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# Mutual Fund Performance Evaluation: A Unifying Approach

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***Abstract:*** In a market with declining interest rates and narrowing alternative investment opportunities, mutual funds do constitute an important segment of the Indian financial market. Mutual fund schemes have a pass through structure i.e. investor return depends entirely on the income generated by the corpus of the scheme in the capital market which in turn depends heavily on the market conditions and also (albeit to a lesser extent) on the fund management abilities of relative mutual fund. While the risk emanating from adverse market conditions is an unavoidable risk, the second kind of risk can be mitigated (to certain extent) through portfolio reallocation which in turn depends on fund management skills. Performance evaluation of mutual funds is therefore an area of research which has generated considerable interest in the minds of both academicians and industry experts.

The methodology of mutual fund evaluation has two distinct strands. The traditional approach is essentially a ratio based approach which evaluates observed portfolio performance relative to the market portfolio. Thus this approach uses an external benchmark for performance evaluation.The non-parametric approach, on the other hand, uses an endogenous benchmark as it generates a risk-return frontier (from the observed data) which is then used for evaluating the performance of any observed fund. The present study adopts a hybrid path as it attempts to use the market portfolio risk-return data for performance evaluation in a non-parametric setting.

***Keywords:*** Mutual Fund, Data envelopment analysis, Performance evaluation, Hybrid approach, Fixed benchmarking, Variable benchmarking.

***JEL Classification:*** G-110,C-61, D-21.

## Introduction

For common investors with limited knowledge about the market fundamentals, mutual funds provide an importance vehicle of investment in the capital market. Depending on the return-risk expectation of the investor, the market offers pure equity, pure debt and hybrid (balanced) schemes of investment in mutual funds. In a market with declining interest rates and narrowing alternative investment opportunities, mutual funds do constitute an important segment of the financial market.

Unlike the commercial banks, the mutual fund schemes have a pass through structure i.e. investor return depends entirely on the income generated by the corpus of the scheme in the capital market which in turn depends heavily on the market conditions and also (albeit to a lesser extent) on the fund management abilities of relative mutual fund. While the risk emanating from adverse market conditions is an unavoidable risk, the second kind of risk can be mitigated (to certain extent) through portfolio reallocation which in turn depends on fund management skills. Performance evaluation of mutual funds is therefore an area of research which has generated considerable interest in the minds of both academicians and industry experts.

Broadly speaking, there are two approaches for the evaluation of mutual fund performance. The traditional approach is a ratio based approach which evaluates observed portfolio performance relative to the market excess return i.e. it uses an external benchmark. Thus the Capital Asset Pricing Model links the portfolio excess return with the excess return available on the market portfolio. The Fama–French (1992) approach adds two other explanatory factors –differential return available on small caps (over big caps) and differential return on firms with high book value/ market value ratio (over low book value/market value ratio).

The non-parametric approach, on the other hand, uses an endogenous benchmark as it generates a risk-return frontier (from the observed data) which is then used for evaluating the performance of any observed fund. While this approach uses multi-criteria evaluation method and is suitable for intra-fund comparison, the approach does not link fund performance with market return.

The present study adopts a unifying approach. To be more specific, it attempts to use the market portfolio risk-return data for performance evaluation in a non-parametric setting. Thus, the current approach retains the flavor of external benchmarking in the context of multi-criteria decision making. The paper has four sections and proceeds as follows. Section 1 reviews the extant literature. Section 2

outlines the methodological developments. Section 3 describes the variables and the study outcomes. Section 4 concludes.

## 1. Review of Related Literature

Murthi, Choi, and Desai (1997) estimated the performance of 2083 mutual fund schemes for October-December 1993 using DPEI (DEA Portfolio Efficiency Index). The study considered a two input (standard deviation and transaction loads) –one output (excess return) model. The second stage analysis tried to identify the sources of efficiency variation.

Basso and Funari (2001) evaluated performance of fifty Italian mutual fund schemes (comprising of 24 stock funds, 10 balanced funds and 16 balanced funds) for January 1997 to June 1999. The study included two DEA measures. The first measure included mutual fund return as the output and two inputs (standard deviation of return and transaction costs). The second DEA measure included a stochastic dominance indicator as well. The second study by Basso and Funari (2003) used an ethical score of mutual funds in lieu of the stochastic dominance indicator.

Gregoriou, Sedzro, Zhu (2005) pointed out that standard performance measures like Sharpe ratio is not suitable for evaluating hedge fund performance.They accordingly evaluated (using DEA) eight categories of hedge funds for two separate runs spanning 1997-2001 and 1999-2001. They initially utilised the Banker, Charnes-Cooper (1984) model to categorise the hedge funds for the identification of efficient and inefficient funds. Further, the study utilised cross and super-efficiency models for estimating peer-appraisal scores and ranking of in-sample funds.

Daraio and Simar (2006) applied a variety of measures (conditional input oriented order-m efficiency, Free Disposal Hull (FDH) method and DEA, Jensen's á and Sharpe Index) for performance benchmarking of six mutual funds groups (asset allocation, aggressive growth, balanced, equity income, growth and growth income). The study used a three input (turnover ratio, expense ratio and fund loads)-one output (total return) framework. The study estimated correlation of traditional indicators (Jensen's á and Sharpe Index) with the non-parametric estimates (order m efficiency, DEA and FDH). The results indicated that while intra-group correlations are high, inter-group correspondence is weak.

Zhao, Wang and Lai (2011) applied two DEA models (involving quadratic constraints) for evaluating 25 open-ended Chinese mutual funds for 2005 and 2006. The study identified two key factors influencing mutual fund performance: excess

return and risk. Two measures of return indicating asset allocation and excess over market benchmark return are used. The two quadratic-constrained DEA models measure efficiency from output and input perspectives. The results show that although the market environment in year 2006 was much better than that in 2005, mean efficiency score decreased during 2006 due to the relaxation of system risk control. Further, most of the observed mutual funds did show fluctuations in efficiency ranking.

Goel and Mani (2018) investigated efficiency performance of Indian mutual funds and tried to identify the corrective measures for improving their performance. Their study included 143 mutual fund schemes for 11 years (April 2006 to March 2017)). The study includes two outputs (Sharpe ratio and Jensen's alpha) and five inputs (load fee, expense ratio, minimum initial investment needed and risk ($\beta$ and $\alpha$)). The outcome showed that only a few mutual fund schemes performed efficiently and the inefficient schemes need to reduce their load and expense ratio. Most of the efficient funds belong to the equity linked savings scheme category followed by income, growth and balanced funds.

## 2. Methodological Developments

### *1.1. CAPM, Mean-Variance and Stochastic Dominance*

The capital asset pricing model proposed by Sharpe (1964) and Lintner (1965) showed that in equilibrium the excess return of an observed portfolio (over the risk free rate) is linked to the excess return of the market portfolio. This theoretical development provided the basis for the evaluation of portfolio risk-return performance. Thus the Sharpe ratio used excess return earned by a portfolio over the risk free rate normalized by the standard deviation as the indicator performance. The Treynor (1965) measure considered the ratio of the excess return of the portfolio and the portfolio beta as the measure of performance. Jensen (1968) measured the difference between the observed and risk adjusted rate of return (computed from capital asset pricing model).

The seminal contribution of Markowitz (1952) in terms of the mean-variance approach was behind the development of capital asset pricing model. The framework of analysis, however, critically depends upon the assumption of normality of portfolio returns which is unlikely to materialize in most of the cases. Thus many researchers expressed reservations about the use of CAPM framework for portfolio performance

evaluation. Roy (1952) pointed out that an investor would be concerned primarily by the safety of principal in case of his investments. The investor would thus prefer the investment with the smallest probability of going below the target return. By maximizing a reward to variability ratio, $\frac{(R_e - T_r)}{\sigma}$, the investor will choose the portfolio with the lowest probability of going below the target level, $T_r$, given a expected mean return, $R_e$, and a standard deviation, $\sigma$. Klemkosky (1973) and Ang and Chua (1979) pointed out that CAPM based measures can lead to incorrect rankings. Thus they suggested the use of reward to semi-variability (R/SV) ratio instead of portfolio reward to standard deviation. However, significant development regarding the use of downside risk measures occurred with the development of the Lower Partial Moment (LPM) risk measure contributed by Bawa (1975) and Fishburn (1977). Bawa (1975) expressed the lower partial moment (LPM) as a general family of below-target risk measures. Further, he proved that the LPM measure is mathematically connected to the measure of stochastic dominance for risk tolerance values of 0, 1, and 2. Fishburn (1974,1978) further extended the model and formulated the conditions for identifying optimal and dominated choice sets. i.e. Conditional Stochastic Dominance which enables the decomposition of the choice set in to optimal and dominated sets. Bawa, Lindenberg & Rafsky (1979) and Bawa, Bothurda Jr., Rao and Suri (1985) proposed and implemented exact linear programming algorithms (with the application of Fishburn's conditions for convex stochastic dominance) for the assignment of discrete return distributions into the first- and second-order stochastic dominance optimal sets. For third-order stochastic dominance, Bawa et.al. (1985) defined a superconvex stochastic dominance approach which permits classification of choice elements into superdominated, mixed, and superoptimal sets. The downside approach to the measurement of risk got the necessary support from the practitioners as well. Sortino (1991) pointed out that in situations with some identifiable Minimum Acceptable Return (MAR), it is essential to segregate good and bad volatility where good volatility is dispersion above MAR and bad volatility is dispersion below MAR. Sortino (1994) thus proposed a downside risk ratio (an alternative to the Sharpe ratio) which includes portfolio return net of MAR on the numerator and downside deviation in the numerator. Sortino, Meer and Platinga (1999) introduced the Upside Potential Ratio which contains the expected return above the MAR in the numerator and the denominator is downside risk.

The discussion so far mostly includes the refinements in the ratio based approach. However, with the growing application of non-parametric approaches in the context of the financial services industry, portfolio performance evaluation became an interesting application area for Data Envelopment Analysis. In the non-parametric approach, the performance of a portfolio is evaluated on the basis of its distance from a risk-return frontier. Thus the evaluation is based on the concept of distance function which was originally formalised in the context of a multi-input and multi-output technology. The input distance function relates to the input set of the production technology while the output distance function relates to the output set.

For providing a brief description of the concept of distance function, Let us consider a production set $P_s$ with a nonnegative vector of inputs $x = (x_1, x_2,....., x_n) \in R^n_+$ which is used to produce a nonnegative vector of outputs $y = (y_1, y_2,....., y_m) R^m_+$. In functional terms, they can be related as: $y = P(x)$ and $x = L(y)$ where $P(x)$ and L(y) represent the output and input requirement set respectively. In input distance function can be defined as $D_{IN}$= Min[λ: $X/\lambda$ L(Y)]. Thus an input distance function provides the minimum amount by which the producer's input vector can be radially deflated and yet remain feasible for the given output vector. The inverse of the input distance function (λ) can be considered as the radial measure of input oriented technical efficiency.

In an similar vein, the output distance function is defined as: $D_{OUT}$ = Max[μ:Y/ ∈ P(X)]. Intuitively speaking, an output distance function gives the maximum amount by which the producer's output vector can be deflated and yet remain feasible for a given input vector . The radial measure of output oriented technical efficiency coincides with the output distance function.

The benefit of the distance function approach is that we are able to accommodate multi-inputs and multiple outputs which is not possible in the ratio approach. When we apply the non-parametric method for the estimation of the distance function, we need not assume a specific parametric relationship. However, the conventional non-parametric approach computes efficiency by comparing the observed portfolio with a frontier which is constructed from the observed set of data. In the present context, we have avoided this by taking the commonly used market portfolio indices as the benchmark. The technology is global i.e. estimation is made under the assumption of operation of constant returns to scale.

Continuing with the previously mentioned production possibility set $P_s$, the objective of an observed decision making unit (fund manager in the present context) for output maximization under the Banker, Charnes and Cooper model (1984) is:

$$\text{Max } \theta$$
$$\text{Subject to: } x_0 \geq \lambda X, y_0 \leq \lambda Y, \lambda \geq 0$$

Where and represent the input and output vectors of the observed decision making unit (DMU). The Charnes, Cooper and Rhodes (1978) approach towards benchmarking is special case of the more generalized Banker, Charnes and Cooper model where we do not permit local variations in technology. In both cases, the decision making units are evaluated on the basis of reference set formed output of the input and output data for the observed productive units. In the context of mutual fund performance evaluation, both models use benchmarks which are endogenous in nature.

In the present study, extended the conventional DEA based benchmarking by following the procedures suggested by Cook, Seiford and Zhu (2004). To be more specific, we have used the fixed and variable benchmarking models suggested by we have used two external benchmarks –CNX Nifty and BSE 100. The benchmarks have been used in both fixed and variable benchmark models. In the fixed benchmark model the mathematical program is:

$$\text{Max } \theta_F$$
$$\text{Subject to: } x_0 \geq \lambda X_B, \theta_F y_0 \leq Y_B, \lambda \geq 0$$

Where $X_B$ and $Y_B$ represent the input and output corresponding to the external benchmark used for performance evaluation. Efficiency of the observed DMU is the inverse of $\theta_F$. $\theta_F$ is the Farrell (1957) distance function in the fixed benchmarking case.

In the variable benchmark model, let the two benchmarks be $(X_1, Y_1)$ and $(X_2, Y_2)$ respectively. Then the optimization program for the observed decision making unit is:

$$Max\, \theta_V$$
$$Subject\ to: x_0 \geq \Sigma \lambda_i X_i, \quad \theta_V y_0 \leq \lambda, \ \Sigma \lambda_i Y_i, \lambda \geq 0$$

Efficiency of the observed DMU is the inverse of which is the Farrell (1957) distance function in the context of variable benchmarking.

## 3. Variables, Results and Discussion

### *3.1. Description of Variables*

For explaining the working of the two benchmarking models (fixed and variable), we have used the AMFI supplied data relating to Net Asset Values of 50 equity oriented mutual fund schemes. The equity oriented schemes include 27 sectoral and 23 diversified mutual funds. The data pertain to the financial years 2010-11, 2011-12 and 2012-13.

For the evaluation of fund efficiency, it is essential to specify inputs and outputs. In the present context, we have used one input (value at risk) and two outputs-mean return on the portfolio and probability of excess return over the mean. The input and output measures have been calculated from the net asset values.In order to avoid the problem of handling negative data, rate of return is calculated as where and represent the net asset values of the observed fund for time periods t and t+1 respectively.

### *3.2. Results and Discussion*

In the present study we have applied fixed and variable benchmark models for the in-sample funds for the period under observation. In addition to the aforementioned estimates, we have also estimated fund efficiency scores using the radial envelopment model and computed the returns to scale exhibited by the funds.

#### *3.2.1. Fixed and Variable Benchmark Models*

Table 1 provides the mean efficiency scores obtained by the application of the two benchmarks (CNX Nifty and BSE 100) one at a time. The table includes the scores separately for the sectoral and diversified equity funds as well as the overall scores. The sectoral equity funds concentrate their equity investments to a few or one identified high growth sectors. On the the other hand, diversified mutual funds follow the strategy of portfolio diversification. Obviously the sectoral funds are more risky as compared to the diversified funds. However, they also provide higher prospects of return in a booming market. In our case study, the sectoral funds (in terms of mean efficiency) have out-performed the diversified equity oriented mutual funds for all the three years under observation. The fund wise efficiency scores are included in appendix tables A1 through A4. Figure 1 provides a graphical presentation of mean efficiency scores for the years 2010-11, 2011-12 and 2012-13.

**Table 1: Mean efficiency scores-fixed benchmark model**

| *Fund Category* | *Benchmark* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|---|
| Sectoral equity schemes | CNX Nifty | 1.0723 | 1.0515 | 1.0542 |
| Diversified equity schemes | CNX Nifty | 1.0467 | 1.0144 | 1.0253 |
| Overall | CNX Nifty | 1.0605 | 1.0344 | 1.0409 |
| Sectoral equity schemes | BSE 100 | 1.0352 | 1.0321 | 1.0404 |
| Diversified equity schemes | BSE 100 | 1.0132 | 0.9991 | 1.0145 |
| **Overall** | **BSE 100** | **1.0251** | **1.0169** | **1.0284** |

*Source:* Calculated.

**Figure 1: Mean efficiency-fixed benchmark models**

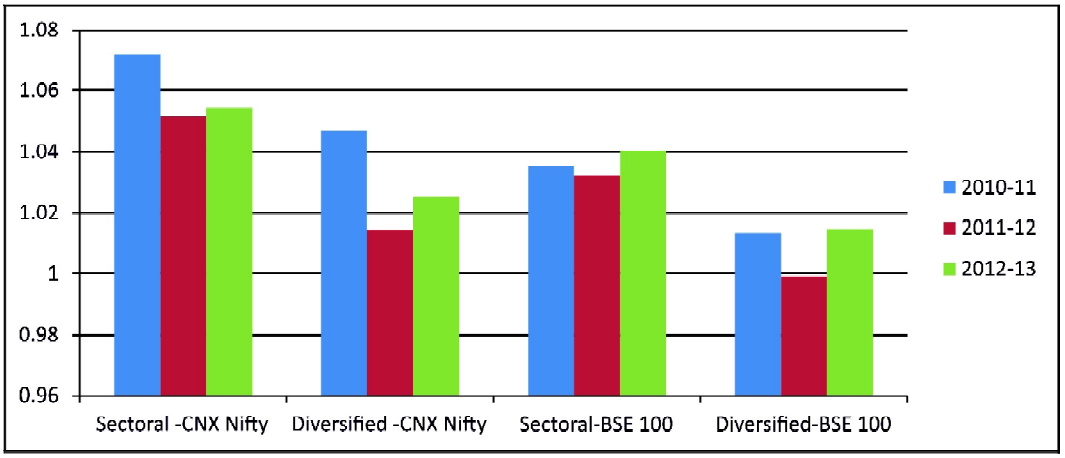



Table 2 provides the mean efficiency scores for three in-sample years pertaining to the variable benchmarking model where weighted combination of CNX Nifty and BSE 100 is taken as the benchmark. In this case also, the mean efficiency score for the sectoral mutual fund schemes is found to be higher than the diversified schemes. Figure 2 gives a graphical presentation of the mean efficiency scores. Tables A 5 and A 6 provides the fund wise mean efficiency scores for the sectoral and diversified equity oriented schemes respectively. Tables A 7 through A 12 present the optimal weights corresponding to the two benchmarks (CNX Nifty and BSE 100) for the observed years.

**Table 2: Mean efficiency scores-variable benchmark model**

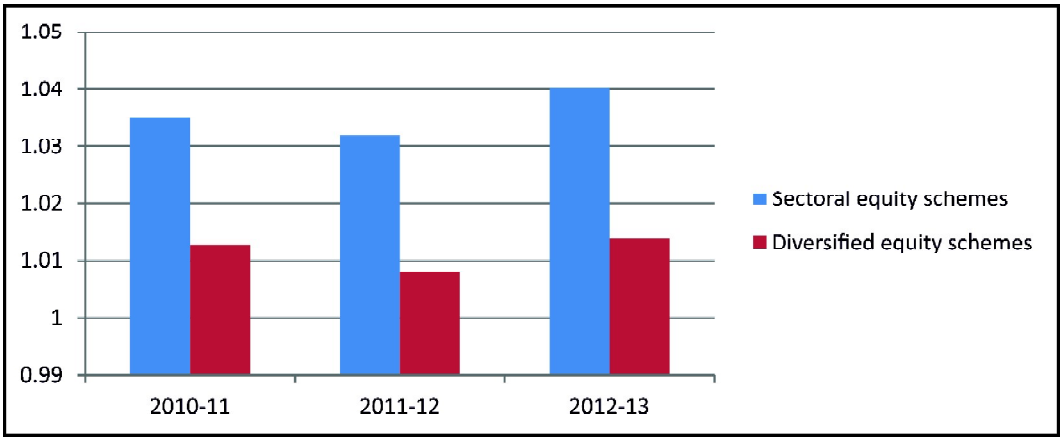
| *Fund Category* | *Benchmark* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|---|
| Sectoral equity schemes | Weighted average of CNX Nifty and BSE 100 | 1.0351 | 1.0321 | 1.0401 |
| Diversified equity schemes | Weighted average of CNX Nifty and BSE 100 | 1.0130 | 1.008 | 1.0141 |
| Overall | Weighted average of CNX Nifty and BSE 100 | 1.0249 | 1.0177 | 1.0281 |

*Source:* Calculated.

### *3.2.2. Endogenous benchmarking and returns to scale*

The previous results are obtained from the application of NSE-50 and BSE-100 as the two external benchmarks. The results can be supplemented by the use of

**Figure 2: Mean efficiency-variable benchmark**




endogenous benchmasrk in the conventional DEA framework. Presently, we provide the outcomes refer table 3) from the application of radial CCR (1978) and BCC (1984) envelopment model. Table 4 provides the summary information regarding returns to scale exhibited by the observed funds. The fund wise efficiency scores under constant and variable returns to scale are available from appendix tables A 13 through A 16.

**Table 3: Mean efficiency scores (envelopment model)**

| *Fund type* | *Benchmark* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|---|
| Sectoral equity schemes | Global (CRS) | 0.9873 | 0.9859 | 0.9836 |
| Sectoral equity schemes | Local (VRS) | 0.9992 | 0.9991 | 0.9993 |
| Diversified equity schemes | Global (CRS) | 0.9812 | 0.9716 | 0.9716 |
| Diversified equity schemes | Local (VRS) | 0.9988 | 0.9989 | 0.9996 |
| All schemes | Global (CRS) | 0.9845 | 0.9794 | 0.9781 |
| All schemes | Local(VRS) | 0.9990 | 0.9990 | 0.9994 |

*Source:* Calculated.

**Table 4: Returns to scale composition**

| *Fund type* | *Returns to scale* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|---|
| Sectoral | Constant | 3 | 4 | 2 |
| Sectoral | Increasing | 24 | 23 | 25 |
| Sectoral | Decreasing | 0 | 0 | 0 |
| Diversified | Constant | 0 | 0 | 0 |
| Diversified | Increasing | 0 | 0 | 0 |
| Diversified | Decreasing | 23 | 23 | 23 |

*Source:* Calculated.

Table 3 shows that the sectoral funds have outperformed (in terms of mean efficiency)the diversified funds for the observed years (2010-11,2011-12 and 2012-13) under the observation of constant returns to scale. However, if we assume local returns to scale (vrs), then the diversified funds exhibited slightly higher mean efficiency than the diversified funds for 2012-13. However, for the previous two years, the mean efficiency for the sectoral funds was higher than the diversified equity oriented mutual funds.

## 4. Concluding Observations

Performance evaluation of mutual fund schemes is important from the point of view of all stakeholders including investors, asset management companies and capital market regulators. The efficacy of the traditional ratio based evaluation of performance is critically dependent on the validity of the Capital Asset Pricing Model. None of the research studies supported the normality of return distribution. Thus it is essential to move beyond normality. In the present study, we have used an extended model by incorporating both downside measure of risk and upside measure of return. However, the estimation of efficiency in the non-parametric setting is now linked to the commonly used indices of market portfolio. For the interest of the reader, the results so obtained are supplemented by efficiency estimates obtained through endogenous benchmarking. The study is limited to three years only and this can be extended to longer period to see equity oriented schemes have performed in India relative to the various market portfolio indices.

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**Table A 1: Sectoral equity fund wise efficiency performance (fixed benchmark-CNX Nifty)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| Baroda Pioneer Infrastructure Fund | 1.1230 | 1.0275 | 1.0101 |
| BOI AXA Focused Infrastructure Fund | 1.0506 | 1.0180 | 1.0271 |
| Canara Robeco Infrastructure | 1.0622 | 1.0317 | 1.0738 |
| DSP BlackRock World Energy Fund | 1.1078 | 1.0677 | 1.1093 |
| DSP BlackRock World Gold Fund | 1.1036 | 1.0264 | 1.1862 |
| DSP BlackRock World Mining Fund | 1.0826 | 1.0576 | 1.0301 |
| DWS Global Agribusiness offshore Fund | 1.0551 | 1.1334 | 1.0691 |
| Fidelity Global Real Assets Fund | 1.0314 | 1.0368 | 1.1095 |
| HDFC Core and Satellite Fund | 1.1068 | 1.0282 | 1.0618 |
| HDFC Infrastructure Fund | 1.0615 | 1.0545 | 1.0302 |
| ICICI Prudential Banking and Financial Services Fund | 1.0180 | 1.1090 | 1.0169 |
| ICICI Prudential Exports and Other Services Fund | 1.0262 | 1.0424 | 1.0183 |
| ICICI Prudential Technology Fund | 1.0645 | 1.0966 | 1.0384 |
| IDFC Strategic Sector (50-50) Equity Fund | 0.9997 | 0.9998 | 1.0069 |
| ING Global Commodities Fund | 1.1201 | 1.0959 | 1.0271 |
| JPMorgan India Smaller Companies Fund | 1.0865 | 1.0959 | 1.1047 |
| Kotak PSU Bank ETF | 1.1442 | 1.1008 | 1.0591 |
| L&T Infrastructure Fund | 1.1066 | 1.0615 | 1.0791 |
| LIC Nomura MF Infrastructure Fund | 1.1461 | 1.0044 | 1.0221 |
| Mirae Asset Global Commodity Stocks Fund | 1.0057 | 1.0408 | 1.1088 |
| PineBridge Infrastructure & Economic Reform Fund | 1.0560 | 1.0590 | 1.0347 |
| PineBridge World Gold Fund | 1.0460 | 1.0244 | 1.0885 |
| Reliance Banking Fund | 1.1013 | 1.0566 | 1.0195 |
| SBI Infrastructure Fund | 1.0436 | 1.0003 | 1.0576 |
| Sundaram Energy Opportunities Fund | 1.0964 | 1.0734 | 1.0619 |
| Tata Growing Economies Infrastructure Fund | 1.0453 | 0.9851 | 0.9935 |
| UTI Banking Sector Fund | 1.0624 | 1.0616 | 1.0194 |

*Source:* Calculated.

**Table A 2: Diversified equity fund efficiency performance (fixed benchmark-CNX Nifty)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| UTI Equity Fund | 1.0433 | 0.9941 | 1.0018 |
| Tata Equity Fund | 1.0879 | 0.9940 | 1.0601 |
| SBI Equity Fund | 1.0667 | 0.9949 | 1.0027 |
| Religare Invesco Equity Fund | 1.0074 | 1.0566 | 1.0817 |
| Reliance Equity Fund | 1.0229 | 1.0166 | 1.0588 |
| Quantum Equity Fund | 1.0578 | 0.9978 | 1.0149 |
| Pramerica Equity Fund | 1.0972 | 0.9999 | 1.0076 |
| PineBridge Equity Fund | 1.0205 | 0.9930 | 1.0346 |
| Kotak Mahindra Equity Fund | 1.0546 | 1.0253 | 0.9845 |
| JPMorgan Equity Fund | 1.0458 | 0.9965 | 1.0382 |
| JM Financial Equity Fund | 1.0218 | 1.0670 | 1.0086 |
| ING Equity Fund | 1.0627 | 1.0028 | 1.0598 |
| IDFC Equity Fund | 1.0006 | 0.9995 | 1.0166 |
| ICICI Prudential Equity Fund | 0.9985 | 0.9846 | 0.9846 |
| HSBC Equity Fund | 1.0433 | 0.9955 | 1.0033 |
| Franklin Templeton Equity Fund | 1.0213 | 1.0184 | 1.0276 |
| DSP BlackRock Equity Fund | 1.0429 | 1.0574 | 1.0662 |
| Deutsche Equity Fund | 1.0946 | 1.0370 | 1.0211 |
| Canara Robeco Equity Fund | 1.0697 | 1.0178 | 1.0185 |
| BOI AXA Equity Fund | 1.0372 | 1.0141 | 1.0231 |
| Birla Sun Life Equity Fund | 1.0707 | 0.9976 | 1.0148 |
| Baroda Pioneer Equity Fund | 1.0268 | 1.0181 | 1.0106 |
| Axis Equity Fund | 1.0789 | 1.0533 | 1.0414 |

*Source:* Calculated.

**Table A 3: Sectoral equity fund wise efficiency performance (fixed benchmark-BSE 100)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| Baroda Pioneer Infrastructure Fund | 1.0793 | 1.0052 | 1.0109 |
| BOI AXA Focused Infrastructure Fund | 1.0098 | 0.9958 | 1.0097 |
| Canara Robeco Infrastructure | 1.0210 | 1.0093 | 1.0521 |
| DSP BlackRock World Energy Fund | 1.0647 | 1.0444 | 1.0870 |
| DSP BlackRock World Gold Fund | 1.0607 | 1.0206 | 1.1624 |
| DSP BlackRock World Mining Fund | 1.0405 | 1.0346 | 1.0309 |
| DWS Global Agribusiness offshore Fund | 1.0140 | 1.1088 | 1.0476 |
| Fidelity Global Real Assets Fund | 1.0006 | 1.0142 | 1.0871 |
| HDFC Core and Satellite Fund | 1.0638 | 1.0057 | 1.0404 |
| HDFC Infrastructure Fund | 1.0202 | 1.0316 | 1.0126 |
| ICICI Prudential Banking and Financial Services Fund | 1.0070 | 1.0848 | 1.0177 |
| ICICI Prudential Exports and Other Services Fund | 0.9982 | 1.0198 | 1.0103 |
| ICICI Prudential Technology Fund | 1.0230 | 1.0727 | 1.0213 |
| IDFC Strategic Sector (50-50) Equity Fund | 1.0007 | 0.9942 | 1.0078 |
| ING Global Commodities Fund | 1.0765 | 1.0720 | 1.0280 |
| JPMorgan India Smaller Companies Fund | 1.0442 | 1.0720 | 1.0825 |
| Kotak PSU Bank ETF | 1.0996 | 1.0768 | 1.0378 |
| L&T Infrastructure Fund | 1.0635 | 1.0384 | 1.0574 |
| LIC Nomura MF Infrastructure Fund | 1.1016 | 0.9988 | 1.0134 |
| Mirae Asset Global Commodity Stocks Fund | 0.9950 | 1.0181 | 1.0865 |
| PineBridge Infrastructure & Economic Reform Fund | 1.0148 | 1.0358 | 1.0138 |
| PineBridge World Gold Fund | 1.0105 | 1.0158 | 1.0666 |
| Reliance Banking Fund | 1.0585 | 1.0336 | 1.0158 |
| SBI Infrastructure Fund | 1.0030 | 0.9947 | 1.0363 |
| Sundaram Energy Opportunities Fund | 1.0537 | 1.0500 | 1.0406 |
| Tata Growing Economies Infrastructure Fund | 1.0046 | 0.9795 | 0.9934 |
| UTI Banking Sector Fund | 1.0210 | 1.0384 | 1.0202 |

*Source:* Calculated.

**Table A 4: Diversified equity fund efficiency performance (fixed benchmark-BSE 100)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| UTI Equity Fund | 1.0028 | 1.0116 | 1.0026 |
| Tata Equity Fund | 1.0457 | 1.0117 | 1.0389 |
| SBI Equity Fund | 1.0252 | 1.0108 | 1.0034 |
| Religare Invesco Equity Fund | 0.9959 | 0.9675 | 1.0599 |
| Reliance Equity Fund | 1.0026 | 1.0054 | 1.0375 |
| Quantum Equity Fund | 1.0167 | 1.0078 | 1.0064 |
| Pramerica Equity Fund | 1.0545 | 1.0058 | 1.0084 |
| PineBridge Equity Fund | 0.9927 | 1.0127 | 1.0137 |
| Kotak Mahindra Equity Fund | 1.0136 | 0.9970 | 0.9853 |
| JPMorgan Equity Fund | 1.0052 | 1.0092 | 1.0174 |
| JM Financial Equity Fund | 1.0018 | 0.9581 | 1.0094 |
| ING Equity Fund | 1.0213 | 1.0029 | 1.0384 |
| IDFC Equity Fund | 1.0016 | 1.0061 | 1.0083 |
| ICICI Prudential Equity Fund | 0.9793 | 0.9675 | 0.9854 |
| HSBC Equity Fund | 1.0027 | 1.0054 | 1.0041 |
| Franklin Templeton Equity Fund | 0.9938 | 1.0078 | 1.0194 |
| DSP BlackRock Equity Fund | 1.0023 | 1.0058 | 1.0447 |
| Deutsche Equity Fund | 1.0521 | 1.0127 | 1.0047 |
| Canara Robeco Equity Fund | 1.0282 | 0.9970 | 1.0019 |
| BOI AXA Equity Fund | 1.0008 | 1.0092 | 1.0064 |
| Birla Sun Life Equity Fund | 1.0290 | 0.9581 | 1.0063 |
| Baroda Pioneer Equity Fund | 0.9984 | 1.0029 | 1.0096 |
| Axis Equity Fund | 1.0369 | 1.0061 | 1.0204 |

*Source:* Calculated.

**Table A 5: Sectoral equity fund wise efficiency performance (variable benchmark model)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| Baroda Pioneer Infrastructure Fund | 1.0793 | 1.0052 | 1.0101 |
| BOI AXA Focused Infrastructure Fund | 1.0098 | 0.9959 | 1.0096 |
| Canara Robeco Infrastructure | 1.0210 | 1.0092 | 1.0521 |
| DSP BlackRock World Energy Fund | 1.0647 | 1.0444 | 1.0870 |
| DSP BlackRock World Gold Fund | 1.0607 | 1.0207 | 1.1624 |
| DSP BlackRock World Mining Fund | 1.0405 | 1.0346 | 1.0301 |
| DWS Global Agribusiness offshore Fund | 1.0140 | 1.1088 | 1.0475 |
| Fidelity Global Real Assets Fund | 1.0004 | 1.0142 | 1.0871 |
| HDFC Core and Satellite Fund | 1.0638 | 1.0058 | 1.0404 |
| HDFC Infrastructure Fund | 1.0202 | 1.0316 | 1.0125 |
| ICICI Prudential Banking and Financial Services Fund | 1.0063 | 1.0849 | 1.0169 |
| ICICI Prudential Exports and Other Services Fund | 0.9979 | 1.0198 | 1.0098 |
| ICICI Prudential Technology Fund | 1.0231 | 1.0728 | 1.0212 |
| IDFC Strategic Sector (50-50) Equity Fund | 0.9997 | 0.9942 | 1.0070 |
| ING Global Commodities Fund | 1.0765 | 1.0721 | 1.0272 |
| JPMorgan India Smaller Companies Fund | 1.0442 | 1.0721 | 1.0824 |
| Kotak PSU Bank ETF | 1.0997 | 1.0768 | 1.0378 |
| L&T Infrastructure Fund | 1.0635 | 1.0384 | 1.0574 |
| LIC Nomura MF Infrastructure Fund | 1.1015 | 0.9988 | 1.0129 |
| Mirae Asset Global Commodity Stocks Fund | 0.9943 | 1.0181 | 1.0865 |
| PineBridge Infrastructure & Economic Reform Fund | 1.0149 | 1.0359 | 1.0138 |
| PineBridge World Gold Fund | 1.0104 | 1.0158 | 1.0666 |
| Reliance Banking Fund | 1.0585 | 1.0336 | 1.0152 |
| SBI Infrastructure Fund | 1.0031 | 0.9947 | 1.0363 |
| Sundaram Energy Opportunities Fund | 1.0537 | 1.0500 | 1.0406 |
| Tata Growing Economies Infrastructure Fund | 1.0046 | 0.9796 | 0.9927 |
| UTI Banking Sector Fund | 1.0210 | 1.0385 | 1.0194 |

*Source:* Calculated.

**Table A 6 : Diversified equity fund efficiency performance (variable benchmark model)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| UTI Equity Fund | 1.0028 | 0.9885 | 1.0018 |
| Tata Equity Fund | 1.0457 | 0.9884 | 1.0388 |
| SBI Equity Fund | 1.0252 | 0.9893 | 1.0027 |
| Religare Invesco Equity Fund | 0.9953 | 1.0336 | 1.0599 |
| Reliance Equity Fund | 1.0021 | 0.9947 | 1.0375 |
| Quantum Equity Fund | 1.0166 | 0.9922 | 1.0060 |
| Pramerica Equity Fund | 1.0545 | 0.9942 | 1.0076 |
| PineBridge Equity Fund | 0.9923 | 0.9874 | 1.0137 |
| Kotak Mahindra Equity Fund | 1.0136 | 1.0030 | 0.9846 |
| JPMorgan Equity Fund | 1.0052 | 0.9909 | 1.0174 |
| JM Financial Equity Fund | 1.0013 | 1.0437 | 1.0086 |
| ING Equity Fund | 1.0214 | 0.9971 | 1.0384 |
| IDFC Equity Fund | 1.0006 | 0.9939 | 1.0078 |
| ICICI Prudential Equity Fund | 0.9789 | 0.9719 | 0.9846 |
| HSBC Equity Fund | 1.0027 | 0.9900 | 1.0033 |
| Franklin Templeton Equity Fund | 0.9936 | 1.0052 | 1.0189 |
| DSP BlackRock Equity Fund | 1.0023 | 1.0343 | 1.0447 |
| Deutsche Equity Fund | 1.0520 | 1.0144 | 1.0045 |
| Canara Robeco Equity Fund | 1.0281 | 0.9956 | 1.0017 |
| BOI AXA Equity Fund | 1.0007 | 0.9923 | 1.0063 |
| Birla Sun Life Equity Fund | 1.0290 | 0.9920 | 1.0059 |
| Baroda Pioneer Equity Fund | 0.9981 | 0.9959 | 1.0088 |
| Axis Equity Fund | 1.0370 | 1.0304 | 1.0204 |

*Source:* Calculated.

**Table A 7 : Sectoral fund reference weights (variable benchmark model)-2010-11**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| Baroda Pioneer Infrastructure Fund | 0 | 0.997 |
| BOI AXA Focused Infrastructure Fund | 0 | 0.994 |
| Canara Robeco Infrastructure | 0 | 1.007 |
| DSP BlackRock World Energy Fund | 0 | 0.994 |
| DSP BlackRock World Gold Fund | 0 | 0.990 |
| DSP BlackRock World Mining Fund | 0 | 0.985 |
| DWS Global Agribusiness offshore Fund | 0 | 1.006 |
| Fidelity Global Real Assets Fund | 0.234 | 0.767 |
| HDFC Core and Satellite Fund | 0 | 1.004 |
| HDFC Infrastructure Fund | 0 | 1 |
| ICICI Prudential Banking and Financial Services Fund | 0.710 | 0.285 |
| ICICI Prudential Exports and Other Services Fund | 0.303 | 0.699 |
| ICICI Prudential Technology Fund | 0 | 0.997 |
| IDFC Strategic Sector (50-50) Equity Fund | 1.001 | 1 |
| ING Global Commodities Fund | 0 | 0.997 |
| JPMorgan India Smaller Companies Fund | 0 | 1 |
| Kotak PSU Bank ETF | 0 | 0.985 |
| L&T Infrastructure Fund | 0 | 0.996 |
| LIC Nomura MF Infrastructure Fund | 0 | 0.996 |
| Mirae Asset Global Commodity Stocks Fund | 0.721 | 0.285 |
| PineBridge Infrastructure & Economic Reform Fund | 0 | 1.005 |
| PineBridge World Gold Fund | 0.126 | 0.864 |
| Reliance Banking Fund | 0 | 0.994 |
| SBI Infrastructure Fund | 0 | 1.001 |
| Sundaram Energy Opportunities Fund | 0 | 0.998 |
| Tata Growing Economies Infrastructure Fund | 0 | 1.007 |
| UTI Banking Sector Fund | 0 | 0.991 |

*Source:* Calculated.

**Table A 8 : Sectoral fund reference weights (variable benchmark model)-2011-12**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| Baroda Pioneer Infrastructure Fund | 0 | 1.003 |
| BOI AXA Focused Infrastructure Fund | 0 | 1.004 |
| Canara Robeco Infrastructure | 0 | 1.007 |
| DSP BlackRock World Energy Fund | 0 | 0.982 |
| DSP BlackRock World Gold Fund | 0 | 0.980 |
| DSP BlackRock World Mining Fund | 0 | 0.983 |
| DWS Global Agribusiness offshore Fund | 0 | 0.996 |
| Fidelity Global Real Assets Fund | 0 | 0.994 |
| HDFC Core and Satellite Fund | 0 | 1.010 |
| HDFC Infrastructure Fund | 0 | 1.001 |
| ICICI Prudential Banking and Financial Services Fund | 0 | 0.997 |
| ICICI Prudential Exports and Other Services Fund | 0 | 1.005 |
| ICICI Prudential Technology Fund | 0 | 0.993 |
| IDFC Strategic Sector (50-50) Equity Fund | 0 | 1.006 |
| ING Global Commodities Fund | 0 | 0.986 |
| JPMorgan India Smaller Companies Fund | 0 | 0.986 |
| Kotak PSU Bank ETF | 0 | 0.989 |
| L&T Infrastructure Fund | 0 | 1.002 |
| LIC Nomura MF Infrastructure Fund | 0 | 1.001 |
| Mirae Asset Global Commodity Stocks Fund | 0 | 0.990 |
| PineBridge Infrastructure & Economic Reform Fund | 0 | 1.005 |
| PineBridge World Gold Fund | 0 | 0.985 |
| Reliance Banking Fund | 0 | 0.999 |
| SBI Infrastructure Fund | 0 | 1.005 |
| Sundaram Energy Opportunities Fund | 0 | 1.002 |
| Tata Growing Economies Infrastructure Fund | 0 | 1.021 |
| UTI Banking Sector Fund | 0 | 0.994 |

*Source:* Calculated.

**Table A 9 : Sectoral fund reference weights (variable benchmark model)-2012-13**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| Baroda Pioneer Infrastructure Fund | 0.989 | 0 |
| BOI AXA Focused Infrastructure Fund | 0.152 | 0.837 |
| Canara Robeco Infrastructure | 0 | 0.993 |
| DSP BlackRock World Energy Fund | 0 | 0.968 |
| DSP BlackRock World Gold Fund | 0 | 0.966 |
| DSP BlackRock World Mining Fund | 0.969 | 0 |
| DWS Global Agribusiness offshore Fund | 0.982 | 0.982 |
| Fidelity Global Real Assets Fund | 0.980 | 0.980 |
| HDFC Core and Satellite Fund | 0.996 | 0.996 |
| HDFC Infrastructure Fund | 0.143 | 0,843 |
| ICICI Prudential Banking and Financial Services Fund | 0.983 | 0 |
| ICICI Prudential Exports and Other Services Fund | 0.587 | 0.404 |
| ICICI Prudential Technology Fund | 0.179 | 0.800 |
| IDFC Strategic Sector (50-50) Equity Fund | 0.992 | 0 |
| ING Global Commodities Fund | 0.973 | 0 |
| JPMorgan India Smaller Companies Fund | 0 | 0.972 |
| Kotak PSU Bank ETF | 0 | 0.975 |
| L&T Infrastructure Fund | 0 | 0.988 |
| LIC Nomura MF Infrastructure Fund | 0.551 | 0.436 |
| Mirae Asset Global Commodity Stocks Fund | 0 | 0.976 |
| PineBridge Infrastructure & Economic Reform Fund | 0 | 0.990 |
| PineBridge World Gold Fund | 0 | 0.971 |
| Reliance Banking Fund | 0.781 | 0.204 |
| SBI Infrastructure Fund | 0.991 | 0 |
| Sundaram Energy Opportunities Fund | 0.988 | 0 |
| Tata Growing Economies Infrastructure Fund | 0.965 | 0.042 |
| UTI Banking Sector Fund | 0.981 | 0 |

*Source:* Calculated.

**Table A 10 : Diversified fund reference weights (variable benchmark model)-2010-11**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| UTI Equity Fund | 0 | 1.001 |
| Tata Equity Fund | 0 | 0.998 |
| SBI Equity Fund | 0 | 1.003 |
| Religare Invesco Equity Fund | 0.704 | 0.300 |
| Reliance Equity Fund | 0.487 | 0.510 |
| Quantum Equity Fund | 0 | 1.003 |
| Pramerica Equity Fund | 0 | 1.000 |
| PineBridge Equity Fund | 0.301 | 0.707 |
| Kotak Mahindra Equity Fund | 0 | 1.022 |
| JPMorgan Equity Fund | 0 | 0.999 |
| JM Financial Equity Fund | 0.495 | 0.503 |
| ING Equity Fund | 0 | 0.999 |
| IDFC Equity Fund | 0.999 | 0 |
| ICICI Prudential Equity Fund | 0.515 | 0.506 |
| HSBC Equity Fund | 0 | 1.001 |
| Franklin Templeton Equity Fund | 0.311 | 0.696 |
| DSP BlackRock Equity Fund | 0 | 1.002 |
| Deutsche Equity Fund | 0 | 1.000 |
| Canara Robeco Equity Fund | 0 | 1.007 |
| BOI AXA Equity Fund | 0.099 | 0.900 |
| Birla Sun Life Equity Fund | 0 | 0.999 |
| Baroda Pioneer Equity Fund | 0.292 | 0.709 |
| Axis Equity Fund | 0.999 | 0.999 |

*Source:* Calculated.

**Table A 11 : Diversified fund reference weights (variable benchmark model)-2011-12**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| UTI Equity Fund | 1.012 | 1.012 |
| Tata Equity Fund | 1.012 | 1.012 |
| SBI Equity Fund | 1.011 | 1.011 |
| Religare Invesco Equity Fund | 1.015 | 1.015 |
| Reliance Equity Fund | 1.005 | 1.005 |
| Quantum Equity Fund | 1.008 | 1.008 |
| Pramerica Equity Fund | 1.006 | 1.006 |
| PineBridge Equity Fund | 1.013 | 1.013 |
| Kotak Mahindra Equity Fund | 1.030 | 1.030 |
| JPMorgan Equity Fund | 1.009 | 1.009 |
| JM Financial Equity Fund | 1.005 | 1.005 |
| ING Equity Fund | 1.005 | 1.005 |
| IDFC Equity Fund | 1.006 | 1.006 |
| ICICI Prudential Equity Fund | 1.030 | 1.030 |
| HSBC Equity Fund | 1.010 | 1.010 |
| Franklin Templeton Equity Fund | 0.995 | 0.995 |
| DSP BlackRock Equity Fund | 1.006 | 1.006 |
| Deutsche Equity Fund | 1.010 | 1.010 |
| Canara Robeco Equity Fund | 1.012 | 1.012 |
| BOI AXA Equity Fund | 1.008 | 1.008 |
| Birla Sun Life Equity Fund | 1.008 | 1.008 |
| Baroda Pioneer Equity Fund | 1.004 | 1.004 |
| Axis Equity Fund | 1.010 | 1.010 |

*Source:* Calculated.

**Table A 12 : Diversified fund reference weights (variable benchmark model)-2012-13**

| *Fund Name* | *CNX Nifty* | *BSE 100* |
|---|---|---|
| UTI Equity Fund | 0.998 | 0 |
| Tata Equity Fund | 0 | 0.998 |
| SBI Equity Fund | 0.997 | 0 |
| Religare Invesco Equity Fund | 0 | 1 |
| Reliance Equity Fund | 0 | 0.991 |
| Quantum Equity Fund | 0.563 | 0.431 |
| Pramerica Equity Fund | 0.992 | 0 |
| PineBridge Equity Fund | 0 | 0.999 |
| Kotak Mahindra Equity Fund | 1.015 | 0 |
| JPMorgan Equity Fund | 0.995 | 0 |
| JM Financial Equity Fund | 0.991 | 0 |
| ING Equity Fund | 0 | 0.990 |
| IDFC Equity Fund | 0.572 | 0.420 |
| ICICI Prudential Equity Fund | 1.015 | 0 |
| HSBC Equity Fund | 0.996 | 0 |
| Franklin Templeton Equity Fund | 0.569 | 0.413 |
| DSP BlackRock Equity Fund | 0.000 | 0.992 |
| Deutsche Equity Fund | 0.194 | 0.802 |
| Canara Robeco Equity Fund | 0.182 | 0.816 |
| BOI AXA Equity Fund | 0.182 | 0.812 |
| Birla Sun Life Equity Fund | 0.566 | 0.428 |
| Baroda Pioneer Equity Fund | 0.903 | 0.087 |
| Axis Equity Fund | 0 | 0.996 |

*Source:* Calculated.

**Table A 13: Sectoral equity fund wise efficiency performance (constant returns to scale)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| Baroda Pioneer Infrastructure Fund | 0.9877 | 0.9777 | 0.9779 |
| BOI AXA Focused Infrastructure Fund | 0.9892 | 0.9765 | 0.9768 |
| Canara Robeco Infrastructure | 0.9773 | 0.9745 | 0.9741 |
| DSP BlackRock World Energy Fund | 0.9913 | 1.0000 | 1.0000 |
| DSP BlackRock World Gold Fund | 0.9946 | 1.0000 | 1.0000 |
| DSP BlackRock World Mining Fund | 1.0000 | 0.9982 | 0.9973 |
| DWS Global Agribusiness offshore Fund | 0.9791 | 1.0000 | 0.9856 |
| Fidelity Global Real Assets Fund | 0.9845 | 0.9877 | 0.9868 |
| HDFC Core and Satellite Fund | 0.9813 | 0.9707 | 0.9707 |
| HDFC Infrastructure Fund | 0.9840 | 0.9813 | 0.9795 |
| ICICI Prudential Banking and Financial Services Fund | 0.9908 | 0.9938 | 0.9845 |
| ICICI Prudential Exports and Other Services Fund | 0.9822 | 0.9769 | 0.9773 |
| ICICI Prudential Technology Fund | 0.9876 | 0.9950 | 0.9880 |
| IDFC Strategic Sector (50-50) Equity Fund | 0.9846 | 0.9746 | 0.9749 |
| ING Global Commodities Fund | 0.9888 | 1.0000 | 0.9944 |
| JPMorgan India Smaller Companies Fund | 0.9847 | 1.0000 | 0.9951 |
| Kotak PSU Bank ETF | 1.0000 | 0.9982 | 0.9907 |
| L&T Infrastructure Fund | 0.9876 | 0.9813 | 0.9784 |
| LIC Nomura MF Infrastructure Fund | 1.0000 | 0.9787 | 0.9803 |
| Mirae Asset Global Commodity Stocks Fund | 0.9790 | 0.9907 | 0.9907 |
| PineBridge Infrastructure & Economic Reform Fund | 0.9789 | 0.9789 | 0.9762 |
| PineBridge World Gold Fund | 0.9943 | 0.9960 | 0.9946 |
| Reliance Banking Fund | 0.9913 | 0.9835 | 0.9826 |
| SBI Infrastructure Fund | 0.9825 | 0.9749 | 0.9759 |
| Sundaram Energy Opportunities Fund | 0.9858 | 0.9831 | 0.9783 |
| Tata Growing Economies Infrastructure Fund | 0.9769 | 0.9601 | 0.9610 |
| UTI Banking Sector Fund | 0.9933 | 0.9881 | 0.9869 |

*Source:* Calculated.

**Table A 14: Diversified equity fund efficiency performance (constant returns to scale)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| UTI Equity Fund | 0.9830 | 0.9689 | 0.9699 |
| Tata Equity Fund | 0.9859 | 0.9691 | 0.9697 |
| SBI Equity Fund | 0.9810 | 0.9698 | 0.9707 |
| Religare Invesco Equity Fund | 0.9799 | 0.9707 | 0.9673 |
| Reliance Equity Fund | 0.9865 | 0.9756 | 0.9762 |
| Quantum Equity Fund | 0.9809 | 0.9727 | 0.9736 |
| Pramerica Equity Fund | 0.9839 | 0.9741 | 0.9755 |
| PineBridge Equity Fund | 0.9767 | 0.9678 | 0.9687 |
| Kotak Mahindra Equity Fund | 0.9631 | 0.9548 | 0.9532 |
| JPMorgan Equity Fund | 0.9853 | 0.9712 | 0.9723 |
| JM Financial Equity Fund | 0.9857 | 0.9781 | 0.9764 |
| ING Equity Fund | 0.9855 | 0.9769 | 0.9768 |
| IDFC Equity Fund | 0.9855 | 0.9740 | 0.9753 |
| ICICI Prudential Equity Fund | 0.9636 | 0.9531 | 0.9532 |
| HSBC Equity Fund | 0.9828 | 0.9706 | 0.9714 |
| Franklin Templeton Equity Fund | 0.9779 | 0.9857 | 0.9861 |
| DSP BlackRock Equity Fund | 0.9824 | 0.9776 | 0.9750 |
| Deutsche Equity Fund | 0.9846 | 0.9716 | 0.9719 |
| Canara Robeco Equity Fund | 0.9769 | 0.9692 | 0.9692 |
| BOI AXA Equity Fund | 0.9847 | 0.9732 | 0.9736 |
| Birla Sun Life Equity Fund | 0.9849 | 0.9725 | 0.9735 |
| Baroda Pioneer Equity Fund | 0.9824 | 0.9766 | 0.9766 |
| Axis Equity Fund | 0.9852 | 0.9740 | 0.9719 |

*Source:* Calculated.

**Table A 15: Sectoral equity fund wise efficiency performance (variable returns to scale)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| Baroda Pioneer Infrastructure Fund | 0.9988 | 0.9984 | 0.9989 |
| BOI AXA Focused Infrastructure Fund | 0.9983 | 0.9984 | 0.9989 |
| Canara Robeco Infrastructure | 0.9987 | 0.9989 | 0.9992 |
| DSP BlackRock World Energy Fund | 1.0000 | 1.0000 | 1.0000 |
| DSP BlackRock World Gold Fund | 0.9993 | 1.0000 | 1.0000 |
| DSP BlackRock World Mining Fund | 1.0000 | 0.9994 | 0.9983 |
| DWS Global Agribusiness offshore Fund | 0.9996 | 1.0000 | 0.9998 |
| Fidelity Global Real Assets Fund | 0.9998 | 0.9997 | 0.9993 |
| HDFC Core and Satellite Fund | 0.9992 | 0.9986 | 0.9991 |
| HDFC Infrastructure Fund | 0.9986 | 0.9986 | 0.9987 |
| ICICI Prudential Banking and Financial Services Fund | 0.9994 | 0.9992 | 1.0000 |
| ICICI Prudential Exports and Other Services Fund | 0.9989 | 0.9989 | 1.0000 |
| ICICI Prudential Technology Fund | 0.9994 | 0.9996 | 0.9996 |
| IDFC Strategic Sector (50-50) Equity Fund | 0.9993 | 0.9986 | 0.9987 |
| ING Global Commodities Fund | 1.0000 | 1.0000 | 0.9991 |
| JPMorgan India Smaller Companies Fund | 0.9989 | 1.0000 | 0.9999 |
| Kotak PSU Bank ETF | 1.0000 | 0.9992 | 0.9986 |
| L&T Infrastructure Fund | 0.9984 | 0.9987 | 0.9991 |
| LIC Nomura MF Infrastructure Fund | 1.0000 | 0.9983 | 0.9993 |
| Mirae Asset Global Commodity Stocks Fund | 0.9995 | 0.9991 | 0.9994 |
| PineBridge Infrastructure & Economic Reform Fund | 0.9987 | 0.9987 | 0.9991 |
| PineBridge World Gold Fund | 0.9995 | 0.9995 | 0.9976 |
| Reliance Banking Fund | 0.9995 | 0.9990 | 1.0000 |
| SBI Infrastructure Fund | 0.9982 | 0.9982 | 0.9990 |
| Sundaram Energy Opportunities Fund | 0.9985 | 0.9989 | 0.9990 |
| Tata Growing Economies Infrastructure Fund | 0.9990 | 0.9990 | 0.9996 |
| UTI Banking Sector Fund | 0.9993 | 0.9992 | 0.9997 |

*Source:* Calculated.

**Table A 16: Diversified equity fund efficiency performance (variable returns to scale)**

| *Fund Name* | *2010-11* | *2011-12* | *2012-13* |
|---|---|---|---|
| UTI Equity Fund | 0.9991 | 0.9990 | 0.9996 |
| Tata Equity Fund | 0.9987 | 0.9990 | 0.9996 |
| SBI Equity Fund | 0.9989 | 0.9989 | 0.9996 |
| Religare Invesco Equity Fund | 0.9988 | 0.9991 | 1.0000 |
| Reliance Equity Fund | 0.9983 | 0.9988 | 0.9998 |
| Quantum Equity Fund | 0.9989 | 0.9987 | 0.9995 |
| Pramerica Equity Fund | 0.9983 | 0.9989 | 0.9996 |
| PineBridge Equity Fund | 0.9987 | 0.9989 | 0.9995 |
| Kotak Mahindra Equity Fund | 0.9990 | 0.9995 | 0.9995 |
| JPMorgan Equity Fund | 0.9990 | 0.9987 | 0.9996 |
| JM Financial Equity Fund | 0.9986 | 0.9965 | 0.9996 |
| ING Equity Fund | 0.9990 | 1.0000 | 0.9995 |
| IDFC Equity Fund | 0.9990 | 0.9988 | 0.9997 |
| ICICI Prudential Equity Fund | 0.9990 | 0.9993 | 0.9995 |
| HSBC Equity Fund | 0.9989 | 0.9987 | 0.9994 |
| Franklin Templeton Equity Fund | 0.9992 | 0.9995 | 0.9998 |
| DSP BlackRock Equity Fund | 0.9989 | 0.9989 | 0.9995 |
| Deutsche Equity Fund | 0.9988 | 0.9988 | 0.9997 |
| Canara Robeco Equity Fund | 0.9990 | 0.9991 | 0.9995 |
| BOI AXA Equity Fund | 0.9988 | 0.9989 | 0.9995 |
| Birla Sun Life Equity Fund | 0.9986 | 0.9987 | 0.9995 |
| Baroda Pioneer Equity Fund | 0.9977 | 0.9984 | 0.9986 |
| Axis Equity Fund | 0.9988 | 0.9991 | 1.0000 |

*Source:* Calculated.