



ANALYSIS OF TRACKING ERRORS OF INDEX MUTUAL FUNDS IN INDIA

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ABSTRACT

“Analysis of tracking errors of Index Mutual Funds in India.”

It is believed that an actively managed mutual fund can obtain better returns over a passive fund by forecasting returns on individual stocks. However obtaining excess returns may be difficult in a competitive market. Thus a safer and superior investment strategy can be “ Index Mutual Funds “. Index Funds is a portfolio which passively replicates the returns of the index. Index funds are important to the modern approach to fund management as it gives the returns which are almost equal to the returns of an Index.

However, it is misunderstood that all index funds give same returns . Though they are supposed to deliver the same returns , many times there is difference between returns of two similar Index Funds. The difference is mainly due to “Tracking Error”. Tracking Error is the annualized standard deviation of the error between index funds returns and index returns. It is argued that in developing countries , where the equity market is relatively illiquid, the tracking error of the index funds can be fairly higher, of course it should not be too high.

This paper is an attempt to analyze the tracking errors of selected index mutual funds in India. Analysis of tracking error is highly required to point out the inefficiency of the fund managers, possibility of insufficient funds , unnecessary activeness of the fund managers or any other possible reasons.

KEYWORDS: *Diversification, Index, Passive Fund, Tracking Error.*

INTRODUCTION

Index funds are easy to construct for this kind of index, since the index fund does not need to trade in response to price fluctuations. Trading is only required in response to issuance of shares, mergers, etc. Index funds are central to the modern approach to fund management. Since the first index fund launched in 1972, investors all over the world have discovered that there are substantial benefits from utilising index funds as an alternative to actively managed funds. In many countries, assets with index funds amount to 30% to 40% of the total equity assets managed by professional fund managers.ⁱ

In this paper, an attempt is made to focus on one important aspect of Index Funds i.e. Tracking Error. Assuming that an investor is interested in utilising an index fund, the hurdle faced is that of tracking error. Tracking Error is the annualised standard deviation of the error between index fund returns and index returns. It is argued that in developing countries, where the equity market is illiquid, the tracking error of index funds can be fairly large, thus diminishing the benefits from indexation. It is the efficiency of the fund manager and his team to minimize the tracking error so that the returns of their fund is higher.

An Index Fund with high tracking error is not preferred by the investors. As a result they may exit from the fund and it will affect the assets' size of the fund which again may affect the performance of the fund manager because he may be required to higher portion of his assets in liquid form to fulfil the redemption requisitions. Hence sometimes it can be observed that tracking error of a particular Index Fund is high because tracking error is high. It is like a vicious circle.

THE PROBLEM

Tracking error is typically measured as the standard deviation of difference between index returns and fund returns. The goal of an index fund is to minimise the tracking error. International evidence suggests that index funds incur a tracking error in the range of 4 basis points to about 120 basis points.

Index funds are arguably one of the most successful ideas that have flowed from academic economics into the real world. Indexing is based on the premise that if markets are fairly efficient, then it would prove difficult for active managers to obtain excess returns, after considering the higher fees and costs that they have to run up. Hence, instead of actively engaging in stock picking, index funds simply try to replicate the returns on a chosen market index and aim to deliver the returns and the risk of that index. Evaluating an index fund's performance boils down to observing how closely a fund tracks the underlying index. This is measured in terms of 'tracking error'.

A well-managed index fund is one which exhibits low tracking error. The job of an index fund manager is therefore to minimise the tracking error. In principle, managing an index portfolio requires investment in all constituent index securities in the exact proportion as the underlying benchmark. This is called a "full replication" approach. In practice, fund managers often face problems in replicating the benchmark index returns. Chiang (1998) describes the difficulties faced by managers in matching index returns. The index represents a mathematical calculation derived from a portfolio of securities that are not subject to the same market frictions as those faced by index mutual funds (Perold 1988). Index funds incur transactions costs that are associated with portfolio implementation, re-balancing and capital flows. When

the composition of the underlying index changes, either due to additions or deletions of constituents or due to corporate restructuring, the index assumes that the theoretical portfolio's new weights to each security can be achieved automatically. However, for the index fund, realigning the portfolio to mimic the underlying benchmarks involves physical trading in stock and the transactions costs incurred thereby.

Hence, factors driving tracking error include transactions costs, fund cash flows, uninvested/buffer cash, treatment of dividends by the index, corporate actions, and index composition changes. The liquidity of the underlying index securities also has implications for transaction costs (in terms of impact cost) and in turn the tracking error incurred by funds (Keim 1999). As a result of ongoing subscriptions and redemptions, open-ended index mutual funds engage in flow-induced trading. Upon subscriptions, they are required to rapidly invest the cash flow across index securities, and upon redemptions, to sell securities to generate cash. Index funds often maintain buffer-cash to meet redemptions. The size and timing of cashflows also has an impact on tracking error. Thus the problem of tracking error is affected by a number of factors and in return it affects various factors of the fund.

METHODOLOGY TO CALCULATE TRACKING ERROR

As pointed out above tracking error is defined as the annualised standard deviation of the difference in returns between the Index fund and its target Index. In simple terms, it is the difference between returns from the Index fund to that of the Index. An Index fund manager needs to calculate his tracking error on a daily basis especially if it is open-ended fund. Lower the tracking error, closer are the returns of the fund to that of the target Index. Tracking Error is always calculated against the Total Returns Index which shows the returns on the Index portfolio, inclusive of dividend. A tracking error indicates the following points.

1. HOW CLOSELY THE FUND IS TRACKING THE INDEX: It refers to the how close the weightages of the stocks in the portfolio are to the weightages of the stocks in the Index. Closer the weightage of the stocks in the portfolio to the Index, lower will be the tracking error. The factors that affect tracking error are inflows / outflows in the fund, corporate actions, change of Index constituents and the level of cash maintained in the fund for liquidity purposes.

2. THE COST THAT ROUTINELY SUBTRACTS FROM FUND RETURNS: Expenses like transaction costs including broker's commission, bid and ask spread, etc. gets subtracted from the returns of the fund. Higher the expenses incurred, greater will be the tracking error

CALCULATION OF TRACKING ERRORⁱⁱ

STEP 1

Obtain the NAV values and the TR Index values for each day of the total time period required

STEP 2

Calculate the percentage change in the NAV and TR Index for each day over its previous day

PERCENTAGE CHANGE IN THE NAV

NAV as on day (t) – NAV as on day(t-1)

= -----

NAV as on day (t-1)

STEP 3

Calculate the difference between the percentage change in the NAV and the percentage change in the TR Index for each day

STEP 4

Calculate the standard deviation of the difference obtained from day(1)to day(n) in Step 3

STEP 5

Calculate the annualised tracking error as per the formula given below

Annualised tracking error = Standard deviation obtained (Step 4) *

Square root (250)

LITERATURE REVIEW

A large number of studies have conducted on the analysis of index funds and their performances. William Reichensteinⁱⁱⁱ carried out an analysis of the flow of investments into and out of mutual funds demonstrated a direct relationship between Morningstar Rating changes and investor reactions. Morningstar ratings upgrades resulted in positive abnormal mutual fund investment inflows, and downgrades caused lower than normal inflows . He further points out that the STARS should not have direct impact on investors' confidence because Morningstar itself largely avoids making performance predictions.

Richard Loth^{iv} studies the difference between an index mutual fund (IMF) and an exchange-traded fund (ETF). He focuses on that difference with the objective of determining which of the two is more suitable to an investor's needs. Both IMFs and the vast majority of ETFs are managed passively, i.e., they are tied to a market index that the fund tracks. The only difference between an index mutual fund and a conventional mutual fund is its form of management: the former uses indexing and the latter uses a human element to make investment decisions.

Michael Jensen^v derived a risk-adjusted measure of portfolio performance (Jensen's alpha) that estimates how much a manager's forecasting ability contributes to fund's returns. As indicated by him the performance of a fund portfolio is the excess return of the portfolio over the return of the benchmark index, where the portfolio is leveraged to have the benchmark index's standard deviation.

K. Pendaraki et al^{vi} studied construction of mutual fund portfolios, developed a multi- criteria methodology and applied it to the Greek market of equity mutual funds. The methodology is

based on the combination of discrete and continuous multi-criteria decision aid methods for mutual fund selection and composition. UTADIS multi-criteria decision aid method is employed in order to develop mutual fund's performance models. Goal programming model is employed to determine proportion of selected mutual funds in the final portfolios.

Cunningham and Fender^{vii} (1999) revisited the debate of passive and active management processes and found that only a very small percentage of money managers have outperformed the after-tax S&P index in US. while Malkiel and Aleksander (2001), found no evidence that the success of indexing is self-fulfilling. Bogle (2002) demonstrated that low cost funds outperform high cost funds on both an absolute and risk-adjusted basis. Given the overwhelming evidence that mutual fund managers as a family do not create superior net returns compared to the index through their active fund management process,

Edward Wyatt^{viii} criticizes the concept of Index funds. It points out that doomed to lag behind the performance of the hottest mutual funds while the market is going up, they also fail to attract great cheers when their funds sink no lower than the market during a downturn. He points out that no one asks them for impassioned reviews of their favorite stocks, nor do shareholders flock to their presentations at mutual fund confabs, breathlessly waiting for a chance to tell them how they have guaranteed returns to the investors.

Joshua Kennon^{ix} believes that Index funds are ideal for those who have no idea how to evaluate competitive advantage of various corporations, differentiate an income statement and balance sheets, or calculate discounted cash flows. Because company-specific risk is diversified away thanks to the dozens or hundreds of companies that make up each of the major indices, such analysis is unnecessary. In addition, an index fund is a cost effective way to acquire hundreds of stocks while avoiding the thousands of dollars in brokerage commissions that would otherwise result.

UNIVERSE & SAMPLE SIZE

UNIVERSE –There are 19 Index Funds listed on National Stock Exchange by various Assets Management Companies. The list is as below.

List of Index Funds listed on National Stock Exchange^x

Sr. No.	Index Fund
1	Principal Index Fund
2	UTI Nifty Index Fund
3	Franklin India Index Fund
4	SBI Magnum Index Fund
5	ICICI Prudential Index Fund

6	HDFC Index Fund – Nifty Plan
7	Birla Sun Life Index Fund
8	LICMF Index Fund – Nifty Plan
9	Tata Index Fund-Nifty Plan
10	ING Large Cap Equity Fund
11	Canara Robeco Nifty Index Fund
12	JM Nifty Plus Fund
13	IDFC Nifty Fund
14	Taurus Nifty Index Fund
15	IDBI Nifty Index Fund
16	Reliance Index Fund- Nifty Plan
17	Benchmark S&P CNX 500 Fund
18	ICICI Prudential Nifty Junior Index Fund
19	IDBI Nifty Junior Index Fund

SAMPLE – The researchers intend to take the sample size of 7 index funds out of the total 19 funds available for selection

The size comes to 37% of the total universe size.

SAMPLING METHOD & CRITERIA- The researchers have used the Convenient Sampling Method in selection of funds. The relatively older funds for which the detailed and reliable information is readily available were selected for sample. Following 7 index funds have been selected for study.

Sr No	Fund Name
1	SBI Magnum Index Fund
2	UTI Nifty Index
3	HDFC Index Fund
4	HDFC Index Fund Nifty
5	Franklin India Index NSE Nifty
6	Benchmark S&P CNX 500
7	ICICI Prudential Index Retail

INTERPRETATIONS & OBSERVATIONS

Tracking errors of the selected funds were analysed. The information was collected from the publications of AMCs and AMFI. On analysis of the data , following information was gathered.

TRACKING ERROR OF SELECTED INDEX MUTUAL FUNDS

Sr No	Fund Name	Tracking Error
1.	SBI Magnum Index Fund	1.09
2.	UTI Nifty Index	0.53
3.	HDFC Index Fund	2.41
4.	HDFC Index Fund Nifty	2.69
5	Franklin India Index NSE Nifty	0.23

6.	Benchmark S&P CNX 500	1.72
7.	ICICI Prudential Index Retail	1.89

Note- Tracking error are annualised for the year ended 31st Dec 2010

1.Maximum Tracking Error- Tracking error of HDFC Index Fund –Nifty is maximum out of the selected funds.It is as high as 2.69%. It is maximum for both of the funds of HDFC Index Funds

2.Minimum Tracking Error- Tracking error of Franklin India Index NSE-Nifty Fund is 0.23% only. This is the minimum tracking error out of all selected index funds

3.Average Tracking Error- Average tracking error of the selected index funds is 1.50%

4. Tracking errors of the Index Exchange Traded Funds (ETFs) are comparatively very low for the above period . For example , the tracking error of Nifty Benchmark ETF was 0.09% only while the tracking error for Banking BeES was 0.19% only^{x1}. The researchers feel that the major reason for the low tracking error in case of Index ETFs is the basic difference between the functioning of Index Funds & Index ETFs. ETFs are more flexible and the fund manager has more freedom as compared with that of an Index Funds.

On the basis of the above information following important and major reasons are found for the higher tracking error for different Index Funds. In fact the fund manager and his team always try to minimize the tracking error by taking various steps however because of some practical difficulties , their efforts are restricted .

1. EXPENDITURE INCURRED BY THE FUND

Ideally all the corpus of the fund have to be invested in the securities of the benchmarked Index as the objective of the scheme is to mimic the returns of the underlying index. But it is not possible, as the Fund has to incur expenses towards its day to day management, transaction fees payable at the time of purchase or sale of securities, etc. The expenditure of the fund has to be met out of the corpus of the fund which means that the fund will invest less funds than what it has collected. This in turns affects the returns as the fund will receive returns only on the amount which is invested. Hence, the lower the expenditure incurred by the fund, the lower is the tracking error.

2. CASH BALANCE

The investment pattern of the fund provides for the asset allocation pattern. Ideally, the full corpus of the fund has to be invested in the underlying index. But this may not be possible due to the funds obligation to meet requests for redemption, receipt of dividend, etc. The fund has to set aside some amount of its corpus to meet the redemption request. As the redemption has to be made within a few days, the fund has to hold cash or other short terms assets which enable it to convert such instrument in cash.

To provide for this exigency the fund has to keep aside some part of its corpus and therefore is not able to investment all its corpus. Further, the fund may receive dividend on the shares held by it which should again be invested in the constituents of the benchmarked index as soon as possible. If the fund is not able to invest such dividend then it holds more cash than required and hence its returns would be affected.^{xii}

Similar is the cash of subscription for purchase of units of the fund. So when the funds holds more cash, it has that much less to invest in the underlying index and thus it leads to mismatch in the returns. It should be the endeavour of the fund to keep the right amount of cash which at the same time can provide for redemption request and should not be ideal.

3. UNDERLYING SECURITIES BREACHING THE UPPER OR LOWER CIRCUIT:

The fund has to re-balance its investment for which it has to buy or sell securities. Sometimes, it may happen that the fund is not able to buy or sell the underlying securities due to circuit filters imposed on them. Hence, the fund is not able to hold the required number of securities which could lead to it not mimicking the index fully.

It may also happen that due to the circuit filters the fund is not able to buy or sell securities at the desired price or at the same time when the rest of the underlying securities are purchase or sold. It might have to pay more to buy and receive less amount when it sells. This leads to distortion in the allocation of fund available to the portfolio of stocks.

4. GIVING EFFECT TO THE CORPORATE ACTIONS

Whenever there is a corporate action such as debenture or warrant conversion, rights, merger, change in constituents, bonus, forfeiture, preferential issue, etc. the fund has to realign its portfolio to the benchmarked Index. This leads to buying and selling which add up to the expenditure which again affect the returns of the fund. Also, the realignment has to be proper, otherwise there would be a mismatch in the investment in each security of the benchmarked Index vis-a-vis the actual weightage of each security in the benchmarked Index.

In case of corporate actions such as rights, bonus, conversion, merger or amalgamation, etc. where the existing holders are benefited by receiving more shares. These corporate actions come into effect from the ex-date as announced by the Stock Exchanges.

Usually, there is a time gap between the ex-date and the date on which the Fund is actually credited with that benefit and has the number of shares with itself. During this period, the Index is representing with the benefit but the Fund isn't. Sometimes if there is a redemption pressure or fresh investment during this period then it would be difficult for the fund arrive at the precise portfolio to be sold or purchased as presently its Scheme does not truly reflect the benchmarked Index. There may be cases were a constituent of the benchmarked Index has hived off one of its division into a separate company as per a scheme of amalgamation.

5. VALUATION OF COMPANY

Consequently as per the scheme, it issues shares of the new company to the existing shareholders. This new company is not a constituent of the benchmarked Index and may not even be listed on the Stock Exchange for some time to come. This leads to the problem of valuation of this company and further, the proportionate amount invested in this company which is not as per the scheme of investment. This leads to a mismatch in the assets held by

the Fund with that which is represented by the benchmarked Index. Whenever listed, this company has to be sold off and again the scheme has to be realigned to the benchmarked Index.

The new securities which are issued should be listed on the Stock Exchange where the trading takes place at present. Sometimes if the Company has issued new securities but has not listed its shares, till it is listed there would be mismatch in the valuation of the benchmarked Index with that of the fund.

6. ROUNDING OFF OF QUANTITY OF SHARES UNDERLYING THE INDEX: As mentioned earlier an Index Fund has to invest in the securities of the benchmarked Index in the same proportion or weightage of the security as it has in the Index. However, while determining the number of shares that need to be purchased for each security, one would need to round off this number.

SUGGESTIONS

On the basis of the observations for higher tracking errors, following steps can be undertaken by the fund manager to minimize the tracking errors.

1. MAINTAINING MINIMUM CASH BALANCE

As mentioned earlier, some amount of cash has to be held by the fund. These cash reserves do not generate any returns. A number of techniques may be used to handle the flow of cash into an Index Fund.

2. USE OF INDEX FUTURES

Index Fund managers in order to keep their funds fully invested can use futures contract. The asset allocated to futures contract will obtain the same rate of return as the Index and the entry in and out of the futures can be made at a very low cost. Cash derived from dividend or fresh subscriptions can be used to invest in futures contracts till a short period till reinvestment is made in the stocks. When the cash reaches a size that is sufficient to invest in the securities, the futures position can be closed and funds can be invested.

3. TEMPORARILY INVESTMENT INTO FIXED INCOME SECURITIES:

The cash held by the fund for liquidity purposes or dividend received can be invested in short term money market instruments carrying fixed income or in the call money market. Thus the cash held for meeting the exigencies can be used to generate returns by investing in the above instruments. This would reduce the risk of the fund being hit on tracking error as these investments would be providing a return.

4. STOCK LENDING

The stocks held by the fund can be used for Stock Lending as per the scheme laid down by SEBI. This in turn would generate return for the fund and would help in reducing tracking error.

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