Economic Value Added Analysis

Meaning and Concept of Economic Value Added

Determinants of Economic Value Added
- Net Operating Profit After Tax (NOPAT)
- Invested Capital
- Weighted Average Cost of Capital (WACC)

Computation and Analysis of EVA of Selected Power Companies under Study
- NTPC Limited
- REC Limited
- Power Grid Limited
- Birla Power Limited

Ratio Analysis of Economic Value Added
- EVA to Capital Employed
- EVA per Share
MEANING AND CONCEPT OF ECONOMIC VALUE ADDED

Economic value added is a new powerful management tool which is considered as an important source of corporate governance. It is an alternate performance measurement technique which is used to overcome the limitation of traditional measurement criteria by correlating with shareholder’s wealth and action of a company’s manager.

- EVA is a method to measure a company’s true profitability and to steer the company correctly from the viewpoint of shareholders.
- EVA helps the operating people to see how they can influence the true profitability (especially if EVA is broken down into parts that can be influenced).
- Clarifies considerably the concept of profitability (the former operating profit/capital (ROI %) -observation is turned into EVA -observation).
- EVA improves profitability usually through the improved capital turnover. Companies have usually done a lot in cutting costs but there is still much to do in improving the use of capital.
- EVA is at its best integrated in incentive systems.
Corporate entities have different performance measurement criteria. Common bases used for measurement of performance are net profit margin, operating profit margin, return on net worth, return on investment (ROI) etc. ‘’As a performance measure EVA comes to closer than any other tool to capture the true economic profit of an enterprise. It is directly linked to the creation of the shareholders wealth over time. EVA based financial management and incentive system gives manager superior information and motivation to make decisions that will create the greatest shareholders private enterprise.’’¹

Over the past few years EVA has emerged as a new way to gauge financial performance highly regarded corporations like coco-cola, AT&T, Quaker, oats and Briggs and Stratton have set up EVA measurement systems throughout their organisation. ² It is experienced in U.S.A that EVA has provided financial discipline, encouraged managers to act like owners and boosted shareholders’ fortune.

‘’Economic Value Added (EVA) is an increasingly popular corporate performance measure one that is often used by companies not only for evaluating performance, but also as a basis for determining incentive pay. Like other performance measures, EVA attempts to cope

with the basic tension that exists between the need to come up with a performance measure that is highly correlated with shareholders wealth, but at the same time some what less subject to the random fluctuations in stock prices. This is a difficult tension to resolve, and it explains the relatively low correlation of all accounting based performance measures with stock returns, at least on a year-to-year basis.3

Economic Value Added (EVA), a concept introduced by New York based consulting firm M/s Stern Steward & Co. in early eighties is a developing concept for measurement of performance as far as its application in India is concerned. The corporate world in India is slowly recognising the importance of EVA. Some Indian companies viz., Ranbaxy Laboratories, Samtel India Ltd. etc. have started calculating EVA as an internal report. Infosys Technologies Ltd. is the first Indian company to disclose its EVA in the annual report. It will serve as a pointer to other companies to come out with EVA disclosure. This would be a bold step towards better disclosure practice.

EVA is a rupee amount rather than a ratio remaining after capital charge (or cost of capital) is deducted from the amount of operating profits. One of the earliest to define residual income concept was Alfred Marshall, in 1890, as, economic profit is total net gains less the interest on invested capital at the current rate. Peter Drucker has defined EVA as,

“Eva is based on something we have known for a long time: what we call profits, the money left to service equity, is usually not profit at all. Until a business returns a profit that is greater than its cost of capital, it operates at a loss. Never mind, it pays taxes as if it had a genuine profit. The entire enterprise returns less to the economy than it devours in resources ... until then it does not create wealth, it destroys it”.

But EVA, as implemented by Stern Stewart Co., differ from residual income concept in three ways:

(i) EVA makes use of principles and methods modern financial economics to provide a more accurate measure of the weighted average cost of capital (WACC).

(ii) Instead of using earnings, as computed under Generally Accepted Accounting Principles (GAAP), clients are encouraged to “undo” certain GAAP procedures to remove accounting distortions.

(iii) Most EVA implementations do not stop at changing the firm’s performance measurement scheme but go farther and often recommend wholesale changes in its compensation packages.


Joel M. Stern, partner of M/s Stern Stewart & Co. mentioned, in the foreword to the book named “EVA: The real key to creating wealth”, that EVA has been a part of economists’ toolkit for more than 200 years. However, EVA has gained increased acceptance and praise during the last decade for evaluating a company’s performance and disclosing genuine addition or drainage of the net worth of the shareholders. More than 300 companies, with revenues reaching a trillion dollars a year, have complemented EVA framework for financial management and incentive compensation.

EVA defined

Economic Value Added (EVA) attempts to measure a corporation’s true economic profit as it compares company’s actual rate of return as against the required rate of return. It describes whether a business unit best utilises its assets to generate return and maximise shareholder’s value. To simplify, EVA is just a way of measuring an operation’s real profitability. EVA holds a concern accountable for the cost of capital it uses to expand and operate its business. EVA is a better system than the traditional ones to encourage growth through investment in new products, new equipments and new manufacturing facilities. A company is required to be more careful about resource mobilisation, resource allocation and investment decisions while measuring EVA. It effectively
measures the productively of all the factors of production viz., land, labour, capital entrepreneur and management. Thus EVA can be defined as - 

‘Excess profit of a firm after charging cost of capital.’

EVA is a corporate surplus, which should be shared by the employees, management and the shareholders. Efficiency bonus, profit sharing schemes, managerial remuneration over and above a minimum sustenance salary, issue of bonus shares and incentive dividend to equity and preference shareholders respectively can be better linked to EVA.

The Intellectual Capital and Intangible Report of Balarampore Sugar Mills Ltd. describes that: ‘what makes EVA potentially potent is in its application: it can be based to structure employee remuneration or increments in proportion to the act of their creation/destruction of wealth. When applied through the organization, the separate divisions are able to break down their expenses/income structure more analytically than if the exercise were carried out by a centralised accounting head.’

Valuation

EVA is the difference between Net Operating Profit After Tax (NOPAT) and the capital charge (or overall cost of capital). In other
words, EVA is a company’s net operating profit after tax after deducting the cost of capital employed. It takes into account the total cost of capital, this is the factor which makes EVA so revealing. The traditional financial statements normally considers only a single component of the total cost of capital i.e., the explicit cost of borrowed capital, to arrive at net profits. EVA recognises explicit cost of borrowed capital as well as implicit cost of equity capital as part of cost to be deducted from net operating profits. While using traditional performance measures, divisional managers tend to focus too much on bottom line but under EVA based measures, they are accountable for the amount of capital they employ along with the earnings generated.

EVA is positive, in case NOPAT exceeds capital charges and negative in case capital charges exceed NOPAT. Symbolically:

\[
EVA = NOPAT - \text{capital charge}
\]

or

\[
EVA = NOPAT - (WACC \times \text{invested capital})
\]

where \( WACC = \) Weighted Average Cost of Capital,

Invested capital = Invested capital at the beginning of the year
The logic behind taking beginning invested capital for computing EVA is that a company would take, at least, a year’s time to earn a return on investment.

There are two factors, which drive EVA - the relative profitability and the invested capital. If a company has suffered loss, growth in size (i.e. invested capital) would reduce EVA. To reduce the impact of negative EVA or improve EVA there are four ways:

(1) Earn higher profits without using more capital.

(2) Use reduced capital to do the same operation.

(3) Downsize or close down of unprofitable divisions or units.

(4) Invest capital in projects having high returns.

Thus, the above formula of EVA connotes that if the returns of a company were not enough to cover the cost of capital totally more investment in the business would bring more negative EVA. In such a situation, the company should make efforts to either increase the returns or reduce the amount of capital invested in order to improve EVA. The basic idea behind EVA is that shareholders must earn a return that is sufficient to compensate for the risk taken by them. EVA holds a company accountable for the cost of capital employed it uses to expand
and operate its business and attempts to disclose whether a company is creating real value for its shareholders.

DETERMINANTS OF ECONOMIC VALUE ADDED

It may be mentioned here that, calculation of EVA faces some tricky issues. Each element of EVA, therefore, is discussed separately to unveil the steps followed by Stewart to compute EVA. Further the necessary adjustments to be made to Stewart computed EVA to arrive at modified EVA for purpose of present study are discussed as follows.

I. Net Operating Profit After Tax (NOPAT)

NOPAT is defined by Stewart as “the profits derived from the company’s operations after taxes but before financing costs and non-cash book keeping entries”.\(^6\) But in eliminating the effect of “non-cash book keeping entries”, Stewart makes an exception. Deprecation is subtracted to arrive at NOPAT. The depreciation is subtracted because, as argued by Stewart, it is a true economic expense. In other words, NOPAT is equal to the income available to shareholders plus interest expenses (after tax). However, Stewart has considered regular non-operating income (e.g. interest/ dividend on investments) as part of NOPAT. This is a major deviation from traditional view of

operating profit. Traditionally, operating profit was defined as profit from main operational activities ignoring other incomes. But Stewart’s definition seems to be more relevant in the present day business. Stewart identified 120 adjustment to be made in accounting profit to arrive at NOPAT. It is argued that these adjustments would eliminate potential distortions in accounting results based on Generally Accepted Accounting Principals (GAAP) of a country.

However, the actual number of adjustment would differ depending upon the prevailing GAAP of a country. Stewart suggested four common adjustments for avoiding complexity in the calculation of NOPAT. These items are termed as equity equivalents. Equity equivalents are added to invested capital and periodic changes in them are added to operating profits to arrive at NOPAT. These adjustments make NOPAT a more realistic measure of yield generated for investors for recurring business activities. These adjustments would convert accounting profit into economic profit. These items are described briefly as follows:

(1) Deferred Income Tax Reserve: Accounting for income tax, as suggested in the GAAP of, U.S., U.K. and international accounting standard (IAS-12) requires every company to account for both current tax as well as deferred tax liability. IAS-12 (as revised in 1996) states
that deferred tax liability should be recognised for all taxable temporary
differences with few exceptions. On the other hand, a deferred tax asset
should be recognised for the carry forward of unused tax losses and
unused tax credits to the extent that it is probable that future taxable
profits would be available against which the unused tax losses and
unused tax credits can be utilised.\(^7\) Thus for accounting purposes,
 provision for tax should include current tax and deferred tax liability.
Deferred tax liability exists when tax computed on accounting profit is
more than tax liability as per income tax laws. Such deferred tax liability
would appear in the balance sheet as a separate item and not under the
head current liabilities. Stewart argues that so long as a company
replenishes the assets that give rise to the deferral of taxes, the deferred
tax reserve would not be consumed but instead would essentially
constitute the equivalent of equity. NOPAT should be charged only with
taxes paid in actual instead of accounting provision for taxation. Thus,
increase in deferred tax liability should be added to NOPAT and deferred
tax assets should be deducted form it.

In Indian context the adjustment for deferred income tax reserve
could not be carried due to different accounting practices and non-
disclosure of information. There is no standard on “Accounting for

\(^7\) Par 34 of IAS-12.
Income Tax” in India. However, there is a guidance note issued by the Institute of Chartered Accountants of India (ICAI) on “accounting for taxes on income”. The note suggested that tax charge for a period should be determined on the basis of the tax effect accounting method which recognises deferred tax liability and deferred tax asset. But immediately after this recommendation, the note commented that, “it is realised that it will take some time to develop the necessary awareness and expertise for the application of this method among the preparers of financial statements. Therefore, till the time such awareness and expertise are developed, it will be permissible for an enterprise to follows the tax payable method as an alternative”. Most of the companies, including companies under the present study, use this alternative ‘tax payable method’, since the companies under study have followed the tax treatment on cash tax basis, the tax related equity equivalent adjustment is not necessary.

(2) The Last-in-First-Out (LIFO) Reserve : A company may follow LIFO method for valuation of inventories in times of rising prices in order to save tax. Closing inventories in that situation are not at current cost. There is a need to mark the inventories to current value to get a true economic value of inventory. However, if a company follows first in -first- out (FIFO) method, inventories in the balance sheet would be
shown at recent prices. There is no need of any adjustment in that situation. The LIFO reserve is the difference between the FIFO and LIFO value of the inventory. It is a measure of the extent to which the LIFO inventories are understated in the balance sheet. The periodic increase in LIFO reserve should be added to NOPAT.

International accounting standard (IAS) 2 on ‘inventories’ recommends assigning cost of inventories by using FIFO or weighted average cost formula. AS-2 in Indian on ‘valuation of inventories’ also follows IAS trend. Not even a single company under study has followed LIFO method. Hence, there is no need to make this adjustment with NOPAT.

(3) Goodwill Amortisation: Goodwill is shown in the balance sheet only when it is purchased i.e., money or money’s worth has been paid. Goodwill arises from the accounting for amalgamation in the nature of purchase by following purchase model. A business combination, which is an acquisition, should be accounted for by use of purchase method of accounting. Paragraph 40 of IAS-22 states that any excess of the cost of acquisition over the acquirer’s interest in the fair value of identifiable assets and liabilities acquired as at the date of the exchange transaction

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should be described as goodwill and recognised as an asset. Such goodwill should be amortised over a period not exceeding five years, unless a longer period, not exceeding twenty years, can be justified. Paragraph 19 of AS-14 also states that goodwill should be amortised over a period not exceeding five years, unless a somewhat longer period can be justified. In the event of major acquisition at a significantly high premium, such amortisation would depress reported profits seriously. Another method i.e., the pooling of interests method, of accounting for amalgamation (not allowed under IAS-22 but allowed under AS-14) prescribes non-recognition of goodwill. According to this method the difference between the purchase consideration and the equity share capital of the acquired company should be adjusted in reserves this would result in reduction in equity of the acquirer company. Consequently, post amalgamation return on equity would be unnecessarily high. On the other hand, if purchase method has been followed, equity would be reduced only to the extent of amortisation of goodwill. Consequently, return on equity capital post-amalgamation would be low. Thus, difference in accounting treatment would have favourable or adverse effect on equity of the company. Goodwill recognition shows the true cost of acquisition, which is the market value of securities offered to consummate the deal as of the date of transaction.
Thus, periodic amount of amortisation of goodwill should be added back to NOPAT and cumulative amortisation of goodwill must be added back to equity.

In Indian context, mergers and acquisition are recent phenomenon. The companies under study have not witnessed any amalgamation. Since goodwill is recognised in the balance sheet only in the event of acquisition of business at a premium, no adjustment is necessary in NOPAT for goodwill. Also AS-14 for ‘Accounting for Amalgamations’ allows a company in India to follow “Pooling of Interests Method” which does not require a company to recognise goodwill, even if a premium is paid.

(4) Amortisation of Research and Development Costs: R&D efforts of a company decides its long-term success in highly competitive market. Especially in the industries witnessing rapid technological changes, value of a company would be ascertained by its edge in R&D efforts. Para-12 of SFAS (Statement of Financial Accounting Standards) requires that, all R&D cost should be charged to expenses when incurred. IAS-9 distinguishes between research and development activities. It prescribes that research cost should be immediately expensed while development cost can be deferred and amortised on
fulfillment of certain conditions. The conditions so prescribed are very stringent that their fulfillment becomes difficult. Thus most of the company charge entire R&D cost in the year in which they are incurred. This lower downs the profit for that particular year. The higher the expenditure incurred on R&D, the higher will be the depression in reported profit. As such, a company may be discouraged to embark upon an ambitious R&D programme. The adverse impact on EPS may prompt corporate managers to defer immediate research programme. Stewart suggested capitalising of all R&D costs initially and than following a defined amortisation programme. R&D costs, therefore, should be initially capitalised and than amortised into earnings over the anticipated payoff period for the successful projects. Thus annually charged R&D expenditure should be added back to NOPAT instead an amortised portion would be deducted from NOPAT.

In India, companies at large have practice of writing off R&D cost of revenue nature in the year of incidence. R&D cost of capital nature has been capitalised. Companies, following practice of writing off the R&D cost in full, have included the same in natural heads of accounts. It is, therefore, very difficult to find out the costs written off. Also a sweeping assumption of amortising R&D costs over a fixed period of time cannot be made. It may be noted that a part of capitalised R&D cost
is amortised through annual depreciation and only the R&D cost of revenue nature is written off in full in the year in which it is incurred. Thus, in India, capital part of R&D cost is amortised and revenue part is not normally amortised. Therefore, no adjustments in NOPAT have been made for R&D costs of revenue nature.

II. Invested Capital

Invested capital refers to total assets (net of revaluation) after deducting non-interest bearing current liabilities. From operating viewpoint, invested capital can be described as Net Fixed Assets (i.e., Net Block), plus Investments plus Net Current Assets. Net Current Assets means current assets less current liabilities. From financing viewpoint, invested capital can be defined as Net Worth plus borrowed funds. Borrowed funds include all long-term and short term borrowed funds bearing interest. Stewart mentioned that adjustments for four Equity Equivalents should be made. The adjustments for equity equivalent are intended to arrive at the true economic value of the invested capital. Net worth is defined as total of paid up share capital plus free reserves and surplus (net of revaluation reserve) less miscellaneous expenditure (including accumulated losses) if any. Such adjusted invested capital would be called economic capital.
Invested capital for the purpose of study has been calculated, ignoring the adjustments for equity equivalents, as follows:

Invested Capital = Net worth + Total borrowings

where Net worth = Share capital + Reserves and surplus
- Revaluation Reserve - Accumulated losses
- Miscellaneous Expenditure.

Total Borrowing = Long-term interest bearing debt
+ short-term interest bearing debt.

III. Weighted Average Cost of Capital (WACC)

WACC represents overall cost of capital employed (i.e., debt plus equity). Cost of each source of capital is calculated separately. Then weight is assigned to each source on the basis of proportion of a particular source in the total capital invested. Weights can be assigned on market value basis or book value basis. Stewart preferred market value basis weights.

Symbolically, WACC can be calculated as:

\[
\frac{E}{CE} \times K_c + \frac{LTB}{CE} \times K_d
\]

where E = equity capital
CE = capital employed
LTB = long term borrowing
\( K_e \) = cost of equity
\( K_d \) = cost of debt

WACC has been defined in the present study to include two specific costs viz., cost of equity shares \( (K_e) \) and cost of debt \( (K_d) \). \( K_d \) is calculated by multiplying the pre-tax debt cost by \( (1 - t) \), where ‘\( t \)’ denotes the effective tax rate. This will give the post tax cost of debt. The post tax debt cost is calculated because debt cost enjoys tax shield. In other words, tax reduces the effective debt cost. A company with higher ‘\( t \)’ is encouraged to have higher proportion of debt in its capital structure simply because the effective debt cost would be low. On the other hand, a company with low effective tax rate would not enjoy the tax shield associated with debt. However, a company should not have a higher dosage of debt only to enjoy tax shield, it may increase company’s financial risk.

\[
\text{Cost of debt } (K_d) = \frac{(\text{Total interest expense/ Total borrowings at beginning})}{(1 - T)} \times 100
\]

Cost of debt calculated according to the above formula may give an abnormally high figure. The reason is, the total expenses may be too
high as compared to the beginning total interest-bearing debts. This would give a distorted figure of borrowing cost. The borrowing cost can show an artificially high figure because of the following reasons:

a) Repayment of loans during current year; or

b) Loans taken at the beginning of the current year so that it does not appear at the denominator for calculating \( K_d \); or

c) Rescheduling of loan repayments.

Hence, for the present study, a control variable “normal yearly borrowing cost” has been considered.

If the computed cost of debts \( (K_d) \) in any year is more than the control variable, the control variable has been considered as the borrowing cost of that year. This has been done to see whether the borrowing cost represents the prevailing lending rates of the commercial banks. If the computed cost of debt \( (K_d) \) in any year is less than the control variable, no adjustment is made in \( K_d \). This is so to recognise the innovative financing routes followed by the companies to minimise the borrowing costs.

Cost of equity \( (K_e) \) is the opportunity cost equal to the total return that investor could expect to earn from alternative investments of comparable risk. It is not an explicit cost like cost of debt. The dividend
based approach or earning based approach for finding cost of equity is not a proper way of computing the return expected by equity shareholders. These approaches measure only the explicit cost of servicing equity. Whereas the true measure of cost of equity is not what a company offers but what investors expect. The quantum of investors expectation depends, interalia, on the business risk and financial risk of a company. The equity shares carry highest degree of financial risk since they are entitled to receive dividend and return of principal amount after all the outside obligations of the firm are met. As a compensation to the exposure to the higher risk, holders of equity shares expect a higher return, and hence higher cost is associated with the equity capital.

Conceptually, the cost of equity may be defined as “the minimum rate of return that a firm must earn on the equity- financed portion of an investment project in order to leave unchanged the market price of the shares”. The cost of equity can be calculated by following Capital Asset Pricing Model (CAPM). The CAPM is basically used to determine minimum required rates of return from investment in risky assets. The cost of equity ($K_e$), therefore is determined through CAPM. Stewart has also used CAPM consistently as a measure for cost of equity in his

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methodology for computing EVA. The expected return on equity under CAPM can be found out by following formula.

\[ R_j = R_f + \beta (R_m - R_f) \]

where \( R_j \) = Expected return on scrip \( j \)

\( R_f \) = Risk free rate of return

\( \beta \) = Beta representing the volatility of scrip \( j \) against market volatility

\( R_m \) = Expected stock market return.

It is clear from the above formula that the required rate of return on equity is equal to the sum of the risk-free rate of return and an increment that compensates the investors for accepting the assets risk. The compensation for risk is expressed as the assets’ risk factor i.e. beta, multiplied by the expected excess return i.e., risk premium, of the market. Thus to follow CAPM, following things need to be properly defined:

1. Annual risk-free rate of return
2. Estimated market return
3. Corporate beta estimation
4. Estimated risk premium.
(1) Annual Risk-free Rate of Return: Traditionally the treasury bill rates are considered as the risk free rate. In India, RBI issues four types of treasury bills- 14-day, 19-day, 182-day and 364-day. Of these 14-day intermediate treasury bills were introduced from April 1, 1997.\(^{10}\) 14-day auction treasury bills have been introduced form June 6, 1997. 91-day treasury bills were issued since 1979. 182-day treasury bills were introduced in 1990-91 whereas, the issue of 364-day treasury bills started form the year 1992-93. Thus, only one type of treasury bill was available prior to 1991, that was 91-day treasury bills. The 91-day bills were sold on tap at a fixed discount rate of 4.6% during the period 1979 to 1991. The government introduced a scheme of auction for 91-days treasury bills in January 1993. The discount rate of 4.6% cannot be taken as the average risk-free rate for the period of study. This is because during the same period call money rates were 10%, commercial bank’s one year deposit rates were between 9%-10%. The 364-day treasury bills rate, therefore, are considered as the risk-free rate for the years concerned. However, doubts have been expressed about the risklessness of the risk-free rates by Petit.\(^{11}\)

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It is mentioned that even treasury bill yields are not fully risk free and hence adjustments should be made in treasury bill yield to get the true risk free rates but no reasonable way was found to estimate the risk component of the treasury bills yields in India. For this long historical yield statistics of treasury bills and stocks are required. For example, Petit used yield statistics of 30 years to decompose riskiness of the risk free rates. Hence, under the present study unadjusted treasury bill yield is taken as the risk free rate of return.

(2) Estimated Market Return: For estimating market return, the term market has to be defined. Theoretically, a market represents entire capital market. But, practically it is very difficult to compute market return on the basis of all scrips traded in the market. Hence, return is calculated on the basis of scrips traded in the secondary capital market i.e., the stock exchanges. In India, there are twenty regional stock exchanges in all, registered with Securities and Exchange Board of India (SEBI). The most popular exchange are Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). 5848 companies were listed in BSE whereas 645 companies were listed in NSE as on 31st March 1999. Bombay Stock Exchange (BSE) was established in 1875 as “The Native Share and Stockbrokers Association.” It is a voluntary ‘not for profit’ association. Over the years, the exchange has evolved into its present
status as the Premier Stock Exchange in the country. It is the oldest stock exchange in Asia, generally referred to as the gateway to capital market in India. The National Stock Exchange (NSE) was founded as a public limited company, owned by the leading institutional investors in the country. The different characteristic of NSE is that, membership of exchange here does not means ownership of the exchange. The ownership and management of the exchange is completely separated from the right to trade on NSE. The exchange is well managed by a Board of Directors. Decisions regarding market operations are delegated by the Board to an Executive Committee comprises representatives from the trading members, the public and the management.

Traditionally, stock indices are considered as market proxies. To calculate market return a broad-based index should be selected. Each and every stock exchange maintains an index of shares traded. The performance of individual scrips is compared with that of index. The index of stock market captures the behaviour of the overall equity market. Movements of the index should represent the returns obtained by “typical” portfolios in the country. Every stock price moves because of two possible reasons: news about the company or news about the nation. The job of an index is to capture the movements of the stock market as a whole. This purpose is achieved by averaging. Each stock
contains a mixture of stock news and index news. While averaging the return on many stocks, the individual stock news tends to cancel out. On a particular day, there would be good stock-specific news for a few companies and bad stock-specific news for the others. These variations will cancel out in a good index and the only things left would be the news that is common to all stocks. That is what the index would capture. Thus ‘market return’ refers to the return as depicted by the most representative index. The popular stock indices in India are BSE Sensitive Index (SENSEX). BSE-100 Index, BSE-200 Index, NSE NIFTY index, other indices are DEFTY, CRISIL 500 Equity Index, NIFTY Junior, CRISIL MIDCAP 200, CRISIL PSE, CRISIL IBG, CRISIL MNC etc.

While the price information flow from both NSE and BSE is fast, regular and electronic, the BSE SENSEX has been chosen as an appropriate index for the following reasons:

(a) NSE does not provide information on corporate actions viz, dates of scrips being traded ex-bonus, ex-rights, ex-dividend etc. However such information is available in NSE and its trading workstations, it is not disseminated as part of its price distribution mechanism at the end of the day.

(b) The BSE provide a longer time series of price data than NSE.
(c) More companies are traded on BSE as compared to NSE.

There is no unanimity of opinion regarding estimating expected market return on a portfolio. A definite computational methodology is important for estimating such return in order to find out opportunity cost of equity under Capital Asset Pricing Method (CAPM). On the basis of researches carried out in developed countries, it has been proved that CAPM gives a more reliable estimate of equity cost inspite of its limitation of assuming beta (β) to represent the entire market risk. But CAPM may give a totally biased and misleading equity cost if expected market return (R_m) is not calculated properly. In fact a wrong estimation of market return may put the cost of equity to less than the risk-free rate of return (R_f).

An expected market return depends basically on the size and quality of the portfolio. However, it is not guaranteed that if the size of the portfolio is increased, expected return of the portfolio would be more smoothened. To obtain a representative market return, the portfolio should consist of actively traded shares. A theoretically correct market portfolio is one, which covers all the stocks, bonds, real estate and any other marketable risky asset. But it is practically not possible to form such type of market portfolio.
As BSE SENSEX is the most popular market index, the representative market return is computed taking BSE SENSEX as the market proxy. Market return for any particular period is calculated as
\[
\left(\frac{P_t - P_{t-1}}{P_{t-1}}\right) \times 100
\]
where \(t\) is the period and \(P\) represents closing index value. For calculation of market return, monthly index values are considered instead of daily, weekly or quarterly.

(3) Corporate Beta Estimation: The key variable in formula of CAPM is beta (\(\beta\)) - a statistical measure of risk. In fact, beta is a measure of exposure to systematic risk. A security’s systematic risk, as measured by beta, is the sensitivity of its return in relation to the risk of a diversified portfolio which is commonly referred to as the market portfolio or market. In other words, beta is a measure of the volatility of a security’s return relative to the returns of a broad-based market portfolio. It is an index of the degree of responsiveness of return on an investment with the market return. Securities having high betas exaggerate general market developments, performing exceptionally well when the market goes in positive direction and exceptionally poor when the goings in the market are downward. The beta is statistically measured by following formula:

\[
\beta = \frac{\text{Co-variance} (R_j, R_m)}{\text{Variance}(R_m)}
\]
Beta is computed on the basis of monthly returns on a scrip and monthly return on SENSEX. Monthly returns are calculated on adjusted closing prices as follows:

\[
\text{Return on scrip } j \ (R_{jt}) = \frac{\text{Adjusted closing price of } j \text{ in month } (t) - \text{Adjusted closing price of } j \text{ in month } (t-1)}{\text{Adjusted closing price of } j \text{ in month } (t-1)}
\]

\[
\text{Return on SENSEX } (R_{mt}) = \frac{\text{Closing value of SENSEX in month } (t) - \text{closing value of SENSEX in month } (t-1)}{\text{closing value of SENSEX in month } (t-1)}
\]

For a publicly traded company, beta can be estimated by observing the relationship between that company’s Stock Price and Market Movements. This estimate of beta can be computed from a regression relationship based on a series of past stock prices and market returns. The beta of a stock is greater (less) to the extent that the excess stock return is greater (less) than the excess return on the market.\(^{12}\)

At a beta coefficient of one, investors expect an average return. In other words, a beta of one indicate that the risk of the specified security is equal the market i.e. the price of the security has moved in proportion to the movement of the market. A zero coefficient indicates that there is no market related risk to the investment. A low beta coefficient is safe

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when there is a downfall in the market. While if market is surging up, a low beta indicates low return of the security. A scrip, which is not traded regularly, normally has low beta which represents docile securities. A negative beta implies that the price of the security is moving opposite to the market. If market is moving up, negative beta indicates that the return on the security is falling and vice-versa. Beta of a company also depends on the degree of leverage used. Higher degree of financial leverage increases the volatility of profits and pushes a company’s share further high on the risk map. As a result, the company’s beta increases and so is its cost of equity.

(4) Estimated Risk Premium : Risk premium is the difference between the market return ($R_m$) and the risk-free rate of return ($R_f$). To find out return on equity shares, expected risk premium should be considered. The expected risk premium of 5.01, the difference between market return (15.03%) and the risk free rate of return (10.02) has been consistently taken for the purpose of present study.

Thus modified WACC = $K_d \times (\text{Beginning total borrowings/Beginning invested capital}) + K_e \times (\text{Beginning net worth/Beginning invested capital})$.

where invested capital = Beginning total borrowings + Beginning net worth.
COMPUTATION AND ANALYSIS OF EVA IN SELECTED POWER COMPANIES UNDER STUDY

NTPC Limited

The Table 5.1 shows EVA computation of NTPC Limited for the period under study from 2007-08 to 2011-12.

From Table 5.1, it can be seen that average capital employed in NTPC Ltd. had an increasing trend throughout the period under study. It was Rs. 83177.60 crore in 2007-08 which increased to Rs. 96230.20 crore in 2008-09, to Rs. 106756.30 crore in 2009-10, to Rs. 119153.33 crore in 2009-10 and further inclined up to Rs. 132307.30 crore in the final year 2011-12.

Average debt to total capital ratio also showed an increasing trend throughout the period under study. In 2007-08, it was 36.45 percent which increased to 40.34 percent in 2008-09, 41.35 percent in 2009-10, 42.61 percent in 2010-11 and reached up to 43.86 percent in the year 2011-12.

Beta variant for NTPC Ltd. had an increasing trend except in the year 2010-11. It was 0.71 in 2007-08 which increased to 0.75 in 2008-09 and reached to 0.76 in 2009-10. Then it came down slightly to 0.72 in 2010-11 but increased and reached to 0.78 finally in 2011-12. The Beta
variant was below 1.00 all the time for NTPC Ltd. from 2007-08 to 2011-12 which indicate that it fluctuate lesser than market variations.

Cost of equity was constant for NTPC during the period under study at 824.55 percent as there was no change in equity shareholding numbers in this duration.

Cost of debt showed a decreasing trend except in the year 2011-12 for NTPC Ltd. It was highest at 4.29 percent in 2007-08 which decreased to 3.82 percent in 2008-09, to 3.30 percent in 2009-10 and came down to 2.38 percent in 2010-11. Finally, it increased and reached to 2.57 percent in the year 2011-12.

Weighted Average Cost of Capital (WACC) for NTPC Ltd. showed a decreasing trend throughout the period under study. It was 83.30 percent initially in 2007-08 which came down sharply to 72.18 percent in 2008-09, decreased further to 65.04 percent in 2009-10, 58.07 percent in 2010-11 and came down to 52.52 percent in the final year 2011-12.

Profit before tax (PBT) was positive and increased continuously except in the year 2008-09. It was Rs. 10351 crore in 2007-08 which decreased to Rs. 9307.30 crore in 2008-09 but increased in the next year 2009-10 to Rs. 11049.10 crore, to Rs. 12392.33 crore in 2010-11 and reached up to Rs. 13137.26 crore in the final year 2011-12.
Cost of capital for NTPC Ltd. showed a fluctuating trend during the period under study. It was Rs. 6928.69 crore in 2007-08 which increased to Rs. 6945.90 crore in 2008-09 but decreased to Rs. 6943.43 crore in 2009-10 and came down to Rs. 96919.23 crore in 2010-11. Finally, it increased sharply up to Rs. 6948.78 in the final year 2011-12.

Economic Value Added (EVA) was positive for the period under study for NTPC Ltd. as can be seen from Table 5.1. It was Rs. 541.21 crore in 2007-08 which increased to Rs. 1146.60 crore in 2008-09, to Rs. 1894.27 crore in 2009-10. Then it again increased to Rs. 2429 crore in 2010-11 and rose finally to Rs. 2865.88 crore in the year 2011-12.

The NTPC Ltd. earned profit during the period under study and EVA was positive throughout this period which shows that the company created large economic value for its shareholders. It is therefore, suggested that company should maintain this performance and profitability which is much favourable for its shareholders’ wealth.

Rural Electrification Corporation (REC) Limited

Table 5.2 shows EVA computation of REC Limited for the period under study from 2007-08 to 2011-12.
From this table, it can be seen that average capital employed in REC Ltd. had an increasing trend throughout the period under study. It was Rs. 39652.14 crore in 2007-08 which increased to Rs. 51129.16 crore in 2008-09, to Rs. 67052.46 crore in 2009-10, to Rs. 74050.51 crore in 2009-10 and further inclined up to Rs. 91447.84 crore in the final year 2011-12.

Average debt to total capital ratio showed a fluctuating trend during the period under study. In 2007-08, it was 86.46 percent which increased slightly to 87.89 percent in 2008-09 but decreased to 83.44 percent in 2009-10 and came down to 82.68 percent in 2010-11. Finally, it increased marginally and reached up to 83.81 percent in the year 2011-12.

Beta variant for REC Ltd. had a fluctuating trend during studied period. It was 1.57 in 2007-08 which decreased to 1.51 in 2008-09 but then increased to 1.56 in 2009-10 and rose up to 1.59 in 2010-11. Finally, it declined slightly to 1.58 in the year 2011-12. The Beta variant was above 1.00 all the time for REC Ltd. from 2007-08 to 2011-12 which indicate that it fluctuate more than market variations.

Cost of equity was constant for REC Ltd. for 2007-08 to 2008-09 at 85.87 percent. Then it increased to 98.75 percent for rest of the period under study i.e. from 2009-10 to 2011-12.
Cost of debt showed an increasing trend throughout the period under study for REC Ltd. It was lowest at 4.21 percent in 2007-08 which increased to 4.50 percent in 2008-09, to 4.87 percent in 2009-10, to 5.55 percent in 2010-11 and finally increased and reached to 5.83 percent in the year 2011-12.

Weighted Average Cost of Capital (WACC) for REC Ltd. showed an increasing trend throughout the period under study except in the year 2008-09. It was highest 15.32 percent initially in 2007-08 which came down sharply to 5.39 percent in 2008-09. Then it increased to 5.51 percent in 2009-10, 5.91 percent in 2010-11 and reached up to 5.96 percent in the final year 2011-12.

Table 5.2 shows that Profit before tax (PBT) was positive all the time and increased continuously during the period under study. It was Rs. 1315.12 crore in 2007-08 which increased to Rs. 1922.37 crore in 2008-09, to Rs. 2680.75 crore in 2009-10, to Rs. 3498.80 crore in 2010-11 and reached up to Rs. 3825.80 crore in the final year 2011-12.

Cost of capital for REC Ltd. showed an increasing trend during the period under study. It was Rs. 607.47 crore in 2007-08 which increased sharply to Rs. 2755.86 crore in 2008-09, to Rs. 3694.59 crore in 2009-10, to Rs. 4376.38 crore in 2010-11. Finally, it increased and reached up to Rs. 5450.29 in the year 2011-12.
Economic Value Added (EVA) was positive only for 2007-08. It was Rs. 254.46 crore in 2007-08 after that it came negative for the remaining period. In 2008-09, it was Rs. -1482.33 crore which decreased to Rs. -1672.34 crore in 2009-10, Rs. -1791.49 crore in 2010-11 and finally came down to Rs. -2611.63 crore in 2011-12.

The REC Ltd. earned profit during the period under study but the increment in profit per year was moderate. On the other hand, cost of capital increased rapidly after 2007-08 and resultantly, EVA became negative afterwards which shows that the company lost economic value for its shareholders in this period. It is therefore, suggested that company should improve the performance and profitability for its shareholders’ wealth.

Power Grid Limited

The Table 5.3 shows EVA computation of Power Grid Limited for the period under study from 2007-08 to 2011-12.

From this Table, it can be seen that average capital employed in Power Grid Ltd. had an increasing trend throughout the period under study. It was Rs. 35763.66 crore in 2007-08 which increased to Rs. 43083.52 crore in 2008-09, to Rs. 50355.13 crore in 2009-10, to Rs. 65208.63 crore in 2009-10 and further inclined up to Rs. 78837.34 crore in the final year 2011-12.
Average debt to total capital ratio also showed an increasing trend during the period under study except in the year 2010-11. In 2007-08, it was 62.25 percent which increased to 66.07 percent in 2008-09 and reached to 68.35 percent in 2009-10. Then it decreased to 67.23 percent in 2010-11 but increased again and reached up to 70.21 percent in the final year 2011-12.

Beta variant for Power Grid Ltd. had a fluctuating trend. It was 0.69 in 2007-08 which increased sharply to 0.87 in 2008-09 which was the highest. After that, it decreased to 0.81 in 2009-10 and further came down to 0.62 in 2010-11. Then it increased to reach at 0.65 finally in 2011-12. The Beta variant was below 1.00 all the time for Power Grid Ltd. from 2007-08 to 2011-12 which indicate that it fluctuated lesser than market variations in this period.

Cost of equity was constant for Power Grid from 2007-08 to 2009-10 at 420.88 percent. It increased up to 462.97 percent in 2010-11 and remained same in the year 2011-12.

Cost of debt showed a decreasing trend for Power Grid Ltd. It was highest at 4.21 percent in 2007-08 which decreased to 4.04 percent in 2008-09, to 3.14 percent in 2009-10, to 2.66 percent in 2010-11 and came down to 2.51 percent in the year 2011-12.
Weighted Average Cost of Capital (WACC) for Power Grid Ltd. showed an increasing trend throughout the period under study except in 2010-11. It was 2.62 percent initially in 2007-08 which increased to 2.67 percent in 2008-09 and reached to 2.90 percent in 2009-10. Then it came down sharply to 1.79 percent in 2010-11 but inclined up to 2.89 percent in the final year 2011-12.

Profit before tax (PBT) was positive and increased continuously during the period under study. It was Rs. 1730.53 crore in 2007-08 which increased to Rs. 2228.57 crore in 2008-09, to Rs. 2626.32 crore in 2009-10, to Rs. 3829.29 crore in 2010-11 and reached up to Rs. 4689.66 crore in the final year 2011-12.

Cost of capital for Power Grid Ltd. showed an increasing trend during the period under study except in the year 2010-11. It was Rs. 937.01 crore in 2007-08 which increased to Rs. 1150 crore in 2008-09 and reached up to Rs. 1460.30 crore in 2009-10. Then it came down to Rs. 1167.23 crore in 2010-11 but increased sharply up to Rs. 2282.34 crore in the final year 2011-12.

Economic Value Added (EVA) was positive for the period under study for Power Grid Ltd. and increased during the period under study except in 2011-12 as can be seen from Table 5.3. It was Rs. 511.46 crore
in 2007-08 which increased to Rs. 540.61 crore in 2008-09, to Rs. 580.64 crore in 2009-10. Then it again increased sharply to Rs. 1504.68 crore in 2010-11 but declined up to Rs. 1020.65 crore in the final year 2011-12.

The Power Grid Ltd. earned profit during the period under study and EVA was positive throughout this period which shows that the company created large economic value for its shareholders. It is therefore, suggested that company should maintain this performance and profitability which is favourable for its shareholders’ wealth.

Birla Power Limited

The Table 5.4 shows EVA computation of Birla Power Limited for the period under study from 2007-08 to 2011-12.

From this Table, it can be seen that average capital employed in Birla Power Ltd. had an increasing trend throughout the period under study. It was Rs. 282.81 crore in 2007-08 which increased to Rs. 291.39 crore in 2008-09, to Rs. 375.36 crore in 2009-10, to Rs. 564.99 crore in 2009-10 and further inclined up to Rs. 616.19 crore in the final year 2011-12.

Average debt to total capital ratio showed a fluctuating trend throughout the period under study. In 2007-08, it was 32.05 percent
which increased slightly to 32.69 percent in 2008-09 but decreased to 27.68 percent in 2009-10 and came down rapidly to 7.53 percent in 2010-11. Finally, it increased up to 10.71 percent in the year 2011-12.

Beta variant for Birla Power Ltd. had a fluctuating trend during studied period. It was 0.51 in 2007-08 which increased to 0.55 in 2008-09 but decreased to 0.52 in 2009-10. Then it increased again to 0.59 in 2010-11 but declined and came down finally to 0.53 in the year 2011-12. The Beta variant was below 1.00 all the time for Birla Power Ltd. from 2007-08 to 2011-12 which indicate that it fluctuate lesser than market variations.

Cost of equity was 0.42 percent for 2007-08 and 2008-09. Then it increased to 0.72 percent in 2009-10 and reached to 2.14 percent in 2010-11 which remained same in the next year 2011-12 also.

Cost of debt showed an increasing trend except in the year 2011-12 for Birla Power Ltd. It was lowest at 7.42 percent in 2007-08 which increased to 10.74 percent in 2008-09, to 12.27 percent in 2009-10 and reached up to 38.62 percent in 2010-11. Finally, it declined and came down to 29.98 percent in the year 2011-12.

Weighted Average Cost of Capital (WACC) for Birla Power Ltd. showed an increasing trend throughout the period under study except in
the year 2009-10. It was 2.44 percent initially in 2007-08 which increased to 3.57 percent in 2008-09 but decreased to 3.53 percent in 2009-10. Then it increased to 3.72 percent in 2010-11 and further inclined up to 3.95 percent in the final year 2011-12.

Profit before tax (PBT) was positive but showed fluctuating trend. It was Rs. 8.58 crore in 2007-08 which decreased to Rs. 7.82 crore in 2008-09 and further came down to Rs. 2.98 crore in 2009-10. Then it increased to Rs. 10.09 crore in 2010-11 but declined to Rs. 8.61 crore in the final year 2011-12.

Cost of capital for Birla Power Ltd. showed an increasing trend during the period under study. It was Rs. 6.90 crore in 2007-08 which increased to Rs. 10.40 crore in 2008-09, to Rs. 13.25 crore in 2009-10, to Rs. 21.02 crore in 2010-11 and finally, it reached up to Rs. 24.34 crore in the year 2011-12.

Economic Value Added (EVA) was Rs. 0.03 crore in 2007-08 which was the only positive value for the period under study for Birla Power Ltd. as can be seen from Table 5.4. It came down to Rs. -6.32 crore in 2008-09, to Rs. -11.23 crore in 2009-10, to Rs. -13.47 crore in 2010-11 and further declined to Rs. -19.05 crore in the year 2011-12.
The Birla Power Ltd. earned little profit during the period under study with fluctuating trend and on the other hand, cost of capital for company increased continuously and in large amount hence, EVA was positive (only Rs. 0.03 crore) in 2007-08 and then it was negative throughout remaining period under study which shows that the company not created economic value for its shareholders. It is therefore, suggested that company should improve its performance and profitability which is must for its shareholders’ wealth.

From this EVA analysis of the selected companies, it can be concluded that NTPC added highest economic value for its shareholders followed by Power Grid. The performance and profitability of these companies can be said satisfactory. On the other hand, REC and Birla Power showed negative EVA most of the time, so their performance and profitability were not up to the mark and serious attempts for improvement is required for these companies.

RATIO ANALYSIS OF ECONOMIC VALUE ADDED

EVA to Capital Employed

EVA as a Percentage of Average Capital Employed : Economic Value Added as a percentage of Capital Employed (EVACE) shows the relationship between EVA and average capital employed in the business.
It is termed as relative measure as the EVA and capital employed are associated with each other to a great extent. A slight increase or decrease in the capital employed will show a corresponding increase or decrease in the quantum of EVA. A higher EVACE signifies a greater profitability and popularity of the company among the perspective investors. This ratio has been calculated by using the following formula

$$EVACE = \frac{\text{Economic Value Added}}{\text{Average Capital Employed}} \times 100$$

The EVA as a percentage of average capital employed of the companies under study has been shown in the following table:

Table 5.5
EVA as a Percentage of Capital Employed
(From 2007-08 to 2011-12)
(Ratio in Percentage)

<table>
<thead>
<tr>
<th>Year</th>
<th>NTPC</th>
<th>RECL</th>
<th>Power Grid</th>
<th>Birla Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-08</td>
<td>0.65</td>
<td>0.64</td>
<td>1.43</td>
<td>0.01</td>
</tr>
<tr>
<td>2008-09</td>
<td>1.19</td>
<td>-2.90</td>
<td>1.25</td>
<td>-2.17</td>
</tr>
<tr>
<td>2009-10</td>
<td>1.77</td>
<td>-2.49</td>
<td>1.15</td>
<td>-2.99</td>
</tr>
<tr>
<td>2010-11</td>
<td>2.04</td>
<td>-2.42</td>
<td>2.31</td>
<td>-2.38</td>
</tr>
<tr>
<td>2011-12</td>
<td>2.17</td>
<td>-2.86</td>
<td>1.29</td>
<td>-3.09</td>
</tr>
<tr>
<td>Average</td>
<td>1.56</td>
<td>-2.01</td>
<td>1.49</td>
<td>-2.13</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.57</td>
<td>1.34</td>
<td>0.42</td>
<td>1.12</td>
</tr>
<tr>
<td>C.V. (%)</td>
<td>36.22</td>
<td>-66.68</td>
<td>28.18</td>
<td>-52.88</td>
</tr>
</tbody>
</table>

Source: Annual Reports & Accounts of the Companies under study for the period from 2007-08 to 2011-12.
It can be noted from the Table 5.5 that the EVACE of NTPC showed an increasing trend during the whole period of study as the EVACE during 2007-08 was 0.65 percent kept on increasing and reached to 2.17 percent in 2011-12. The increasing trend was because of the increasing trend of EVA and average capital employed during the whole period of study. The increasing trend of the ratio shows a good performance of the business of the company. The average of the EVACE was 1.56 percent which 36.22 percent as coefficient of variation showing a fluctuating trend due to increasing trend of the ratio during the period of study. However, it is suggested that the management of the company should try to maintain it in future also.

In case of RECL, the EVACE showed a decreasing trend during the whole period of study. During the year 2007-08, the EVACE was 0.64 percent which decreased to 2.90 (negative) percent in 2008-09 and finally came down to 2.86 (negative) percent in 2011-12. The average of the EVACE for the period of study was -2.01 percent which is highly unfavourable for the company and shows that the company failed to create value for the shareholders. It also denotes a very poor performance of the company.

For Power Grid, the EVACE showed a mixed fluctuating trend during the whole period of study and fluctuated within the range of 2.31
percent in 2010-11 to 1.15 percent in 2009-10. The average of the EVACE for the period of study was 1.49 percent which cannot be regarded satisfactory but however, positive value can be regarded satisfactory. The management of the company should try to control the decreasing trend of the EVACE. The EVACE was on decreasing trend during the first three years of study because the EVA did not increase in the same proportion of increasing trend of the average capital employed. The coefficient of variation was 28.18 percent showing a fluctuating trend which should be controlled.

The EVACE for Birla Power showed a highly poor position because the EVACE during the whole period of study was negative except 0.01 percent in 2007-08 which shows that the management of the company failed to make an optimum use of the average capital employed to generate economic value added for the shareholders. The EVA of Birla Power showed a decreasing trend while the average capital employed of the company showed an increasing trend during the whole period of study. The average was also negative. It is suggested that the management of the company should try to generate the value for its shareholders to remain in the market otherwise the shareholders may withdraw their investments.

Among all the companies under study, the EVACE can be regarded satisfactory for NTPC and Power Grid because in these companies the
EVACE was positive but for RECL and Birla Power, the EVACE was not at all good because it was negative during the whole period of study denoting that the management of the company failed to create value for their shareholders.

Two Way Analysis of Variance (F-Test)

To test the significance of EVA as a percentage of Capital Employed of the companies under study, F-test has been applied and following hypothesis has been tested:

(i) Null Hypothesis \( (H_0) \): There is no significant difference in the EVA as a percentage of Capital Employed of the companies under study.

(ii) Null Hypothesis \( (H_0) \): There is no significant difference in the year-wise EVA as a percentage of Capital Employed of the companies under study.

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum</th>
<th>Degree of Freedom (d.f.)</th>
<th>Variance (Sum/d.f)</th>
<th>F-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Companies (SSC)</td>
<td>64.49</td>
<td>(c-1)=(4-1)=3</td>
<td>21.50</td>
<td>( F=20.87 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Between Companies)</td>
</tr>
<tr>
<td>Within Companies (SSR)</td>
<td>5.73</td>
<td>(r-1)=(5-1)=4</td>
<td>1.34</td>
<td>( F=1.30 )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Within Companies)</td>
</tr>
<tr>
<td>Error</td>
<td>12.37</td>
<td>(c-1)(r-1)=12</td>
<td>1.03</td>
<td></td>
</tr>
</tbody>
</table>
(i) F-Test Between the Companies

\[ F = \frac{\text{Higher Variance}}{\text{Smaller Variance}} = \frac{21.50}{1.03} = 20.87 \]

Critical value of F at 5 percent level of significance \((V_1 = 3\) and \(V_2 = 12\)) is 3.49

Decision: Since the calculated value of F is more than the critical value of F at 5 percent level of significance, therefore the null hypothesis is rejected and it is concluded that the year wise difference in the EVA as a percentage of Capital Employed of the companies under study is significant.

(ii) F-Test within the Companies

\[ F = \frac{\text{Higher Variance}}{\text{Smaller Variance}} = \frac{1.34}{1.03} = 1.30 \]

Critical value of F at 5 percent level of significance \((V_1 = 12\) and \(V_2 = 4\)) is 5.91

Decision: Since the calculated value of F is less than the critical value of F at 5 percent level of significance, therefore the null hypothesis is accepted and it is concluded that the difference in the EVA as a percentage of Capital Employed of the companies under study is not significant.
EVA per Share

Economic Value Added (EVA) per Share: EVA per share helps in determining the additional earnings available to equity shareholders on per share basis. It can be used to determine the profitability of the business concern from the viewpoint of the shareholders. In the present study, the EVA per share has been calculated by using the following formula:

\[
\text{EVA per share} = \frac{\text{Economic Value Added}}{\text{Number of Equity Shares}}
\]

The EVA per share of the Power Companies under study has been shown in the following table:

Table 5.7
Economic Value Added (EVA) per share
(From 2007-08 to 2011-12)
(Amount in Rupees)

<table>
<thead>
<tr>
<th>Year</th>
<th>NTPC</th>
<th>RECL</th>
<th>Power Grid</th>
<th>Birla Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-08</td>
<td>0.66</td>
<td>2.96</td>
<td>1.22</td>
<td>0.01</td>
</tr>
<tr>
<td>2008-09</td>
<td>1.39</td>
<td>-17.26</td>
<td>1.28</td>
<td>-1.49</td>
</tr>
<tr>
<td>2009-10</td>
<td>2.30</td>
<td>-16.94</td>
<td>1.38</td>
<td>-1.57</td>
</tr>
<tr>
<td>2010-11</td>
<td>2.95</td>
<td>-18.14</td>
<td>3.25</td>
<td>-0.63</td>
</tr>
<tr>
<td>2011-12</td>
<td>3.48</td>
<td>-26.45</td>
<td>2.20</td>
<td>-0.89</td>
</tr>
<tr>
<td>Average</td>
<td>2.15</td>
<td>-15.17</td>
<td>1.87</td>
<td>-0.91</td>
</tr>
<tr>
<td>S.D.</td>
<td>1.02</td>
<td>9.72</td>
<td>0.78</td>
<td>0.58</td>
</tr>
<tr>
<td>C.V.(%)</td>
<td>47.45</td>
<td>-64.09</td>
<td>41.69</td>
<td>-63.51</td>
</tr>
</tbody>
</table>

Source: Annual Reports & Accounts of the Companies under study for the period from 2007-08 to 2011-12.
It is evident from the Table 5.7 that the EVA per share of NTPC showed an increasing trend during the whole period of study. Initially during 2007-08, the EVA per share was Rs. 0.66 per share which continuously kept on increasing and increased to Rs. 3.48 per share in 2011-12. The average of the EVA per share in NTPC was Rs. 2.15 which is though not high but shows a satisfactory position as it registered an increasing trend. The coefficient of variation was 47.45 percent showing a fluctuating trend which should be controlled by the management of the company.

The EVA per share in RECL showed a decreasing trend throughout the period under study because during the period under study the EVA per share was negative except in the year 2007-08 when it was Rs. 2.96. It was lowest at Rs. -26.45 in the year 2011-12. The decreasing trend of the EVA per share shows that the company has destroyed the value of the shareholders which should be improved by the management of the company.

The EVA per share in Power Grid showed an increasing trend during the whole period of study except in the year 2011-12. Initially during 2007-08, the EVA per share was Rs. 1.22 increased to Rs. 1.28 per share in 2008-09, to Rs. 1.38 per share in 2009-10 and to Rs.3.25 per
share in 2010-11 but it decreased to Rs. 2.20 per share in 2011-12. The average of the EVA per share was Rs. 1.87 which is though not satisfactory but increasing trend of the EVA per share can be regarded favourable for the company as it generates trust among the shareholders. The coefficient of variation was 41.69 percent showing a fluctuating trend which should be controlled.

The EVA per share in Birla Power showed a decreasing trend during the whole period of study. During the year 2007-08, the EVA per share was Rs. 0.01 which is quite negligible and then after it continuously showed a decreasing trend and came down to Rs. -0.91 per share. The negative EVA per share was because of the negative EVA of the company during the whole period of study. This situation cannot be regarded favourable for the company because it is losing the trust and confidence of the shareholders as the company has not generated any value for the shareholders. It is suggested that the management of the company should try to generate the EVA and convert the EVA per share positive.

Two Way Analysis of Variance (F-Test)

To test the significance of Economic Value Added per share of the companies under study F-test has been applied and following hypotheses have been tested:
(i) Null Hypothesis \((H_0)\) : There is no significant difference in the Economic Value Added per share of the companies under study.

(ii) Null Hypothesis \((H_0)\) : There is no significant difference in the year-wise Economic Value Added per share of the companies under study.

Table 5.8
ANOVA TABLE

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum</th>
<th>Degree of Freedom (d.f.)</th>
<th>Variance (Sum/d.f)</th>
<th>F-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Companies (SSC)</td>
<td>1013.12</td>
<td>(c-1)= (4-1)=3</td>
<td>337.71</td>
<td>F=10.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Between Companies)</td>
</tr>
<tr>
<td>Within Companies (SSR)</td>
<td>100.55</td>
<td>(r-1)= (5-1)=4</td>
<td>25.14</td>
<td>F=1.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Within Companies)</td>
</tr>
<tr>
<td>Error</td>
<td>381.66</td>
<td>(c-1)(r-1)=12</td>
<td>31.80</td>
<td></td>
</tr>
</tbody>
</table>

(i) F-Test Between the Companies

\[
F = \frac{\text{Higher Variance}}{\text{Smaller Variance}} = \frac{337.71}{31.80} = 10.62
\]

Critical value of \(F\) at 5 percent level of significance \((V_1 = 3\) and \(V_2 = 12\) is 3.49

Decision: Since the calculated value of \(F\) is more than the critical value of \(F\) at 5 percent level of significance, therefore the null hypothesis is rejected and it is concluded that the difference in the Economic Value Added per share of the companies under study is significant.
(ii) F-Test within the Companies

\[ F = \frac{\text{Higher Variance}}{\text{Smaller Variance}} = \frac{31.80}{25.14} = 1.26 \]

Critical value of F at 5 percent level of significance \((V_1 = 12\) and \(V_2 = 4)\) is 3.26

Decision: Since the calculated value of F is less than the critical value of F at 5 percent level of significance, therefore the null hypothesis is accepted and it is concluded that the difference in the Economic Value Added per share of the companies under study is not significant.

From this whole EVA analysis of the companies under study, it is clear that NTPC and Power Grid are beneficial from shareholders’ point of view whereas RECL and Birla Power need improvement in their performance.

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