

A Study on Accounting Ratio Analysis of Bombay Stock Exchange Companies

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ABSTRACT

The paper attempts to analyze the financial statements and measure the performance in terms of assets utilization, and profitability. Thoroughly the research methodology used for the study that focuses on the past and present performance of companies. The study is conducted purely based on secondary data obtained through websites. By using the ratio analysis tool, we can analyze the performance of firm's and we can easily find out the strength and weakness of the company and their position in the market. Different ratios are used in this study and particularly those which were collected for a period of five years 2015-2019 from the audited annual reports of the companies and maintained and provided by several organizations. And Bombay Stock Exchange (BSE) for the purpose of effective periodical analysis is used and from them ratios are calculated so according to which we can easily compare the performance. The paper used accounting ratios and annual report analysis of companies. Namely, profitability ratios, which might affect the financial performance of the firms. Ratio analysis has been done to analyze and compare the performance trends over several years. Different ratios such as; Price to Earnings Ratio (P/E), Price to Book value Ratio (P/B), Price to Sales Ratio (P/S), Return on Equity (ROE), Return on Assets (ROA), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and amortization Ratio (EV/EBITDA) are being calculated in order to study the financial position of the firms. And also, to find the relation of each ratio on one another using correlation test. This study would provide a direction to companies and to other companies so as to efficiently manage and maintain working capital requirements in order to improve the profitability position. In conclusion, ROE is the most comprehensive measure of profitability of a firm; it considers the operating and investing decisions made as well as the financing and tax related decisions.

Key words: Financial Performance, Profitability, Accounting Ratio Analysis, Correlation, and Regression Analysis.

1. INTRODUCTION:

Financial performance analysis is the process of identifying the financial strengths and weaknesses of the firm by properly establishing the relationship between the items of balance sheet and profit and loss account. It also helps in short-term and long-term forecasting and growth can be identified with the help of financial performance analysis. The dictionary meaning of 'analysis' is to resolve or separate a thing into its components parts for tracing their relation to the things as whole and to each other. The analysis of financial statement is a process of evaluating the relationship between the component parts of financial statement to obtain a better understanding of the firm's position and performance. This analysis can be undertaken by management of the firm or by parties outside the namely, owners, creditors, investors. For the large, medium or small-scale organizations, huge analysis work has been done on the working capital management, effective assets utilization, profitability practices. Analysis work has been carried using survey or by empirical approach to determine relationship between working capital and profitability of the organization. A sound financial performance enables a firm to attain profitability, market share and sustainable competitive advantage for its survival and growth. Financial performance evaluations are process of determining the financial health of a concern from different angles, identifying its strengths and weaknesses and suggesting ways for improvement in its future workings. Financial performance measures evaluate how well a company is using its resources to make profit. The present study has been conducted to evaluate financial performance of the firms. Which are public sector enterprises in respective Indian industry and largest producer in India.

2. REVIEW OF LITERATURE:

(Mr. Manjunath Awalakki. and Dr. Archanna H. N. 2021), The findings of paper are significant as far as framing investment strategies techniques and to predict market efficiencies. (Cohn & Pringle, 1975), Research study is also connecting the similar related situation that very less scholarly efforts have been made to relate long term investment strategy and various financial models in context to study short-term working capital management decisions. Thus, there is a huge research gap found in finance area. And scholars must make some efforts

to study the short-term strategic decision making related to finance like management of working capital. (Grass, 1972), Research works also depict the similar situation and reported the cause of many business failures due to mismanagement of working capital like insufficient working capital hindering the day-to-day business activities and over use of scarce resources resulting in excess of working capital both situations are hazardous for survival, Existence & growth of business. For small & medium scale organization working capital is a factor of high concern as it is only the deciding factor for the success or failure. (Gitman, 1982), Stated that working capital of firm is crucial deciding factor for any firm's return, risk and their share value. Many researchers are being done which are studying capital budgeting decision, dividend paying capability, capital structure, long term decision making which the researchers on short term investment avenues such as importance of current assets, working capital management is still lacking. Inventory management is also considered as optimal decision as it may result in reduction for many irrelevant costs. And also reduce disruption in the day to day working activities and save business from any uncertain mishappening. (Sharma Nishi, 2011), Studied the financial performance of passenger and commercial vehicle segment of the automobile industry in the terms of four financial parameters namely liquidity, profitability, leverage and managerial efficiency analysis for period of decade from 2001-02 to 2010-11. The study concludes that profitability and managerial efficiency of Tata motors as well as Mahindra & Mahindra Ltd are satisfactory but their liquidity position is not satisfactory. (Deloof, 2003, Yadav et al., 2009, Singh and Pandey, 2008, Vishnani et al., 2007, and Surendra et al., 2001), All researchers studied the relationship between working capital management & profitability of firm and reported that the organization with less profits require more time to pay their debts resulting in high creditors turnover period. A study analyzing working capital management is also conducted on various oil companies like BPCL, IOCL, HPCL conducted over the years from 1988 to 1997. (Soenen, 1993), Reported about the cause of short cash conversion cycle as the firm managers always try to collect their cash as soon as possible and delay to pay cash. As the inverse relation of profitability and short-term asset is practically proved. So, to improve profitability position, the firm tries to maintain low amount of short-term assets. As a result, the profits rise but solvency of the firm gets threatened. (Blinber and Mancini, 1991), Reported in their study about the importance of inventory management for firms. As inventory Management has many advantages. As many research works concluded that more the investment in the current assets or more working capital lesser the profitability would be. Thus, firms investing more in current assets such as inventories, debtors, are likely to result in less profitability. Thus, greater the investment in current assets, lower is the risk, and profitability obtained. (Barnor, Charles, 2014), The purpose of this study was to evaluate the relationship between selected macro-variables and stock returns in Ghana Stock Exchange the results revealed that interest rates and money supply has negative correlations and whereas exchange rates have a positive impact on stock returns and inflation rate have a neutral effect on the stock market in Ghana. (Placido M. Menaje, 2012), The paper aims to determine the relationship between earnings per share (EPS) and return on assets (ROA) and have a significant effect on the stock price of the Philippines. The data collected for 2009 for 50 firms from the OSIRIS electronic database. The result showed that the Spearman Rank Correlation showed a strong positive relationship between EPS and share price. Return on assets highlighted that a weak negative relationship with stock prices. (Muhammad Arslan and Rashid Zaman, 2014), the study investigated the influence of dividend yield and PE ratio on stock valuation by taking 111 nonfinancial firms of Karachi Stock Exchange from 1998 to 2008. The results showed that the size of firms and earnings ratios have positive correlations with stock value. (Raymond, Y.C., 2002), the study attempted to evaluate the dividend yield and PE ratio of the companies and fluctuations in property values and dividend yield have a significant effect on PE ratio and changes in PE ratio have a positive effect on stock valuations. (Fama, E, 1970), the role of new information has a significant impact on deciding the quick response in movements of securities prices and prevailing stock prices which have strong fundamentals that have less effect on stock prices. (Hobarth, 2006), The findings revealed firms with low book-to-market ratio, efficient working capital management, low liquidity, more equity, and fewer liabilities, have high income based on Return on Investments. Firms with a low book-to-market ratio, efficient working capital management, more equity and fewer liabilities, low total assets, and high EBIT have better market performance. (Basu, 1977), the study showed that the Economic and Financial performance variable of the PE ratio does not affect the share price. Generally, it looks that the stocks model is different coefficients that have incorrect prices as compared to another type of pricing, and a major contributor in predicting the returns is by investors. (Sareewiwathana, 2014), the paper attempted to study Economic and Financial performance variables like PE, PEG, and PERG ratios for the stock selections PE ratio as has shown that to be a better option for stock screening, and for providing the highest returns during the period tested. (Louis K. C. Chan, Yasushi Hamao, and Josef Lakonishok, 1991), the attempt was made to study the relationship between cross-sectional and stock returns of Japan stocks with earnings yield, the book to returns to cash flow. The findings observed that there exists a positive relationship between stock returns and financial variables among all variables cash flow and book to market ratio are more significant with stock returns. (Ali, Kim Ehab Shelbaya, 2014), The primary objective of the study is to develop the algorithmic financial model to evaluate the earnings, net income, EBDITA, sales, book value with stock returns by using the multilinear regression, the results showed that price to sales and price to book value have a significant relationship with stock returns were as PE ratio, EBDITA ratio and price to Net Income have neutral impact on stock returns. (Hongduo Cao, Tiantian Lin, Ying Li, and Hanyu Zhang, 2019), the forecasting of future stock prices is still a complex method for many investors and researchers. Many experiments were conducted on predicting the future stock prices by taking few independent variables. But very few have come with unique methods that proved to some extent in predicting the prices. (Gupta, 2011), Stock returns are the results of many outcomes and but it is very difficult to predict the future price, one of the influenced factors is financial formations. (Bansal and Gupta, 1985), in their study entitled, "Financial Ratio Analysis and Statistics" progressive that the coefficient of variation in the study period had a wide gap changing between 7.1 per cent and 51.3 per cent for current ratio and ratio of fixed assets to sales. The correlation of gears of short-term liquidity ratio generally low correlation as against long term solvency ratio components but the component Ratio independently keep quite satisfactory correlation in cotton textile industry. The profitability ratio elements in the industry also have quite high correlation in cotton industry as compared to synthetic industry. (Prof. Mr. S. Sabarinathan and Ms. V. Jenifer.), attempt research analyze 5-year balance sheet and profit and loss a/c of

Kaleeswarar Mills B Unit of National Textile Corporation Ltd by using ratio analysis. The objective of their study includes the profitability, cost of goods sold and other experience company overall financial performance of the company. They gave suggestion to the company to concentrate on financial performance, to control the ratio to earn more profit and to improve the absolute liquid asset. (L.C Gupta, 1979) attempted a refinement of Beaver's method with the objective of building a forewarning system of corporate sickness. A simple non-parametric test for measuring the relative differentiating power of the various financial ratios was used. The test is based on taking a sample of sick and non-sick companies, arraying them by the magnitude of each ratio to be tested, selecting a cut-off point which will divide the array into two classes with the minimum possible number of misclassification and then computing the percentage classification error. The cut-off point is determined by visual inspection. The percentage classification error is determined as number of classifications divided by the number in samples. The ratios will result into the lower percentage classification error are the most efficient ratio.

3. OBJECTIVES OF THE STUDY:

- To bring out the origin and growth of the companies in the country.
- To compare the performance of a companies for different periods.
- To provide information derived from financial statements useful for making projections and estimates for the future.

4. SCOPE OF THE STUDY:

This paper examined the annual reports and financial statements of the companies from 2015-2019 with the help of statistical analysis, the projecting of following years can also be made for particular item such as independent variables and dependent variables. The statistical scrutiny can also be applied to every ratio and by them upon more inclusive results can be obtained. Thus, this study also provides significant information to the management of the companies, for prophesying profit, EPS etc.

5. RESEARCH METHODOLOGY:

The study is purely based on secondary data. The required data were collected from the published annual report of the companies. As the study is based on data analysis and interpretation of financial performance of companies. Annual report from 2015-2019 has taken has taken into consideration so as to study the fiveyears financial performance of companies. Apart from annual reports various journals, articles, magazine, and websites are used for the purpose of data collection. In order to analyze the data both ratio analysis and trend analysis techniques have been used in this research. So, to analyze ratios like Price to Earnings ratio (P/E), Price to Book value (P/B), Price to Sales ratio (P/S), Return on Equity (ROE), Return on Assets (ROA), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and amortization Ratio (EV/EBITDA) has been calculated and for profitability measurement return on investment has been calculated. Correlation test has been applied to test the degree of relationship among working capital ratios & profitability ratios. Thus, further to analyze the combined impact of working capital ratios on profitability ratio multiple regression tests have been employed.

Sample: in this ratio analysis we took 5 companies as sample

- ONGC
- GAIL
- SAIL
- TATA MOTORS LTD
- TATA POWER CO.LTD

Data collection: The evaluation of profitability and financial performance was for period of five years 2015-2019. Necessary data was obtained from the annual reports, namely financial statements, magazine, websites of the company's and published by the Bombay Stock exchange (BSE).

Methods of Analysis and Interpretation: The analysis and interpretation of financial statement is used to determine the financial position and result of operation as well. The following are tools that are used for analyzing the financial position of the company's:

- a. Ratio Analysis,
- b. Comparative balance sheet and profit and loss statement, and trend analysis.

Ratio and Reasons for Using Them: To measure this performance the study focused on profitability and efficiency ratios which enable evaluation of the sources and magnitude of the firm's profit. There are a number of ratios for measuring performance of firms, but the present study has zeroed in on the most popular accounting ratios used for the purpose to make the analysis more meaningful and manageable. The interpretation of the data is extremely important financial tool for each of the activities performed by the organization. The managers use various different ratios to create different policies for financing external as well as focusing on solving problems and specific issues afflicting the organizational performances. Through the interpretation of the data presented in the financial statements; managers, investors, customers, employees and suppliers of financing can account for the performance that the organization shows in the market.

Profitability: Profitability ratios measure the income or operating success of a company for a given period of time, income or the lack of it, affects the company's ability to obtain debt and equity financing, it also affects the liquidity position and the company's ability to grow. As a

consequence, both creditors and investors are interested in evaluating earning power-profitability. It can be measured with respect to return on equity (ROE), return on assets (ROA), and price to earnings ratio (P/E), price to book value ratio (P/B), and price to sales ratio (P/S). Some major ratios that measure operating results.

6. DATA ANALYSIS AND INTERPRETATION:

Ratio Analysis: Ratio analysis is a technique of analysis and interpretation of economic statements. It's the process of determinant and presenting the relationship of items and group of items within the statement.

Data Analysis: The process of assessing data using diagnostic and logical reasoning to examine each component of the data provided. This form of analysis is just one of the many steps that must complete when conducting a research experiment. Data from various sources is assembled, studied, and then analyzed to form some sort of outcome or conclusion.

Statistical techniques: Arithmetic mean, standard deviation, coefficient of variation, coefficient of correlation, regression and student t-test.

6.1. Independent variables: Independent variable is an attribute that can be changed in order to measure the impact on dependent variable. We can use independent variables to assess performance, sales, expenses, profitability and more. Independent variables are identified almost any factor might be an independent variable depending on the dependent variable you're measuring. When it comes to identifying independent variables, you might need to do some hypothesizing. You can probably predict the most influential factors that would impact the dependent variable just by understanding your product, service, market and industry. A sensitivity analysis can be used to measure how sensitive a dependent variable is to changes in an independent variable. Regression analysis helps you identify trends and correlations between variables. The regression value can then be used to forecast how dependent values may change in the future based on changes in independent variables. Current study uses the measures of independent variables they are; ROE (Return on Equity), ROA (Return on Assets), P/E (Price to Earnings ratio), P/B (Price to Book Value ratio), P/S (Price to Sale Revenue ratio).

6.1.1. Return on Equity (ROE): ROE is a measure of financial performance calculated by dividing net income by shareholder's equity. Because shareholder's equity is equal to a company's assets minus its debt, ROE is considered the return on net assets. ROE is considered a gauge of a corporation's profitability and how efficient it is generating profits.

$$ROE = \frac{\text{Net Income}}{\text{Average Shareholder's Equity}}$$

Whether ROE is deemed good or bad will depend on what is normal among a stock's peers. For example, utilities have many assets and debt on the balance sheet compared to a relatively small amount of net income. A normal ROE in the utility sector could be ten percentages or less. A technology or retail firm with smaller balance sheet accounts relative to net income may have normal ROE levels of eighteen or more.

Interpretation: A high ROE suggests that a company's management team is more efficient when it comes to utilizing investment financing to grow their business and is more likely to provide better returns to investors. A low ROE, however, indicates that a company may be mismanaged and could be reinvesting earnings into unproductive assets. The results show that the ROE of ONGCLtd. was 10.16 in 2015 and increased to 14.08 in the year 2019. The results show that the ROE of GAIL (India) Ltd. was 9.29 in 2015 and increased to 14.23 in the year 2019. The results show that the ROE of SAIL Ltd. was 4.65 in 2015 and increased to 5.92 in the year 2019. The results show that the ROE of TATA MOTORS Ltd. was 5.30 in 2015 and decreased to 0 in the year 2019. The results show that the ROE of TATA POWER CO. Ltd. was 1.14 in 2015 and increased to 12.87 in the year 2019.

6.1.2. Return on Assets (ROA): ROA is an indicator of how profitable a corporation is relative to its total assets. ROA offers a manager, investor, or analyst a thought on how economical a company's management is at victimization its assets to gets earnings. ROA is displayed as a percentage, the higher the ROA is the better.

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}}$$

Interpretation: ROA is an important ratio in analyzing a company's profitability. It gives an indication of the capital intensity of the company. It is very industry specific because a capital-intensive industry will possess a high value of fixed assets for its functioning. It is very important to consider the scale of business and operations performed when comparing two different firms using ROA. For instance, a business that is capital intensive and possess high value fixed assets will have a higher assets base as denominator as compared to a similar business with a lower assets base as denominator, even if the two may earn similar income, the business that is more capital intensive may have a lower ROA due to a larger denominator. ROA can also show companies as to how to improve the efficiency of their company and also how they can make better use of their assets. As a general rule, a ROA under five percentage is considered an asset-intensive business while a return of assets above twenty percentage is considered an asset-light business. The results show that the ROA of ONGC Ltd was 5.42

in 2015 and increased to 6.19 in the year 2019. The results show that the ROA of GAIL (India) Ltd. was 4.54 in 2015 and increased to 9.57 in the year 2019. The results show that the ROA of SAIL Ltd. was 1.98 in 2015 and increased to 1.99 in the year 2019. The results show that the ROA of TATA MOTORS Ltd. was 5.30 in 2015 and decreased to 0 in the year 2019. The results show that the ROA of TATA POWER CO. Ltd. was 0.223 in 2015 and increased to 2.80 in the year 2019.

6.1.3.Price to Earnings Ratio (P/E ratio): Is that the ratio for valuing an organization that measures its current share worth relative to its earnings per share (EPS). The ratio is generally called the worth multiple or the earnings multiple. P/E ratios area unit employed by investors and analysts to see the relative worth of a company’s shares in an apples-to-apples comparison. It may also be accustomed compare a corporation against its own history or to match combination markets against each other or over time. P/E may be estimated in a trailing (backward-looking) or forward (projected) basis.

$$P/E \text{ Ratio} = \frac{\text{Market value per share}}{\text{Earnings per share}}$$

It helps investors analyse how much they should pay for a stock on the basis of its current earnings and also shows if the market is overvaluing or undervaluing the company.

Interpretation: consider a company with Earnings=E, Market capitalization Rate=k, Earnings Retention Ratio=b, Divided Payout Ratio=1-b; $P/E = (1-b) / (k-ROE*b)$; Riskier stocks should have higher k hence lower P/E; Companies with higher growth opportunities (ROE) will have higher P/E; Higher plowback increases P/E only if $ROE > k$; P/E proxy for earnings growth. The results show that the P/E of ONGC Ltd. was 9.83 in 2015 and decreased to 6.58 in the year 2019. The results show that the P/E of GAIL (India) Ltd. was 4.38 in 2015 and increased to 11.98 in the year 2019. The results show that the P/E of SAIL Ltd. was 13.68 in 2015 and decreased to 9.45 in the year 2019. The results show that the P/E of TATA MOTORS Ltd. was 13.80 in 2015 and decreased to 0 in the year 2019. The results show that the P/E of TATA POWER CO. Ltd. was 124.25 in 2015 and decreased to 8.47 in the year 2019.

6.1.4. Price to book Value Ratio (P/B ratio): Companies use the P/B ratio to compare a firm’s market capitalization to its book value. It’s calculated by dividing the company’s stock price per share by its book value per share (BVPS). An assets book value is equal to it carrying value on the balance sheet, and companies calculate it netting the asset against its accumulated depreciation. Book value is also the tangible net asset value of a company calculated as total assets minus intangible assets (e.g., patents, goodwill) and liabilities.

$$P/B \text{ Ratio} = \frac{\text{Market price per share}}{\text{Book value per share}}$$

The P/B ratio has been favored by value investors for decades and is widely used by market analysts. Traditionally, any value under 1.0 is considered a good P/B ratio for value investors, indicating a potentially undervalued stock. However, value investors may often consider stocks with a P/B value under 3.0 as their benchmark. The P/B ratio is important because it can help investors to understand whether the market price of a company seems reasonable when compared to its balance sheet.

Interpretation: P/B ratio indicates the inherent value of a company. Many investors have successfully used this to discover dormant stocks, held them over a long term and booked good profits. Though it has its own flaws, it offers an extremely easy tool for identifying clearly under or overvalued companies. The results show that the P/B of ONGC Ltd. was 0.968 in 2015 and decreased to 0.926 in the year 2019. The results show that the P/B of GAIL (India) Ltd. was 0.407 in 2015 and increased to 1.70 in the year 2019. The results show that the P/B of SAIL Ltd. was 0.636 in 2015 and decreased to 0.560 in the year 2019. The results show that the P/B of TATA MOTORS Ltd. was 3.15 in 2015 and decreased to 1.07 in the year 2019. The results show that the P/B of TATA POWER CO. Ltd. was 1.42 in 2015 and decreased to 1.09 in the year 2019.

6.1.5.Price to Sales Ratio (P/S Ratio): The P/S ratio is a valuation ratio that compares a company’s stock price to its revenues. It is an indicator of the value that financial markets have placed on each rupee of a company’s sales or revenues.

$$P/S \text{ Ratio} = \frac{\text{Market value per share}}{\text{Sales per share}}$$

Interpretation: The P/S ratio is of greatest value when it is used for comparing companies within the same sector. The P/S ratio is a key analysis and valuation tool for investors and analysts. The ratio shows how much investors are willing to pay per rupee of sales. It can be calculated either by dividing the company’s market capitalization by its total sales over a designated period or on a per share basis by dividing the stock price by sales per share. Like all ratios, the P/S ratio is most relevant when used to compare companies in same sector. A low ratio may indicate the stock is undervalued, while a ratio that is significantly above the average may suggest overvaluation. The results show that the ROA of ONGC Ltd. was 1.08 in 2015 and decreased to 0.443 in the year 2019. The results show that the P/s of GAIL (India) Ltd. was 0.228 in 2015 and increased to 1.03 in the year 2019. The results show that the P/S of SAIL Ltd. was 0.604 in 2015 and decreased to 0.331 in the year 2019. The results show that the P/S of TATA MOTORS Ltd. was 0.669 in 2015 and decreased to 0.196 in the year 2019. The results show that the P/S of TATA POWER CO. Ltd. was 0.618 in 2015 and increased to 0.693 in the year 2019.

6.2. Dependent variable:A dependent variable is a variable whose value will change depending on the independent variable. It is the variable being tested, and therefore, it is called the dependent variable. Dependent variables are also known as outcome variables or response variables.

6.2.1. Enterprise value to earnings before interest, taxes, and depreciation, amortization ratio (EV/EBITDA): Is a metric used to determine if a stock is priced too high or too low in relation to similar stocks and the market as a whole. The EV/EBITDA ratio is similar to the price to earnings ratio; however, it makes up for certain shortcomings of the latter ratio. Used in Relative business valuation models, the ratio is used to compare two companies with similar financial, operating, and ownership profiles.

$$EV/EBITDA = \frac{\text{Enterprise value}}{EBITDA}$$

Interpretation: Though less commonly used than EV/EBITDA is an important ratio when it comes to valuation. It can be used to determine a target price in an equity research report or value a company compared to its peers. The major difference between the two ratios is EV/EBIT inclusion of depreciation and amortization. It is useful for capital-intensive businesses where depreciation is a true economic cost. The results show that the EV/EBITDA of ONGC Ltd. was 4.27 in 2015 and decreased to 3.62 in the year 2019. The results show that the EV/EBITDA of GAIL (India) Ltd. was 4.41 in 2015 and increased to 6.88 in the year 2019. The results show that the EV/EBITDA of SAIL Ltd. was 7.27 in 2015 and decreased to 6.29 in the year 2019. The results show that the EV/EBITDA of TATA MOTORS Ltd. was 5.15 in 2015 and decreased to 0 in the year 2019. The results show that the EV/EBITDA of TATA POWER CO. Ltd. was 7.72 in 2015 and decreased to 6.83 in the year 2019.

6.3. Descriptive analysis:

A descriptive statistic is a summary statistic that quantitatively describes or summarizes features from a collection of information, while descriptive statistics is the process of using and analyzing those statistics. Some measures that are commonly used to describe a data set are measures of central tendency and measures of variability or dispersion. Measures of central tendency include the mean, median and mode, while measures of variability include the standard deviation (or variance), the minimum maximum values of the variables, kurtosis and skewness.

Use in statistical analysis: Descriptive statistics provide simple summaries about the observations that have been made. Such summaries may be either quantitative, i.e. summary statistics, or visual, i.e. simple to understand graphs. These summaries may either form the basis of the initial description of the data as part of a more extensive statistical analysis, or they may be sufficient in and of themselves for a particular investigation. The use of descriptive and summary statistics has an extensive history and, indeed, the simple tabulation of populations and of economic data was the first way the topic of statistics appeared. More recently, a collection of summarization techniques has been formulated under the heading of exploratory data analysis.

In the business world, descriptive statistics provides a useful summary of many types of data. For example, investors and brokers may use a historical account of return behavior by performing empirical and analytical analysis on their investments in order to make better investing decisions in the future.

6.4. Correlation analysis: Financial correlations measure the relationship between the changes of two or more financial variables over time. For example, the prices of equity stocks and fixed interest bonds often move in opposite directions: when investors sell stocks, they often use proceeds to buy bonds and vice versa. In this case, stock and bond prices are negatively correlated. Financial correlations play a key role on modern finance. Under the capital asset pricing model, an increase in diversification increases the return/risk ratio. Measures of risk include value at risk, expected shortfall, and portfolio return variance.

6.5. Regression analysis: In statistical modeling, regression analysis is a set of statistical processes for estimating the relationship between dependent variables (or outcome or response variables) and one or more independent variables (or predictors or covariates or explanatory variables or features). The most common form of regression analysis is linear regression, in which one finds the line (or a more complex linear combination) that mostly closely fits the data according to a specific mathematical criterion. For specific mathematical reasons, this allows the researcher to estimate the conditional expectation (or population average value) of the dependent variable when the independent variables take on a given set of values. Less common forms of regression use slightly different procedures to estimate alternative location parameters (e.g., quantile regression or necessary condition analysis) or estimate the conditional expectation across a broader collection of non-linear models (e.g., nonparametric regression).

Regression analysis is primarily used for two conceptually distinct purposes.

1. Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning.
2. In some situation's regression analysis can be used to infer causal relationships between the independent and dependent variables. Importantly, regressions by themselves only reveal relationships between a dependent variable and a collection of independent variables in a fixed dataset. To use regressions for prediction or to infer causal relationships, respectively, a researcher must carefully justify why existing relationships have predictive power for a new context or why a relationship between two variables has a causal interpretation. The latter is especially important when researchers hope to estimate causal relationships using observational data.

6.5.1. R-squared (R²): -

R-squared (R²) is a statistical measure that represents the proportion of the variance for a dependent variable that's explained by an independent variable or variables in a regression model. R-squared explains to what extent the variance of one variable explains the variance of the second variable. So, if the R² of a model is 0.50, then approximately half of the observed variation can be explained by the model's inputs.

6.5.2. Adjusted R²: -

Adjusted R-squared is a modified version of R-squared that has been adjusted for the number of predictors in the model. ... Adding more independent variables or predictors to a regression model tends to increase the R-squared value, which tempts makers of the model to add even more variables.

6.5.3. Standard error: -

The standard error of the regression (S), also known as the standard error of the estimate, represents the average distance that the observed values fall from the regression line. Conveniently, it tells you how wrong the regression model is on average using the units of the response variable.

6.5.4. F-Value: -

The F value is a value on the F distribution. Various statistical tests generate an F value. The value can be used to determine whether the test is statistically significant. The F value is used in analysis of variance (ANOVA).

6.5.5. T-Stat: -In statistics, the *t*-statistic is the ratio of the departure of the estimated value of a parameter from its hypothesized value to its standard error. It is used in hypothesis testing via Student's *t*-test. The *t*-statistic is used in a *t*-test to determine whether to support or reject the null hypothesis. It is very similar to the Z-score but with the difference that *t*-statistic is used when the sample size is small or the population standard deviation is unknown.

6.5.6. P-value: -In statistics, the p-value is the probability of obtaining results at least as extreme as the observed results of a statistical hypothesis test, assuming that the null hypothesis is correct. The p-value is used as an alternative to rejection points to provide the smallest level of significance at which the null hypothesis would be rejected. A smaller p-value means that there is stronger evidence in favor of the alternative hypothesis.

6.6. Oil and Natural Gas Corporation Limited (ONGC):

Oil and Natural Gas Corporation Limited explores for, develops, and produces crude oil and natural gas in India and internationally. It operates through two segments, Exploration and Production, and Refining & Marketing. The company also engages in the refining and marketing of petroleum products; transportation of oil and natural gas; and production of liquefied petroleum gas, ethane/propane, naphtha, superior kerosene oil, low Sulphur high stock, aviation turbine fuel, mineral turpentine oil, and high-speed diesel. In addition, it generates electric power through 726.6 megawatts (MW) gas-based power project in Tripura; 51 MW wind power project in Bhuj, Gujarat; and 102 MW wind power project in Jaisalmer, Rajasthan, as well as generates solar power through a total installed capacity of 31 MW. The company was incorporated in 14 August 1956(65 years ago) and is based in New Delhi, India. Chairman and MD: Subhash Kumar. Listed on the NSE: ONGC, BSE: 500312, it is also part of both BSE SENSEX Constituent and NSE NIFTY 50 Constituent. Number of employees: 30,105.

Table 1: Analysis of overall profitability of ONGC Ltd.:

<i>Year</i>	<i>ROE</i>	<i>ROA</i>	<i>P/E</i>	<i>P/B</i>	<i>P/S</i>	<i>EV/EBITDA</i>
2015	10.16	5.42	9.83	0.968	1.08	4.27
2016	6.51	3.76	9.48	0.617	0.9	3.69
2017	12.56	5.48	9.72	1.22	0.729	6.11
2018	10.9	4.83	10.32	1.13	0.63	4.95
2019	14.08	6.19	6.58	0.926	0.443	3.62

Source: Annual report of ONGC LTD. (2015-2019).

The above table 1 depicts an overall profitability ratio which includes Return on Equity, Return on Assets, Price to Earnings (P/E), Price to Book value (P/B), Price to Sales (P/S), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA). Return on Equity is most important indicator of profitability and it ranges from 6.51 to 14.08, ROA indicator ranges from 3.76 to 6.19, P/E indicator ranges from 6.58 to 10.32, P/B indicator ranges from 0.617 to 1.22, P/S indicator ranges from 0.443 to 1.08, and EV/EBITDA indicator ranges from 3.62 to 6.11, which can be considered as reasonable for the selected company. All the ratios related to the profitability performance shows a fluctuating trend but with a positive impact on the overall performance.

Table 1.1: DESCRIPTIVE ANALYSIS

	<i>ROE</i>	<i>ROA</i>	<i>PE</i>	<i>PB</i>	<i>P/S</i>	<i>EV/EBITDA</i>
<i>Mean</i>	10.842	5.136	9.126	0.9722	4.054	4.528
<i>StandardError</i>	1.278102	0.406012	0.653801193	0.103592	0.505318	0.462281
<i>Median</i>	10.9	5.42	9.53	0.968	4.02	4.27
<i>Mode</i>	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
<i>Standard Deviation</i>	2.857922	0.907871	1.461943911	0.231638	1.129925	1.033692
<i>Sample Variance</i>	8.16772	0.82423	2.13728	0.053656	1.27673	1.06852
<i>Kurtosis</i>	0.825797	0.920746	4.099779365	0.819629	-2.26111	0.181254
<i>Skewness</i>	-0.76027	-0.77923	-1.931107021	-0.86384	-0.15208	1.011069
<i>Range</i>	7.57	2.43	3.74	0.603	2.55	2.49
<i>Minimum</i>	6.51	3.76	6.58	0.617	2.64	3.62
<i>Maximum</i>	14.08	6.19	10.32	1.22	5.19	6.11
<i>Sum</i>	54.21	25.68	45.63	4.861	20.27	22.64
<i>Count</i>	5	5	5	5	5	5
<i>Largest (1)</i>	14.08	6.19	10.32	1.22	5.19	6.11
<i>Smallest (1)</i>	6.51	3.76	6.58	0.617	2.64	3.62

Mean= sum/count, ROE is 2.1684, Middle value (when ordered from lowest to highest)50th percentile most frequently occurred value. Average or typical distance scores varies from mean; about GPA points on average. Highest GPA-lowest GPA, Lowest GPA value in dataset (good to check to make sure reasonable), Highest GPA value in dataset (good to check to make sure reasonable), All values added together. Total number of values in the dataset (same as N).

Table 1.2: CORRELATION ANALYSIS

	<i>ROE</i>	<i>ROA</i>	<i>PE</i>	<i>PB</i>	<i>P/S</i>	<i>EV/EBITDA</i>
<i>ROE</i>	1					
<i>ROA</i>	0.939754	1				
<i>PE</i>	-0.53632	-0.60593	1			
<i>PB</i>	0.689901	0.565656	0.240515142	1		
<i>P/S</i>	0.370758	0.446416	0.389324535	0.773693159	1	
<i>EV/EBITDA</i>	0.305362	0.143283	0.554933046	0.834544741	0.727067	1

REGRESSION ANALYSIS:

SUMMARY OUTPUT:

Regression Statistics	
Multiple R	0.913606
R Square	0.834675
Adjusted R Square	0.338701
Standard Error	0.840602
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	3	3.567469	1.189156	1.682900669	0.503059736
Residual	1	0.706611	0.706611		
Total	4	4.27408			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-3.94868	6.181542	-0.63879	0.638112503	-82.49262666	74.59525993	-82.4926	74.59526
ROE	0.430855	0.433425	0.99407	0.501893328	-5.076336281	5.938046168	-5.07634	5.938046
ROA	-0.45484	1.447567	-0.31421	0.806188118	-18.84792092	17.93825021	-18.8479	17.93825
PE	0.672955	0.364099	1.848276	0.315726291	-3.953358227	5.299268476	-3.95336	5.299268

6.7. Gas Authority of India Limited (GAIL):

GAIL (India) Limited operates as a natural gas processing and distribution company in India and internationally. The company operates through Transmission Services, Natural Gas Marketing, Petrochemicals, LPG and Other Liquid Hydrocarbons, and other segments. It is involved in the transmission, distribution, and marketing of natural gas to the power, city gas distribution, fertilizer, industrial, automotive, and other sectors. The company also produces, markets, and trades in liquefied natural gas (LNG); markets liquefied petroleum gas (LPG), propane, pentane, naphtha, mixed fuel oil, propylene, and hydrogenated C4 mix; and manufacture petrochemicals, such as high-density polyethylene and linear low-density polyethylene under the brand names of G-Lex and G-Lene. In addition, it operates a network of compressed natural gas stations; and provides piped natural gas to household, commercial, and industrial applications, as well as has interests in 11 exploration and production blocks located in Assam-Arakan, Cambay, Cauvery, Gujarat Kutch, and Myanmar basins covering an area of 2,170 square kilometers. Further, the company offers telecommunication services through GAILTEL; and generates, transmits, and distributes electric power through 118 MW wind power plant and 12.26 MW solar power plants. Additionally, it engages in the chartering of LNG vessels. The company owns and operates approximately 13,700 km of natural gas pipelines; 2,038 km LPG pipeline transmission network; and five gas processing plants for production of LPG, propane, pentane, naphtha, etc. GAIL (India) Limited was incorporated in August 1984 (37 years ago) and is headquartered in New Delhi, India. Chairman and MD is Manoj Jain. Listed on the BSE: 532155, NSE: GAIL, LSE (London Stock Exchange): GIAD. And it is also part of NSE NIFTY 50 Constituent. Number of employees: 4,529.

Table 1: Analysis of overall profitability position of GAIL (India) Ltd.:

Year	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
2015	9.29	4.54	4.38	0.407	0.228	4.41
2016	5.13	3.17	6.80	0.349	0.242	2.86
2017	8.57	5.78	18.93	1.62	1.29	9.29
2018	11.51	7.82	15.44	1.78	1.35	8.53
2019	14.23	9.57	11.98	1.70	1.03	6.88

Source: Annual report of GAIL (India) LTD. (2015-2019).

The above table 1 depicts an overall profitability ratio which includes Return on Equity, Return on Assets, Price to Earnings (P/E), Price to Book value (P/B), Price to Sales (P/S), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA). Return on Equity is most important indicator of profitability and it ranges from 5.13 to 14.23, ROA indicator ranges from 3.17 to 9.57, P/E indicator ranges from 4.38 to 18.93, P/B indicator ranges from 0.349 to 1.78, P/S indicator ranges from 0.228 to 1.35, and EV/EBITDA indicator ranges from 2.86 to 9.29, which can be considered as reasonable for the selected company. All the ratios related to the profitability performance shows a fluctuating trend but with a positive impact on the overall performance.

Table 1.1: DESCRIPTIVE ANALYSIS

	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
Mean	9.746	6.176	11.506	1.1712	0.828	6.394
Standard Error	1.518491	1.142176	2.680887	0.324939	0.248005	1.216777
Median	9.29	5.78	11.98	1.62	1.03	6.88
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	3.39545	2.553983	5.994646	0.726585	0.554556	2.720796
Sample Variance	11.52908	6.52283	35.93578	0.527926	0.307532	7.40273
Kurtosis	0.180765	-1.27702	-1.85698	-3.27195	-3.12308	-2.00817
Skewness	-0.04716	0.298544	0.007914	-0.58462	-0.41079	-0.36818

Range	9.1	6.4	14.55	1.431	1.122	6.43
Minimum	5.13	3.17	4.38	0.349	0.228	2.86
Maximum	14.23	9.57	18.93	1.78	1.35	9.29
Sum	48.73	30.88	57.53	5.856	4.14	31.97
Count	5	5	5	5	5	5
Largest (1)	14.23	9.57	18.93	1.78	1.35	9.29
Smallest (1)	5.13	3.17	4.38	0.349	0.228	2.86

Mean= sum/count, ROE is 9.746, Middle value (when ordered from lowest to highest)50th percentile most frequently occurred value. Average or typical distance scores varies from mean; about GPA points on average. Highest GPA-lowest GPA, Lowest GPA value in dataset (good to check to make sure reasonable), Highest GPA value in dataset (good to check to make sure reasonable), All values added together. Total number of values in the dataset (same as N).

Table 1.2: CORRELATION ANALYSIS

	ROE	ROA	PE	PB	P/S	EV/EBITDA
ROE	1					
ROA	0.957288	1				
PE	0.310824	0.50523	1			
PB	0.715524	0.854085	0.877747	1		
P/S	0.565841	0.724395	0.948489	0.975529	1	
EV/EBITDA	0.534704	0.643388	0.933499	0.920505	0.963069	1

REGRESSION ANALYSIS:

SUMMARY OUTPUT:

Regression Statistics	
Multiple R	0.996886
R Square	0.993782
Adjusted R Square	0.975127
Standard Error	0.429103
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	3	29.42679	9.80893	53.27184	0.100299
Residual	1	0.18413	0.18413		
Total	4	29.61092			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-2.08184	0.938438	-2.21841	0.269606	-14.0058	9.842146	-14.0058	9.842146
ROE	1.105279	0.302989	3.64792	0.170331	-2.74456	4.955117	-2.74456	4.955117
ROA	-1.33327	0.443649	-3.00523	0.2045	-6.97037	4.30383	-6.97037	4.30383
PE	0.516085	0.057499	8.975598	0.070637	-0.2145	1.246674	-0.2145	1.246674

6.8. Steel Authority of India Limited(SAIL):

Is a steel making company, manufactures and sells iron and steel products in India and Internationally. It offers rails, long rails, blooms, billets, slabs, channels, joists, angles, TMT rebars, wire rods, crane rails, plates, pig iron, and coal chemicals; narrow slabs; wheels and axles; and plate mill plates, HR plates, HR coils, CR sheets/coils, plain and corrugated galvanized sheets, ERW pipes, spiral weld pipes, and CRNO. The company also provides GP and GC sheets, galvanized steel, HRPO, bars and rebars, Z-bars, MS Arch, cold-rolled stainless steel, hot rolled carbon and stainless-steel products, micro-alloyed carbon steel, and alloyed steel squares and rounds. In addition, it offers wear resistant plates, forgings, carne wheels, forged rolls/plates, stainless steel slabs, special steel, and rolled and forged alloy products; and high/medium/low carbon ferromanganese, and silico-manganese products. The company was founded in 19 January 1954 (67 years ago) and is based in New Delhi, India. Chairman is Soma Mondal. SAIL is Listed on the BSE: 500113, NSE: SAIL, and also LSE (London Stock Exchange): SAUD. Number of employees: 64,628.

Table 1:Analysis of overall profitability position of SAIL Ltd.:

Year	ROE	ROA	PE	PB	P/S	EV/EBITDA
2015	4.65	1.98	13.68	0.636	0.604	7.27
2016	0	0	0	0.443	0.405	0
2017	0	0	0	0.684	0.508	130.03
2018	0	0	0	0.785	0.492	12.98
2019	5.92	1.99	9.45	0.560	0.331	6.29

Source: Annual report of SAIL LTD. (2015-2019).

The above table1 depicts an overall profitability ratio which includes Return on Equity, Return on Assets, Price to Earnings (P/E), Price to Book value (P/B), Price to Sales (P/S), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA). Return on Equity is most important indicator of profitability and it ranges from 0 to 5.92, ROA indicator ranges from 0 to 1.99, P/E indicator ranges from 0 to 13.68, P/B indicator ranges from 0.443 to 0.785, P/S indicator ranges from 0.331 to 0.604, and EV/EBITDA indicator ranges from 0 to 130.03, which can be considered as reasonable for the selected company. All the ratios related to the profitability performance shows a fluctuating trend but with a positive impact on the overall performance.

Table 1.1: DESCRIPTIVE ANALYSIS

	ROE	ROA	PE	PB	P/S	EV/EBITDA
Mean	2.114	0.794	4.626	0.6216	0.468	31.314
StandardError	1.310037	0.486226	2.910717	0.05766	0.046589	24.76476
Median	0	0	0	0.636	0.492	7.27
Mode	0	0	0	#N/A	#N/A	#N/A
Standard Deviation	2.929331	1.087235	6.508562	0.128931	0.104175	55.37568
Sample Variance	8.58098	1.18208	42.36138	0.016623	0.010853	3066.466
Kurtosis	-2.71857	-3.33305	-1.98485	-0.03885	-0.43248	4.863009
Skewness	0.714427	0.608629	0.842475	-0.25702	-0.08407	2.197423
Range	5.92	1.99	13.68	0.342	0.273	130.03
Minimum	0	0	0	0.443	0.331	0
Maximum	5.92	1.99	13.68	0.785	0.604	130.03
Sum	10.57	3.97	23.13	3.108	2.34	156.57
Count	5	5	5	5	5	5
Largest (1)	5.92	1.99	13.68	0.785	0.604	130.03
Smallest (1)	0	0	0	0.443	0.331	0

Mean= sum/count ROE is 2.114, Middle value (when ordered from lowest to highest)50th percentile most frequently occurred value. Average or typical distance scores varies from mean; about GPA points on average. Highest GPA-lowest GPA, Lowest GPA value in dataset (good to check to make sure reasonable), Highest GPA value in dataset (good to check to make sure reasonable), All values added together. Total number of values in the dataset (same as N).

Table 1.2: CORRELATION ANALYSIS

	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
ROE	1					
ROA	0.988676	1				
PE	0.926521	0.97249	1			
PB	-0.19706	-0.16777	-0.11474	1		
P/S	-0.14635	-0.00739	0.20863	0.522411	1	
EV/EBITDA	-0.40062	-0.40446	-0.39218	0.348477	0.244407	1

REGRESSION ANALYSIS:

SUMMARY OUTPUT:

Regression Statistics	
Multiple R	0.497788
R Square	0.247793
Adjusted R Square	-3.00883
Standard Error	96.05454
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	4	3039.39	759.8476	0.109807	#NUM!
Residual	1	9226.475	9226.475		
Total	5	12265.87			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-34.7442	252.525	-0.13759	0.912956	-3243.38	3173.89064	-3243.38	3173.891
ROE	-1.32621	44.92077	-0.02952	0.98121	-572.099	569.4463195	-572.099	569.4463
ROA	0	0	65535	#NUM!	0	0	0	0
PE	-2.48982	19.95296	-0.12478	#NUM!	-256.016	251.0365533	-256.016	251.0366
PB	129.311	386.5486	0.334527	0.794484	-4782.25	5040.876697	-4782.25	5040.877

6.9. TATA MOTORS Limited:

Is an Indian multinational automotive manufacturing company, formerly known as Tata Engineering and Locomotive Company (TELCO), The Company was founded in 1945 as a manufacturer of Locomotives. The company manufactured its first commercial vehicle in 1954 in collaboration with Daimler-Benz AG. This ended in 1969. Headquartered in Mumbai, Maharashtra which is part of Tata Group. The company produces passenger cars, trucks, vans, coaches, buses, luxury cars, sports cars, construction equipment and military vehicles. Tata motors has auto manufacturing and vehicle plants in Jamshedpur, Pantnagar, Lucknow, Sanand, Dharwad, and Pune in India, as well as in Argentina, south Africa, the United Kingdom, and Thailand. Tata motors are listed on the BSE (Bombay Stock Exchange):500570, where it is a constituent of the BSE SENSEX index, NSE (National Stock Exchange): TATAMOTORS, the New York Stock Exchange (NYSE): TTM, it is also a part of NSE NIFTY 50 Constituent. On 17 January 2017, Natarajan Chandrasekaran was appointed chairman of the company Tata Group. The Founder of Tata Group and also Tata motors is J. R.D. Tata. Number of employees: 78,906.

Table 1: Analysis of overall profitability position of TATA MOTORS Ltd.:

Year	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
2015	22.80	5.38	13.80	3.15	0.669	5.15
2016	14.67	4.33	11.34	1.66	0.473	4.95
2017	13.95	2.80	21.22	2.96	0.576	6.66
2018	9.89	2.78	12.35	1.22	0.376	4.81
2019	0	0	0	1.07	0.196	0

Source: Annual report of TATA MOTORS LTD. (2015-2019).

The above table 1 depicts an overall profitability ratio which includes Return on Equity, Return on Assets, Price to Earnings (P/E), Price to Book value (P/B), Price to Sales (P/S), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA). Return on Equity is most important indicator of profitability and it ranges from 0 to 22.80, ROA indicator ranges from 0 to 5.38, P/E indicator ranges from 0 to 21.22, P/B indicator ranges from 1.07 to 3.15, P/S indicator ranges from 0.196 to 0.669, and EV/EBITDA indicator ranges from 0 to 6.66, which can be considered as reasonable for the selected company. All the ratios related to the profitability performance shows a fluctuating trend but with a positive impact on the overall performance.

Table 1.1: DESCRIPTIVE ANALYSIS

	<i>ROE</i>	<i>ROA</i>	<i>P/E</i>	<i>P/B</i>	<i>P/S</i>	<i>EV/EBITDA</i>
<i>Mean</i>	12.262	3.058	11.742	2.012	0.458	4.314
<i>StandardError</i>	3.712683	0.908429	3.409352	0.437737	0.081865	1.128355
<i>Median</i>	13.95	2.8	12.35	1.66	0.473	4.95
<i>Mode</i>	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
<i>Standard Deviation</i>	8.301811	2.03131	7.623544	0.978811	0.183056	2.523079
<i>Sample Variance</i>	68.92007	4.12622	58.11842	0.95807	0.03351	6.36593
<i>Kurtosis</i>	1.213861	0.747555	2.02789	-2.98714	-0.28188	3.639641
<i>Skewness</i>	-0.48646	-0.69883	-0.71341	0.421847	-0.50916	-1.7228
<i>Range</i>	22.8	5.38	21.22	2.08	0.473	6.66
<i>Minimum</i>	0	0	0	1.07	0.196	0
<i>Maximum</i>	22.8	5.38	21.22	3.15	0.669	6.66
<i>Sum</i>	61.31	15.29	58.71	10.06	2.29	21.57
<i>Count</i>	5	5	5	5	5	5
<i>Largest (1)</i>	22.8	5.38	21.22	3.15	0.669	6.66
<i>Smallest (1)</i>	0	0	0	1.07	0.196	0

Mean= sum/count ROE is 12.262, Middle value (when ordered from lowest to highest)50th percentile most frequently occurred value. Average or typical distance scores varies from mean; about GPA points on average. Highest GPA-lowest GPA, Lowest GPA value in dataset (good to check to make sure reasonable), Highest GPA value in dataset (good to check to make sure reasonable), All values added together. Total number of values in the dataset (same as N).

Table 1.2: CORRELATION ANALYSIS:

	<i>ROE</i>	<i>ROA</i>	<i>P/E</i>	<i>P/B</i>	<i>P/S</i>	<i>EV/EBITDA</i>
<i>ROE</i>	1					
<i>ROA</i>	0.967372	1				
<i>PE</i>	0.708084	0.606363	1			
<i>PB</i>	0.805273	0.635091	0.738678	1		
<i>P/S</i>	0.96499	0.875752	0.819248	0.918714	1	
<i>EV/EBITDA</i>	0.78801	0.741404	0.970334	0.670394	0.840267	1

RAGRESSION ANALYSIS:

SUMMARY OUTPUT:

<i>Regression Statistics</i>	
Multiple R	0.999782
R Square	0.999564
Adjusted R Square	0.998254
Standard Error	0.105415
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	3	25.45261	8.484203	763.4997	0.026596
Residual	1	0.011112	0.011112		
Total	4	25.46372			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.013654	0.104527	0.130625	0.91731	-1.31448	1.341791304	-1.31448	1.341791
ROE	-0.21782	0.031415	-6.93377	0.091186	-0.61699	0.18134173	-0.61699	0.181342
ROA	1.058061	0.114012	9.28029	0.068335	-0.39059	2.50671562	-0.39059	2.506716
PE	0.318154	0.0109	29.18875	0.021802	0.179658	0.456650436	0.179658	0.45665

7. TATA POWER CO.LTD:

The Tata Power Company Limited engages in the generation, transmission, distribution, and trading of electricity in India and Internationally. It operates through generation, Renewables, Transmission and distribution, and other segments. The generation segment generates power from hydroelectric and thermal sources, such as coal, gas, and oil. The Renewables segments generates power from renewable energy sources, which include wind and solar. The transmission and distribution segment transmits and distributes electricity; sells power to retail customers through distribution network and related ancillary services. The others segment offers project management/Contracts/infrastructure management, and property development services, as well as rents oil tanks. The company also manufactures and sells solar photovoltaic cells and modules, and pumps; operates electric vehicle charging stations and coal mines; generates electricity through waste heat sources; trades in power; and provides engineering, procurement, and construction, as well as logistics services. In addition, it offers solar powered water purifier solutions with reverse osmosis or ultra-filtration technologies; and micro grid and home automation solutions. As of march 31, 2021, the company had an installed capacity of 12,808 MW. Tata power became the first Indian company to ship over 1 GW solar modules. The Tata power company ltd was founded in 18 September 1919 (102 years ago) and based in Mumbai, Maharashtra, India and is part of the Tata Group.Tata power is listed on the BSE (Bombay Stock Exchange):500400, NSE (National Stock Exchange): TATAPOWER. Praveer Sinha is a MD & CEO of Tata power co. ltd. founder of Tata power co. Ltd is Dorabji Tata. Number of employees: 8,613.

Table 1:Analysis of overall profitability position of TATA POWER CO. Ltd.:

Year	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
2015	1.14	0.223	124.25	1.42	0.618	7.72
2016	4.57	0.935	26.41	1.21	0.607	7.16
2017	6.22	1.10	27.26	1.69	0.910	11.17
2018	14.70	2.94	8.87	1.30	0.824	7.91
2019	12.87	2.80	8.47	1.09	0.693	6.83

Source: Annual report of TATA POWER CO. LTD. (2015-2019).

The above table 1 depicts an overall profitability ratio which includes Return on Equity, Return on Assets, Price to Earnings (P/E), Price to Book value (P/B), Price to Sales (P/S), and Enterprise value to Earnings before Interest, Taxes, Depreciation, and Amortization (EV/EBITDA). Return on Equity is most important indicator of profitability and it ranges from 1.14 to 14.70, ROA indicator ranges from 0.223 to 2.94, P/E indicator ranges from 8.47 to 124.25, P/B indicator ranges from 1.09 to 1.69, P/S indicator ranges from 0.607 to 0.910, and EV/EBITDA indicator ranges from 6.83 to 11.17,which can be considered as reasonable for the selected company. All the ratios related to the profitability performance shows a fluctuating trend but with a positive impact on the overall performance.

Table 1.1: DESCRIPTIVE ANALYSIS

	ROE	ROA	P/E	P/B	P/S	EV/EBITDA
Mean	7.9	1.5996	39.052	1.342	0.7304	8.158
StandardError	2.554895	0.539627	21.68384	0.10244	0.059278	0.777338
Median	6.22	1.1	26.41	1.3	0.693	7.72
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	5.71292	1.206643	48.48655	0.229063	0.132549	1.73818
Sample Variance	32.63745	1.455988	2350.946	0.05247	0.017569	3.02127
Kurtosis	-2.17075	-2.60298	4.311985	0.646005	-1.88258	3.838019

<i>Skewness</i>	0.19355	0.263501	2.042115	0.840398	0.583599	1.895483
<i>Range</i>	13.56	2.717	115.78	0.6	0.303	4.34
<i>Minimum</i>	1.14	0.223	8.47	1.09	0.607	6.83
<i>Maximum</i>	14.7	2.94	124.25	1.69	0.91	11.17
<i>Sum</i>	39.5	7.998	195.26	6.71	3.652	40.79
<i>Count</i>	5	5	5	5	5	5
<i>Largest (1)</i>	14.7	2.94	124.25	1.69	0.91	11.17
<i>Smallest (1)</i>	1.14	0.223	8.47	1.09	0.607	6.83

Mean= sum/count ROE is 7.9, Middle value (when ordered from lowest to highest) 50th percentile most frequently occurred value. Average or typical distance scores varies from mean; about GPA points on average. Highest GPA-lowest GPA, Lowest GPA value in dataset (good to check to make sure reasonable), Highest GPA value in dataset (good to check to make sure reasonable), All values added together. Total number of values in the dataset (same as N).

Table 1.2: CORRELATION ANALYSIS

	<i>ROE</i>	<i>ROA</i>	<i>P/E</i>	<i>P/B</i>	<i>P/S</i>	<i>EV/EBITDA</i>
<i>ROE</i>	1					
<i>ROA</i>	0.995109	1				
<i>PE</i>	-0.78634	-0.76982	1			
<i>PB</i>	-0.42228	-0.49956	0.296783	1		
<i>P/S</i>	0.435666	0.355728	-0.45961	0.621794	1	
<i>EV/EBITDA</i>	-0.17781	-0.25808	-0.03595	0.936084	0.802747	1

REGRESSION ANALYSIS:

SUMMARY OUTPUT:

Regression Statistics	
Multiple R	0.05681
R Square	0.003227
Adjusted R Square	-0.32903
Standard Error	12.38513
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.48996	1.48996	0.009713	0.927706
Residual	3	460.1743	153.3914		
Total	4	461.6643			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	8.513119	3.376295	2.521438	0.240369	-34.3868	51.41301992	-34.3868	51.41302
ROE	2.341678	1.721508	1.360248	0.403576	-19.5322	24.2155066	-19.5322	24.21551
ROA	-11.6182	7.88931	-1.47265	0.37976	-111.861	88.62501291	-111.861	88.62501
PE	-0.00691	0.031392	-0.2202	0.862019	-0.40579	0.391962715	-0.40579	0.391963

ANALYSIS OF PROFITABILITY POSITION OF THE COMPANY'S:

7.1. Return on Equity Ratio (ROE Ratio)					
Year\Company	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
2015	10.16	4.65	9.29	22.80	1.14

2016	6.51	0	5.13	14.67	4.57
2017	12.56	0	8.57	13.95	6.22
2018	10.9	0	11.51	9.89	14.70
2019	14.08	5.92	14.23	0	12.87

7.1.1. DESCRIPTIVE ANALYSIS: ROE					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
Mean	10.842	2.114	9.746	12.262	7.9
Standard Error	1.278102	1.310037	1.518491357	3.712683	2.554895
Median	10.9	0	9.29	13.95	6.22
Mode	#N/A	0	#N/A	#N/A	#N/A
Standard Deviation	2.857922	2.929331	3.395449897	8.301811	5.71292
Sample Variance	8.16772	8.58098	11.52908	68.92007	32.63745
Kurtosis	0.825797	-2.71857	0.180764566	1.213861	-2.17075
Skewness	-0.76027	0.714427	-0.04716196	-0.48646	0.19355
Range	7.57	5.92	9.1	22.8	13.56
Minimum	6.51	0	5.13	0	1.14
Maximum	14.08	5.92	14.23	22.8	14.7
Sum	54.21	10.57	48.73	61.31	39.5
Count	5	5	5	5	5
Largest (1)	14.08	5.92	14.23	22.8	14.7
Smallest (1)	6.51	0	5.13	0	1.14

7.1.2. CORRELATION ANALYSIS: ROE					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
ONGC	1				
SAIL	0.477725	1			
GAIL	0.847817	0.613913	1		
TATA MOTORS	-0.5749	-0.2425	-0.68355	1	
TATA POWER	0.499736	-0.03005	0.705104	-0.838979662	1

REGRESSION ANALYSIS: ROE RATIO

SUMMARY OUTPUT: ONGC LTD.

Regression Statistics	
Multiple R	0.676622
R Square	0.457817
Adjusted R Square	0.27709
Standard Error	1.34435
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.578172	4.578172	2.533188924	0.209711311
Residual	3	5.421828	1.807276		
Total	4	10			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2012.941	2.619921	768.3214	4.86227E-09	2004.603653	2021.27917	2004.604	2021.279
ONGC	0.374339	0.235197	1.591599	0.209711311	-0.374162448	1.122841394	-0.37416	1.122841

7.2. Return on Assets Ratio (ROA Ratio)					
Year\Company	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
2015	5.42	1.98	4.54	5.38	0.228
2016	3.76	0	3.17	4.33	0.935
2017	5.48	0	5.78	2.80	1.10
2018	4.83	0	7.82	2.78	2.94
2019	6.19	1.99	9.57	0	2.80

7.2.1. DESCRIPTIVE ANALYSIS: ROA					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
Mean	5.136	0.794	6.176	3.058	1.5996
StandardError	0.406012	0.486226	1.142175993	0.908429	0.539627
Median	5.42	0	5.78	2.8	1.1
Mode	#N/A	0	#N/A	#N/A	#N/A
Standard Deviation	0.907871	1.087235	2.553983164	2.03131	1.206643
Sample Variance	0.82423	1.18208	6.52283	4.12622	1.455988
Kurtosis	0.920746	-3.33305	-1.277020859	0.747555	-2.60298
Skewness	-0.77923	0.608629	0.298544138	-0.69883	0.263501
Range	2.43	1.99	6.4	5.38	2.717
Minimum	3.76	0	3.17	0	0.223
Maximum	6.19	1.99	9.57	5.38	2.94
Sum	25.68	3.97	30.88	15.29	7.998
Count	5	5	5	5	5
Largest (1)	6.19	1.99	9.57	5.38	2.94
Smallest (1)	3.76	0	3.17	0	0.223

7.2.2. CORRELATION ANALYSIS: ROA					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
ONGC	1				
SAIL	0.673656	1			
GAIL	0.712647	0.316444	1		
TATA MOTORS	-0.58531	-0.16842	-0.88456	1	
TATA POWER	0.27539	-0.0642	0.870085	-0.81152	1

REGRESSION ANALYSIS: ROA RATIO

SUMMARY OUTPUT: SAIL

Regression Statistics	
Multiple R	0.002909
R Square	8.46E-06
Adjusted R Square	-0.33332
Standard Error	1.825734
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	8.46E-05	8.46E-05	2.54E-05	0.996297
Residual	3	9.999915	3.333305		
Total	4	10			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2016.99664	1.054086	1913.503	3.15E-10	2013.642	2020.351	2013.642	2020.351
SAIL	0.00422983	0.839623	0.005038	0.996297	-2.66782	2.676284	-2.66782	2.676284

7.3. Price to Earnings Ratio (P/E Ratio)					
Year\Company	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
2015	9.53	13.68	4.38	13.80	124.25
2016	9.48	0	6.80	11.34	26.41
2017	9.72	0	18.93	21.22	27.26
2018	10.32	0	15.44	12.35	8.87
2019	6.58	9.45	11.98	0	8.47

7.3.1. DESCRIPTIVE ANALYSIS: P/E Ratio					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
Mean	9.126	4.626	11.506	11.742	39.052
Standard Error	0.653801	2.910717	2.680887167	3.409352	21.68384
Median	9.53	0	11.98	12.35	26.41
Mode	#N/A	0	#N/A	#N/A	#N/A
Standard Deviation	1.461944	6.508562	5.994645945	7.623544	48.48655
Sample Variance	2.13728	42.36138	35.93578	58.11842	2350.946
Kurtosis	4.099779	-1.98485	-1.856982573	2.02789	4.311985
Skewness	-1.93111	0.842475	0.007913677	-0.71341	2.042115
Range	3.74	13.68	14.55	21.22	115.78
Minimum	6.58	0	4.38	0	8.47
Maximum	10.32	13.68	18.93	21.22	124.25
Sum	45.63	23.13	57.53	58.71	195.26
Count	5	5	5	5	5
Largest (1)	10.32	13.68	18.93	21.22	124.25
Smallest (1)	6.58	0	4.38	0	8.47

7.3.2. CORRELATION ANALYSIS: P/E Ratio					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
ONGC	1				
SAIL	-0.48693	1			
GAIL	0.095718	-0.59593	1		
TATA MOTORS	0.828611	-0.41723	0.297685	1	
TATA POWER	0.228416	0.694368	-0.66091	0.27689	1

REGRESSION ANALYSIS: P/E RATIO

SUMMARY OUTPUT: GAIL

Regression Statistics	
Multiple R	0.6288
R Square	0.39539
Adjusted R Square	0.193853
Standard Error	1.419636
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.953898	3.953898	1.961874411	0.255827414
Residual	3	6.046102	2.015367		
Total	4	10			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2015.092	1.503075	1340.646	9.15225E-10	2010.308257	2019.875	2010.308	2019.875
GAIL	0.165851	0.118409	1.400669	0.255827414	-0.210977887	0.542681	-0.21098	0.542681

7.4. Price to Book Value Ratio (P/B Ratio)					
Year\Company	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
2015	0.968	0.636	0.407	3.15	1.42
2016	0.617	0.443	0.349	1.66	1.21
2017	1.22	0.684	1.62	2.96	1.69
2018	1.33	0.785	1.78	1.22	1.30
2019	0.926	0.560	1.70	1.07	1.09

7.4.1. DESCRIPTIVE ANALYSIS: P/B Ratio					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
Mean	1.0122	0.6216	1.1712	2.012	1.342
Standard Error	0.124448	0.05766	0.324938671	0.437737	0.10244
Median	0.968	0.636	1.62	1.66	1.3
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	0.278274	0.128931	0.726584957	0.978811	0.229063
Sample Variance	0.077436	0.016623	0.5279257	0.95807	0.05247
Kurtosis	-0.38766	-0.03885	-3.271951763	-2.98714	0.646005
Skewness	-0.41342	-0.25702	-0.584621327	0.421847	0.840398
Range	0.713	0.342	1.431	2.08	0.6

Minimum	0.617	0.443	0.349	1.07	1.09
Maximum	1.33	0.785	1.78	3.15	1.69
Sum	5.061	3.108	5.856	10.06	6.71
Count	5	5	5	5	5
Largest (1)	1.33	0.785	1.78	3.15	1.69
Smallest (1)	0.617	0.443	0.349	1.07	1.09

	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
ONGC	1				
SAIL	0.976578	1			
GAIL	0.741713	0.615794	1		
TATA MOTORS	0.105835	0.132774	-0.39901	1	
TATA POWER	0.507544	0.4662	0.069514	0.820415	1

REGRESSION ANALYSIS: P/B RATIO

SUMMARY OUTPUT: TATA MOTORS

Regression Statistics	
Multiple R	0.743069
R Square	0.552152
Adjusted R Square	0.402869
Standard Error	1.221813
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	5.521517	5.521517	3.698697	0.150165
Residual	3	4.478483	1.492828		
Total	4	10			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2019.415	1.369482	1474.583	6.88E-10	2015.057	2023.773	2015.057	2023.773
TATA MOTORS	-1.20033	0.624132	-1.9232	0.150165	-3.1866	0.785936	-3.1866	0.785936

Year\Company	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
2015	1.08	0.604	0.228	0.669	0.618
2016	0.9	0.405	0.242	0.473	0.607
2017	0.729	0.508	1.29	0.576	0.910
2018	0.63	0.492	1.35	0.376	0.824
2019	0.443	0.331	1.03	0.196	0.316

	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
Mean	0.7564	0.468	0.828	0.458	0.7304
Standard Error	0.10961	0.046589	0.248004839	0.081865	0.059278
Median	0.729	0.492	1.03	0.473	0.693
Mode	#N/A	#N/A	#N/A	#N/A	#N/A

Standard Deviation	0.245094	0.104175	0.554555678	0.183056	0.132549
Sample Variance	0.060071	0.010853	0.307532	0.03351	0.017569
Kurtosis	-0.62387	-0.43248	-3.123076683	-0.28188	-1.88258
Skewness	0.113922	-0.08407	-0.410793915	-0.50916	0.583599
Range	0.637	0.273	1.122	0.473	0.303
Minimum	0.443	0.331	0.228	0.196	0.607
Maximum	1.08	0.604	1.35	0.669	0.91
Sum	3.782	2.34	4.14	2.29	3.652
Count	5	5	5	5	5
Largest (1)	1.08	0.604	1.35	0.669	0.91
Smallest (1)	0.443	0.331	0.228	0.196	0.607

7.5.2. CORRELATION ANALYSIS: P/S Ratio					
	ONGC	SAIL	GAIL	TATA MOTORS	TATA POWER
ONGC	1				
SAIL	0.722296	1			
GAIL	-0.77299	-0.17893	1		
TATA MOTORS	0.889738	0.870442	-0.43492	1	
TATA POWER	-0.45498	0.127495	0.897996	-0.02319	1

REGRESSION ANALYSIS: P/S RATIO

SUMMARY OUTPUT: TATA POWER

Regression Statistics	
Multiple R	0.437783
R Square	0.191654
Adjusted R Square	-0.07779
Standard Error	1.641489
Observations	5

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.916539	1.916539	0.711281626	0.460952731
Residual	3	8.083461	2.694487		
Total	4	10			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2013.186	4.581826	439.385	2.59972E-08	1998.604307	2027.767	1998.604	2027.767
TATA POWER	5.222177	6.191998	0.843375	0.460952731	-14.48352438	24.92788	-14.4835	24.92788

7. LIMITATION OF THE STUDY:

- This study mainly depends on the secondary data. i.e., ratios of the companies.
- Financial ratios of the companies are analyzed using five years data.
- The validity of analysis and suggestion depends on the annual report and financial statements provided by the companies.
- The study covers a multiple (five) organization.
- The study is completely relied on secondary source of data.
- The study is confined to a period of five years.

8. CONCLUSION:

The study is conducted to find the relationship between financial indicators of the firms with Ratios of the firms. The study had five independent variables and one dependent variable. The study highlighted that only two independent variables are showed a positive and significant impact on the EV/EBITDA for the whole study and other three variables are reluctant to explain the relationship with the ratios. The ROE shows that profit earned by the shareholders for the year. If there is increase in earnings of the company, the shareholders expectations to receive the dividend and capital appreciations increases and major of the companies in the study have shown consistent profit for the years. This results in more demand for the stock prices for the long run and leads to increase the stock prices. In case of Price to book value (PB) shows that how optimistically the company is engaged in utilization the company assets to generate the sales for the year. If sales increase than there is increase in the earnings of the firms during the years that leads to more creation of demand for the stock prices in the market which in turn increase the stock prices. Whereas the in case of other independent variables have not proved to show the relationship with ratios due to the less informative in among major shareholders to create the demand in stock market.

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