

OTHER CONCEPTS:

The basic idea in an index

A stock market index should capture the behavior of the overall equity market. Movements of the index should represent the returns obtained by "typical" portfolios in the country.

Every stock price moves for two possible reasons: news about the company (e.g. a product launch, or the closure of a factory, etc.) or news about the country (e.g. nuclear bombs, or a budget announcement, etc.). The job of an index is to purely capture the second part, the movements of the stock market as a whole (i.e. news about the country). This is achieved by averaging. Each stock contains a mixture of these two elements - stock news and index news. When we take an average of returns on many stocks, the individual stock news tends to cancel out. On any one day, there would be good stock-specific news for a few companies and bad stock-specific news for others. In a good index, these will cancel out, and the only thing left will be news that is common to all stocks. The news that is common to all stocks is news about India. That is what the index will capture.

Meaning of the ups and downs of an index

They reflect the changing expectations of the stock market about future dividends of India's corporate sector. When the index goes up, it is because the stock market thinks that the prospective dividends in the future will be better than previously thought. When prospects of dividends in the future become pessimistic, the index drops. The ideal index gives us instant-to-instant readings about how the stock market perceives the future of India's corporate sector.

Averaging

For technical reasons, it turns out that the correct method of averaging is to take a weighted average, and give each stock a weight proportional to its market capitalisation.

Suppose an index contains two stocks A and B. A has a market capitalisation of Rs.1000 crore and B has a market capitalisation of Rs.3000 crore. Then we attach a weight of $1/4$ to movements in A and $3/4$ to movements in B.

The averaging that takes place in an index is equivalent to diversification. Diversification cancels out individual stock fluctuations. From an investment perspective, diversification reduces risk. From an information perspective, diversification cancels out stock noise; the only thing left after good diversification is the common factor -- news such as nuclear bombs -- which hits all stocks and cannot possibly be removed by diversification. Putting more stocks into an index yields more diversification. However, two things go wrong when we do this too much: First, there are diminishing returns to diversification. Going from 10 stocks to 20 stocks gives a sharp reduction in risk. Going from 50 stocks to 100 stocks gives very little reduction in risk. Going beyond 100 stocks gives almost zero reduction in risk. Hence, there is little to gain by diversifying, beyond a point. The more serious problem lies in the stocks that we take into an index when it is broadened. If the stock is illiquid, the observed prices yield contaminated information and actually worsen an index.

Portfolio interpretation of index movements:

It is easy to create a portfolio, which will reliably get the same returns as the index. i.e. if the index goes up by 4%, this portfolio will also go up by 4%. Suppose an index is made of two stocks, one with a market cap of Rs.1000 crore and another with a market cap of Rs.3000 crore. Then the index portfolio will assign a weight of 25% to the first and 75% weight to the second. If we form a portfolio of the two stocks, with a weight of 25% on the first and 75% on the second, then the portfolio returns will equal the index returns. So if you want to buy Rs.1 lakh of this two-stock index, you would buy Rs.25,000 of the first and Rs.75,000 of the second; this portfolio would exactly mimic the two-stock index. A stock market index is hence just like other price indices in showing what is happening on the overall indices -- the wholesale price index is a comparable example. In addition, the stock market index is attainable as a portfolio.

Importance of indices:

The most important type of market index is the broad-market index, consisting of the large, liquid stocks of the country. In most countries, a single major index dominates benchmarking, index funds, index derivatives and research applications. In addition, more specialised indices often find interesting applications. In India, we have seen situations where a dedicated industry fund uses an industry index as a benchmark. In India, where clear categories of ownership groups exist, it becomes interesting to examine the performance of classes of companies sorted by ownership group.

Traditionally, indices have been used as information sources. By looking at an index we know how the market is faring. This information aspect also figures in myriad applications of stock market indices in economic research. This is particularly valuable when an index reflects highly up to date information (a central issue which is discussed in detail ahead) and the portfolio of an investor contains illiquid securities - in this case, the index is a lead indicator of how the overall portfolio will fare.

In recent years, indices have come to the fore owing to direct applications in finance, in the form of index funds and index derivatives. Index funds are funds which passively 'invest in the index'. Index derivatives allow people to cheaply alter their risk exposure to an index (this is called hedging) and to implement forecasts about index movements (this is called speculation). Hedging using index derivatives has become a central part of risk management in the modern economy. These applications are now a multi-trillion dollar industry worldwide, and they are critically linked up to market indices.

Finally, indices serve as a benchmark for measuring the performance of fund managers. An all-equity fund should obtain returns like the overall stock market index. A 50:50 debt:equity fund should obtain returns close to those obtained by an investment of 50% in the index and 50% in fixed income. A well-specified relationship between an investor and a fund manager should explicitly define the benchmark against which the fund manager will be compared, and in what fashion.

Kinds of indices:

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Problems with the price information for illiquid stocks:

There are three problems: 'stale prices', 'bid-ask bounce' and vulnerability to manipulation. Through these problems, an index is actually worsened when illiquid stocks are put into it.

'Stale prices'

Suppose we look at the closing price of an index. It is supposed to reflect the state of the stock market at 3:30 PM on NSE. Suppose an illiquid stock is in the index. The last traded price (LTP) of the stock might be an hour, or a day, or a week old! The index is supposed to show how the stock market perceives the future of the corporate sector at 3:30 PM. When an illiquid stock injects these 'stale prices' into the calculation of an index, it makes the index more stale. It reduces the accuracy with which the index reflects information.

'Bid-ask bounce'

Suppose a stock trades at bid (buy) 1440 ask (ask) 1490. Suppose no news appears for ten minutes. But, over this period, suppose that a buy order first comes in (at Rs.1490) followed by a sell order (at Rs. 1440). This sequence of events makes it seem that the stock price has dropped by Rs.50. This is a totally spurious price movement! Even when no news is breaking, when a stock price is not changing, the 'bid-ask bounce' is about prices bouncing up and down between bid and ask. These changes are spurious. This problem is the greatest with illiquid stocks where the bid-ask spread is wide. When an index component shows such price changes it contaminates the index.

Market manipulation

The index is a large entity and is intrinsically harder to manipulate when compared to individual stocks. Obviously, larger indices are harder to manipulate than smaller indices. The weak links in an index are the large, illiquid stocks. These are the achilles heel where a manipulator obtains maximum impact upon the index at minimum cost. Optimal index manipulation consists of attacking these stocks. This is one more reason why illiquid stocks should be excluded from a market index; indeed this aspect requires that the liquidity of a stock in an index should be proportional to its market capitalisation.

S&P CNX Nifty:

S&P CNX Nifty is based upon solid economic research. A trillion calculations were expended to evolve the rules inside the S&P CNX Nifty index. The results of this work are remarkably simple: (a) the correct size to use is 50, (b) stocks considered for the S&P CNX Nifty must be liquid by the 'impact cost' criterion, (c) the largest 50 stocks that meet the criterion go into the index. S&P CNX Nifty is a contrast to the adhoc methods that have gone into index construction in the preceding years, where indices were made out of intuition and lacked a scientific basis.

'Impact cost'

Suppose a stock trades at bid 99 and ask 101. We say the "ideal" price is Rs. 100. Now, suppose a buy order for 1000 shares goes through at Rs.102. Then we say the market impact cost at 1000 shares is 2%. If a buy order for 2000 shares goes through at Rs.104, we say the market impact cost at 2000 shares is 4%. Market impact cost is the best measure of the liquidity of a stock. It accurately reflects the costs faced when actually trading an index. For a stock to qualify for possible inclusion into the S&P CNX Nifty, it has to reliably have market impact cost of below 0.75 % when doing S&P CNX Nifty trades of half a crore rupees.

The impact cost on a trade for Rs.5 million of the full S&P CNX Nifty:

It is safe to think that the impact cost is 0.1% or so. This means that if S&P CNX Nifty is at 1000, a buy order goes through at 1001 and a sell order gets 999. NSE's NEAT software has special facilities to enable buying or selling the entire the S&P CNX Nifty at one shot. The impact cost is not something fixed. It changes, depending upon the liquidity of the market. Indeed, the time-series of the S&P CNX Nifty impact cost is one of the best measures of changes in market liquidity over the years.

Calculation of S&P CNX Nifty closing price:

The Nifty closing prices are calculated by taking the last half an hour weighted average closing prices of the constituents of the index.

Dividends:

IISL also calculates something called the S&P CNX Nifty Total Returns (TR) index. This shows the returns on the index portfolio, inclusive of dividends. This is the appropriate benchmark for mutual funds, which do earn dividends. Both S&P CNX Nifty and S&P CNX Nifty TR use a base of 3 November 1995 as 1000. On December 31, 2001, i.e. nearly six years later, S&P CNX Nifty was at 1059.05 while S&P CNX Nifty TR was at 1150.28. The difference in the two levels is the return obtained on reinvestment of dividends through the intervening period.

Total Returns Index

S&P CNX Nifty reflects the return one would get if investment is made in the index portfolios. As Nifty is computed in real-time, it takes into account only the price movements. However, the price indices do not consider the return from dividend payments of index constituent stocks. Only the capital gains due to price movement is measured by the price index. In order to get a true picture of returns, the dividends received from the index constituent stocks also needs to be included in the index movement. Such an index, which includes the dividends received, is called the Total Returns Index.

The Total Returns Index is an index to reflect the returns on the index from index gain/loss plus dividend payments by constituent index stocks.

Total Returns Index - Methodology

Index information on the following are the prerequisites for calculation of Total Returns (TR) Index:

1. Price Index close.
2. Price Index returns.
3. Dividend payouts in Rupees.
4. Index Base capitalisation on ex-dividend date

Dividend payouts as they occur are indexed on ex-date.

$$\text{Indexed dividend} = \frac{\text{Dividend payout (Rs.)} \times 1000}{\text{Base cap of index (Rs.)}}$$

Indexed dividends are then reinvested in the index to give TR Index.

$$\text{TR Index} = [\text{Prev. TR Index} + (\text{Prev. TR Index} * \text{Index returns})] + [\text{Indexed dividends} + (\text{Indexed dividends} * \text{Index returns})]$$

Base for both the Close index and TR index close will be the same.

Example:

Base index for both the Index and TR Index is 1000.

Day	Dividend Payout	Base capitalisation	Indexed Dividend
7	Rs.15,00,00,000	Rs.15,50,00,00,00,000	0.09677
10	Rs.22,00,00,000	Rs.15,72,50,00,00,000	0.13991

$$\text{Index Return} = (\text{Current index} - \text{Prev. index}) / \text{Prev. index.}$$

Day	Index close	Index return	Indexed Dividend	TR Index
1	1000			1000
2	988.92	-0.01108		988.92
3	978.22	-0.01082		978.22
4	964.01	-0.01453		964.01
5	953.07	-0.01135		953.07
6	948.82	-0.00446		948.82
7	917.26	-0.03326	0.096774	917.3536 *
8	902.56	-0.01603		902.6521
9	913.21	0.0118		913.3031
10	904.08	-0.01	0.139905	904.3107 **
11	898.86	-0.00577		899.0894
12	892.79	-0.00675		893.0178

$$\begin{aligned}
* &= [948.82 + (948.82 * -0.03326)] + [0.096774 + (0.096774 * -0.03326)] \\
&= 948.82 + (-31.5577532) + 0.096774 + (-0.00321870324) \\
&= 917.2622468 + 0.09355529676 \\
&= 917.3536 \text{ (rounding)}
\end{aligned}$$

$$\begin{aligned}
** &= [913.3031 + (913.3031 * -0.01)] + [0.139905 + (0.139905 * -0.01)] \\
&= 913.3031 + (-9.133031) + 0.139905 + (-0.00139905) \\
&= 904.170069 + 0.13850595 \\
&= 904.3107 \text{ (rounding)}
\end{aligned}$$

Note: The indexed dividend on Day 7 will participate in the TR index from Day 7 and the indexed dividend on Day 10 will participate from Day 10.

Index futures:

NSE commenced trading in Index Futures on June 12, 2000. The Nifty futures contracts are based on the popular market benchmark S&P CNX Nifty Index. S&P CNX Nifty is uniquely equipped as an index for the index futures market owing to (a) low market impact cost and (b) high hedging effectiveness. The good diversification of S&P CNX Nifty will generate low initial margin requirements.

Hedging effectiveness:

Suppose you have some portfolio, and you use index futures for hedging. A good index is one, which gives high hedging effectiveness, i.e. the index should correlate well with your portfolio -- whatever it may be. A good index would give a very high risk reduction when a portfolio owner short sells the index futures. S&P CNX Nifty correlates better with all kinds of portfolios in India as compared with other indices. This holds for all kinds of portfolios, not just those that contain index stocks.

How does S&P CNX Nifty compare with other indices?

Every technical reason favours the S&P CNX Nifty.

Diversification. S&P CNX Nifty is a more diversified index, accurately reflecting overall market conditions. The reward-to-risk ratio of S&P CNX Nifty is higher than other leading indices, making it a more attractive portfolio hence offering similar returns, but at lesser risk.

Liquidity. Over one year (October 1998 to October 1999), the trading volume on NSE for Nifty stocks was Rs.3.5 trillion, giving a liquidity ratio of 105%. The 'liquidity ratio' is defined as trading volume over one year divided by market capitalisation today.

Hedging effectiveness. The basic risk of Nifty futures will be lower owing to the superior liquidity of Nifty stocks and of NSE. Nifty has higher correlations with typical portfolios in India as compared to any other index. These two factors imply that hedging using Nifty futures will be superior.

Governance. Nifty is managed by a professional team at IISL, a company setup by NSE and CRISIL with technical assistance from Standard & Poor's. There is a three-tier governance structure comprising the board of directors of IISL, the Index Policy Committee, and the Index Maintenance Subcommittee. S&P CNX Nifty has fully articulated and professionally implemented rules governing index revision, corporate actions, etc.

These rules are carefully thought out, under Indian conditions, to dovetail with operational problems of index funds and index arbitrageurs. S&P CNX Nifty is relatively free of manipulation, for three reasons: (a) the index levels are calculated from a highly liquid exchange with superior surveillance procedures (b) S&P CNX Nifty has a large market capitalisation so the consequence (upon the index) of a given move in an individual stock price is smaller and (c) S&P CNX Nifty calculation intrinsically requires liquidity in proportion to market capitalisation, thus avoiding weak links which a manipulator can attack. Users of the S&P CNX Nifty benefit from the research that is possible owing to the long time-series available: both S&P CNX Nifty and S&P CNX Nifty Total Returns Index series are observed from July 1990 onwards. S&P CNX Nifty is backed by solid economic research and three most respected institutions: NSE, CRISIL and S&P.

India Index Services & Products Ltd. (IISL)

India Index Services & Products Ltd. (IISL) is a joint venture between the National Stock Exchange of India Ltd. (NSE) and CRISIL Ltd. (formerly the Credit Rating Information Services of India Limited). IISL has been formed with the objective of providing a variety of indices and index related services and products for the capital markets. IISL has a consulting and licensing agreement with Standard and Poor's (S&P), the world's leading provider of investible equity indices, for co-branding IISL's equity indices.

