

TRACKING ERROR

An Index Fund is a mutual fund scheme that invests in the securities in the target Index in the same proportion or weightage of the securities as it bears to the target index. The investment objective of an index fund is to achieve returns which are commensurate to that of the target Index. An investment manager attempts to replicate the investment results of the target index by holding all the securities in the Index. Though Index Funds are designed to provide returns that closely track the benchmarked Index, Index Funds carry all the risks associated with the type of asset the fund holds. Indexing merely ensures that the returns of the Index Fund will not stray far from the returns on the Index that the fund mimics. Still there are instances, which are mentioned below, that leads to mismatch of the returns of the index with that of the fund. This mismatch or the difference in the returns of the Index with that of the fund is known as Tracking Error.

Tracking Error

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.

Tracking error indicates

- 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' 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 error

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 <i>Percentage change in the NAV</i> $= \frac{\text{NAV as on day } (t) - \text{NAV as on day}(t-1)}{\text{NAV as on day } (t-1)}$
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 <i>Annualised tracking error = Standard deviation obtained (Step 4) * sqrt (250)</i>

Reasons of Tracking Error

The reasons for tracking error are:

- 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 will be 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. 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 where a constituent of the benchmarked Index has hived off one of its divisions into a separate company as per a scheme of amalgamation. 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 a mismatch in the valuation of the benchmarked Index with that of the fund.

4. **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 as the minimum number of shares that can be purchased on the exchange is 1.

Measure to be adopted to reduce tracking error: The methods mentioned below are only indicative and the Fund Manager has to choose various methods which he thinks is the best for his scheme.

1. 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 such as:
 - a. **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.
 - b. **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.

2. **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.