0.861 (85%)	0.886 (87%)	0.93 (92%)	0.874 (83%)	0.824 (77%)	0.839 (81%)	0.895 (87%)	0.936 (91%)	0.000*	
KTSTF	0.844 (63%)	0.868 (67%)	0.887 (68%)	0.907 (69%)	0.903 (66%)	0.824 (56%)	0.865 (64%)	0.874 (66%)	0.915 ⁺ (68%)	0.912 (66%)	0.000*	
L&TTS	0.892 (89%)	0.915 (94%)	0.935 (95%)	0.957 (96%)	0.954 (89%)	0.882 (76%)	0.905 ⁺ (91%)	0.914 (93%)	0.936 (95%)	0.956 (88%)	0.000*	
LICTP	0.94 ⁺ (92%)	0.959 (95%)	0.977 (96%)	0.996 (96%)	0.956 (83%)	0.874 (70%)	0.952 (93%)	0.959 (95%)	1.001 (96%)	0.967 (84%)	0.000*	
PPTS	0.812 (65%)	0.831 ⁺ (68%)	0.85 (69%)	0.868 (69%)	0.855 (63%)	0.779 (53%)	0.819 (65%)	0.829 (67%)	0.875 (69%)	0.862 (63%)	0.000*	
PTS	0.769 (79%)	0.793 (83%)	0.814 ⁺ (85%)	0.836 (87%)	0.856 (85%)	0.806 (76%)	0.779 (80%)	0.791 (82%)	0.84 (86%)	0.857 (84%)	0.000*	
RTS	0.733 (79%)	0.76 ⁺ (85%)	0.781 (87%)	0.803 (88%)	0.833 (89%)	0.791 (80%)	0.747 (81%)	0.759 (84%)	0.809 (88%)	0.838 (89%)	0.000*	

Continued

Fund	Indices – β & RSquared										Sig.
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSESMLC	NIFTY	CNX100	CNX500	CNXMIDC	
STG	0.753 (82%)	0.781 (88%)	0.802 ⁺ (89%)	0.823 (91%)	0.846 (90%)	0.799 (80%)	0.768 (84%)	0.78 (87%)	0.829 (91%)	0.852 (90%)	0.000*
SBIMTG'93	0.799 (62%)	0.822 ⁺ (64%)	0.839 (65%)	0.857 (65%)	0.837 (58%)	0.765 (50%)	0.806 (62%)	0.817 (64%)	0.857 (65%)	0.843 (58%)	0.000*
STS	0.785 (83%)	0.81 (88%)	0.829 ⁺ (89%)	0.894 (90%)	0.855 (86%)	0.797 (75%)	0.802 (85%)	0.811 (88%)	0.855 (90%)	0.857 (85%)	0.000*
TTS	0.792 ⁺ (80%)	0.818 (85%)	0.838 (87%)	0.859 (88%)	0.871 (84%)	0.813 (74%)	0.807 (82%)	0.818 (85%)	0.864 (88%)	0.877 (84%)	0.000*
TTSH	0.785 (67%)	0.827 (74%)	0.854 ⁺ (77%)	0.882 (79%)	0.947 (85%)	0.908 (78%)	0.804 (70%)	0.825 (73%)	0.888 (79%)	0.95 (84%)	0.000*
UTILAF	0.798 (91%)	0.814 ⁺ (95%)	0.831 (96%)	0.848 (96%)	0.829 (86%)	0.763 (73%)	0.807 (92%)	0.831 (94%)	0.852 (96%)	0.839 (87%)	0.000*

* Significant at 5% level, ⁺ Benchmark Index.

Table 7 Determination of Required Rate of Return through CAPM and Jensen's Alpha (Reference Section-E.5)

Fund	Daily Expected Returns (Based on CAPM) and Jensen's Alpha (%)									
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSESMLC	NIFTY	CNX100	CNX500	CNXMIDC
BPELSS'96	0.0267	0.0264	0.0261	0.0256	0.0259	0.027	0.0265	0.0264	0.0257	0.0258
	0.0142 ⁺	0.0145	0.0148	0.0153 [#]	0.015	0.0139	0.0144	0.0145	0.0152	0.0151
BNPPTAP	0.0432	0.0428	0.0425	0.0421	0.0421	0.0432	0.0428	0.0426	0.0419	0.0419
	0.0143	0.0147	0.015 ⁺	0.0154	0.0154	0.0143	0.0147	0.0149	0.0156 [#]	0.0156 [#]
BSLTR'96	-0.0413	-0.0416	-0.0419	-0.0423	-0.0418	-0.0404	-0.0416	-0.0417	-0.0424	-0.0419
	0.0161	0.0164	0.0167 ⁺	0.0171	0.0166	0.0152	0.0164	0.0165	0.0172 [#]	0.0167
CRETS	0.0174	0.017	0.0167	0.0164	0.0166	0.0178	0.0171	0.017	0.0162	0.0166
	0.0142	0.0146 ⁺	0.0149	0.0152	0.015	0.0138	0.0145	0.0146	0.0154 [#]	0.015
ETP	0.0501	0.0497	0.0492	0.0489	0.0483	0.0491	0.0497	0.0495	0.0488	0.0482
	0.0115	0.0119	0.0124	0.0127	0.0133	0.0125	0.0119 ⁺	0.0121	0.0128	0.0134 [#]
FITTS	0.0783	0.0781	0.0779	0.0778	0.0787	0.0801	0.0781	0.0782	0.0777	0.0784
	0.0141	0.0143	0.0145	0.0146	0.0137	0.0123	0.0143	0.0142	0.0147[#]+	0.014

Continued

HDFCTS	0.0811	0.0809	0.0805	0.0803	0.0807	0.0817	0.0808	0.0807	0.0802	0.0804
	0.0132	0.0134	0.0138	0.014	0.0136	0.0126	0.0135	0.0136	0.0141 [#]	0.0139
ICICITP	0.0578	0.0574	0.057	0.0566	0.0561	0.0565	0.0576	0.0574	0.0564	0.0561
	0.0123	0.0127	0.0131	0.0135	0.014 [#]	0.0136	0.0125 ⁺	0.0127	0.0137	0.014 [#]
INGTS	0.0468	0.0464	0.0459	0.0455	0.0447	0.0457	0.0466	0.0463	0.0454	0.0446
	0.0139	0.0143 ⁺	0.0148	0.0152	0.016	0.015	0.0141	0.0144	0.0153	0.0161 [#]
KTSF	0.0275	0.0271	0.0268	0.0266	0.0265	0.0279	0.0273	0.027	0.0265	0.0264
	0.0145	0.0149	0.0152	0.0154	0.0155	0.0141	0.0147	0.015	0.0155 ⁺	0.0156 [#]
L&TTS	0.0424	0.042	0.0416	0.0413	0.0413	0.0425	0.0422	0.042	0.0396	0.0413
	0.0152	0.0156	0.016	0.0163	0.0163	0.0151	0.0154 ⁺	0.0156	0.018 [#]	0.0163
LICTP	0.0386	0.0383	0.038	0.0377	0.0383	0.0398	0.0384	0.0383	0.0377	0.0382
	0.0161 ⁺	0.0164	0.0167	0.017 [#]	0.0164	0.0149	0.0163	0.0164	0.017 [#]	0.0165
PPTS	0.0109	0.0105	0.0102	0.0099	0.0101	0.0115	0.0108	0.0106	0.0098	0.001
	0.0139	0.0143 ⁺	0.0146	0.0149	0.0147	0.0133	0.014	0.0142	0.015	0.0238 [#]
PTS	0.033	0.0326	0.0322	0.0319	0.0316	0.0324	0.033	0.0328	0.0319	0.0315
	0.0132	0.0136	0.014 ⁺	0.0143	0.0146	0.0138	0.0132	0.0134	0.0143	0.0147 [#]
RTS	0.0578	0.0572	0.0569	0.0565	0.056	0.0567	0.0575	0.0573	0.0565	0.0559
	0.0124	0.013 ⁺	0.0133	0.0137	0.0142	0.0135	0.0127	0.0129	0.0137	0.0143 [#]
STG	0.0702	0.0697	0.0693	0.069	0.0686	0.0694	0.0699	0.0698	0.0689	0.0684
	0.0128	0.0133	0.0137 ⁺	0.014	0.0144	0.0136	0.0131	0.0132	0.0141	0.0146 [#]
SBIMTG'93	-0.0052	-0.0056	-0.0058	-0.0061	-0.0059	-0.0046	-0.0053	-0.0055	-0.0062	-0.006
	0.0137	0.0141 ⁺	0.0143	0.0146	0.0144	0.0131	0.0138	0.014	0.0147 [#]	0.0145
STS	0.0669	0.0664	0.0662	0.0685	0.0657	0.0667	0.0666	0.0664	0.0657	0.0656
	0.0134	0.0139	0.0141 ⁺	0.0118	0.0146	0.0136	0.0137	0.0139	0.0146	0.0147 [#]
TTS	0.0293	0.0288	0.0285	0.0281	0.0279	0.0289	0.0291	0.0289	0.028	0.0278
	0.0136 ⁺	0.0141	0.0144	0.0148	0.015	0.014	0.0138	0.014	0.0149	0.0151 [#]
TTSH	0.061	0.0603	0.0598	0.0593	0.0582	0.0589	0.0607	0.0603	0.0592	0.0582
	0.0134	0.0141	0.0146 ⁺	0.0151	0.0162 [#]	0.0155	0.0137	0.0141	0.0152	0.0162 [#]
UTILAF	0.0399	0.0396	0.0394	0.039	0.0393	0.0405	0.0398	0.0408	0.039	0.0392
	0.0137	0.014 ⁺	0.0142	0.0146 [#]	0.0143	0.0131	0.0138	0.0128	0.0146 [#]	0.0144

Highest abnormal return

⁺ Benchmark Index

5.6 Tracking Error Volatility (TEV)

Table VIII enumerates the Tracking Error Volatility (TEV) broadly understood as the Standard deviation of difference of daily returns between the active portfolio (active portfolio) and the prevailing benchmark index (passive portfolio).

style of the mutual fund. The actual pattern of investment of an active portfolio may deviate from the composition of asset classes in the benchmark. Broadly, portfolio managers invest in securities, which may not be component of a prevailing benchmark index of a particular fund. Thus, the prevailing benchmark does not articulate the Risk-Return profile of an active portfolio. The researchers tried

Table 8 Tracking Error Volatility (TEV)

FUND	TEV Statistics									
	SENSEX	BSE100	BSE200	BSE500	BSEMIDC	BSESMLC	NIFTY	CNX100	CNX500	CNXMIDC
BPELSS'96	0.942 ⁺	0.865	0.830	0.804 [#]	0.942	1.148	0.915	0.875	0.815	0.938
BNPPTAP	0.910	0.768	0.704 ⁺	0.649 [#]	0.752	1.012	0.846	0.776	0.655	0.744
BSLTR'96	1.761	1.708	1.693 ⁺	1.681 [#]	1.792	1.949	1.757	1.729	1.700	1.802
CRETS	1.329	1.268 ⁺	1.249	1.234 [#]	1.358	1.511	1.311	1.282	1.240	1.359
ETP	1.244	1.124	1.058	1.002	0.881 [#]	1.054	1.174 ⁺	1.121	0.989	0.901
FITTS	0.585	0.507	0.476	0.462 [#]	0.897	1.210	0.592	0.542	0.500 ⁺	0.838
HDFCTS	0.808	0.715	0.663	0.621 [#]	0.828	1.087	0.780	0.723	0.629 ⁺	0.765
ICICITP	0.932	0.830	0.767	0.702	0.631 [#]	0.771	0.910 ⁺	0.850	0.700	0.646
INGTS	1.083	0.922 ⁺	0.841	0.768	0.590 [#]	0.858	1.033	0.944	0.766	0.608
KTSF	1.437	1.352	1.321	1.297 [#]	1.363	1.566	1.405	1.363	1.304 ⁺	1.360
L&TTS	0.645	0.500	0.440	0.396 [#]	0.628	0.931	0.596 ⁺	0.520	0.403	0.645
LICTP	0.573 ⁺	0.442	0.407	0.394 [#]	0.793	1.083	0.527	0.461	0.409	0.775
PPTS	1.234	1.179 ⁺	1.153	1.135	1.245	1.430	1.227	1.192	1.130 [#]	1.239
PTS	0.908	0.807	0.751 ⁺	0.698 [#]	0.712	0.912	0.880	0.824	0.704	0.730
RTS	0.909	0.790 ⁺	0.725	0.665	0.618 [#]	0.812	0.860	0.801	0.659	0.618 [#]
STG	0.855	0.721	0.655 ⁺	0.598	0.596	0.818	0.800	0.733	0.590	0.587 [#]
SBIMTG'93	1.292	1.235 ⁺	1.216	1.201 [#]	1.318	1.476	1.284	1.250	1.210	1.318
STS	0.818	0.699	0.644 ⁺	0.598	0.693	0.929	0.754	0.697	0.592 [#]	0.704
TTS	0.876 ⁺	0.762	0.709	0.665 [#]	0.731	0.960	0.829	0.770	0.665 [#]	0.723
TTSH	1.159	1.015	0.950 ⁺	0.894	0.739 [#]	0.894	1.109	1.029	0.891	0.750
UTILAF	0.622	0.527 ⁺	0.478	0.439 [#]	0.697	0.957	0.589	0.539	0.445	0.668

LowestTEV

+ Benchmark Index

$$TEV = \sigma(\text{Daily NAV returns} - \text{Daily benchmark returns}) \quad (8)$$

Though, by considering the excess returns to embark the benchmark index may lead to misappropriation unless understand the volatility among the array of daily excess returns. The study accentuated that the broad based indices like BSE 500, S&P CNX 500 as well as BSE & S&P CNX Mid Cap Indices exhibited lowest Tracking Error Volatility. Hence, there should be a trade-off between

having moderate amount of excess return and containing the highest level risk exposure from the benchmark indices.

6. Conclusion

Universally, the performance of a mutual fund is analysed by considering various risk-related characteristics and also the performance is evaluated against the performance of a benchmark index that typically represent the investment

to eloquent this issue by determining the excess returns generated by the various benchmark indices and its relative volatility. In order to derive excess return, in contrast to Fama & French (1992), who considered monthly returns to measure systematic risk and also in contrast to Kothari, Shanken & Sloan (1995), who measured systematic risk by considering annual returns, we considered daily returns to have precise estimation. During the entire study period, all funds have exhibited high degree of significant correlation and moderate significant proportion of systematic risk. Birla Sunlife Tax Relief'96, Canara Rebeco Tax Saver, Kotak Tax Saver, Principal Personal Tax Savings, SBI Magnum Tax Gain'93 fund's major proportion of variance were not explained by their prevailing benchmark indices indicated larger proportion of unsystematic risk. Franklin India Tax Shield and HDFC Tax Saver funds proved that the prevailing benchmark indices were the right choice in terms of generating highest excess returns compared to other market indices. Despite mingled asset classes, indices like BSE 500, BSE Mid Cap, S&P CNX 500, and S&P CNX Mid Cap shown remarkable leverage in providing excess return across all ELSS funds. This argument is also supported by Tracking Error Volatility (TEV) that low risk has been observed on aforesaid indices. Thus, very broad based indices like BSE 500, S&P CNX500 that comprises of various compositions of asset classes (Large Cap equities, Mid Cap Equities and Small Cap Equities) would be an appropriate benchmark index for Tax Saver Funds (ELSS). More concretely, though the fund managers take enough precautions to exhibit their stock selection skills and restructuring the portfolio, the selection of an appropriate benchmark index to evaluate the fund performance has to happen continuously at regular intervals.

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