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APPENDIX

Managing Different Elements of Cold Chain Management for Overall Profitability in Selected Rajasthani Retail Stores

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Abstract

The economy of India is now one of the economies that are increasing at one of the highest rates in the world, and it is also the country that produces the most of a variety of agricultural products. Infrastructure for the supply chain, including world-class ports and logistics, is the recipient of significant new investments. Because it is the second biggest consumer market, it offers great chances to marketers. Although India generates more than 400 million metric tons of perishable goods annually, most of this output is wasted because the country's supply chain infrastructure is inadequate. In this particular research project, we picked several retail establishments in Rajasthan to investigate the results of implementing various cold chain management techniques. In addition to the milk and poultry products it produces, Rajasthan has a great lot of potential to become the nation's principal food processing centre because of the agro-climatic qualities of its region and the range of soil types it provides for agricultural development. The potential for exporting goods produced by agricultural and food processing exists. Rajasthan is characterized as an area that mostly produces agriculture and has a huge labour pool. Amounts of Rs. 50,000 crore or more in food, especially fruits and vegetables, die yearly in Rajasthan due to a lack of suitable cold storage and warehousing facilities.

Key Words: Cold Chain, Infrastructure, Management, Perishables, Wastage, food processing, inadequate, technology, Nascent, opportunity.

Introduction

India is one of the biggest agricultural product producers, but the cold chain supply is still in its infancy, leading to food and other resource losses. These losses from the agriculture industry alone have been estimated to be as high as US$8 to $15 billion annually. Due in significant part to the increased yields attained as a consequence of the Green Revolution, India's agriculture and food processing industries have been growing and undergoing a dramatic shift. Along with this, producing fruits and vegetables has made considerable advancements. India has been expanding quickly over the past two decades, and it has been observed that there is an increase in the demand for high-quality meals and a move toward horticulture products. The population of India's spending and consumption patterns changed significantly as a result of this and the country's rising urbanization. It is commonly known that the absence of well-organized and well-functioning supply chains is a significant factor in the high number of losses that occur in the perishable food industry. The traditional methods of the food supply chain were not able to keep up with the swift shifts in population patterns that were occurring. A significant quantity of food is lost or thrown away in India; this includes 4.615.9% of fruits, 5.2% of inland fish, 10.5% of sea fish, 2.7% of beef, and 6.7% of chicken. It was estimated in 2014 that losses in agricultural production would amount to 92,651 crores, while it was estimated that losses in fruits, vegetables, meat, fish, and milk would amount to 50,473 crores yearly. It was necessary to have an adequate and efficient cold chain infrastructure from the farm gate all the way to the consumer to halt the significant losses in the supply chain for perishables. The fact that just 75% of available cold storage space is being utilized on average shows that India's cold chain industry is not sustainable. (Opportunities in India's Cold Chain Industry, Ministry of Food Processing Industry, 2014.)

Emerging Trends in Cold Chain

The emphasis in the cold supply chain is now on an end-to-end cold chain rather than merely product storage. The goal is to maintain a cold supply chain while ensuring that items reach customers in their original form, size, texture, flavour, and colour. The current tendency is to update old stores with better, more advanced machinery, new energy-efficient storage technologies, contemporary packaging facilities and equipment, etc. Instead of the usual single commodity storage, there is potential for the establishment of multifunctional cold storage. Integrated cargo complexes are being planned at major airports in India, which will be equipped to handle all kinds of goods, including perishables (Opportunities in Cold Chain Sector in India, Ministry of food processing industry, 2014).

Challenges

Despite this, India still has a significant problem regarding inadequate food processing, cold chain logistics, and storage. The government of India has been a primary impetus behind the growth of the cold chain industry. It has implemented various grant and subsidy programs to encourage private investment in the sector. Recent developments have made it possible for foreign direct investment (FDI) to make up one hundred percent of the capital for cold chain investments in India. India's current cold chain is primarily made up of regionally based, rather small private businesses. The following are the principal difficulties:

- Poor quality cold storage infrastructure

- Lack of standards and procedures in facility construction and operation

- Labourers' lack of knowledge regarding the handling of temperature-sensitive goods

- High fuel prices and maintenance power outages

The cold chain preserves the freshness and safety of frozen and chilled goods. Reducing food temperatures, i.e., above -1oC to below ambient temperatures, is what "chilling" food products are meant. This prevents the microbiological, physical, chemical, and metabolic processes linked to food spoiling and degradation, leading to food items' short-term preservation. Food safety and quality are sustained for extended periods at chilled temperatures, typically between 0°C and +5°C. At these temperatures, microorganism development happens slowly, and food spoilage and degradation processes are significantly hindered (seafood.oregonstate.edu.pdf.com).

Opportunity

The Planning Commission of India and the Indian government have stated plans to promote and enhance the cold chain. The primary areas of development emphasized include fundamental infrastructure, environmentally friendly technology, standards and protocols, enabling laws, and specialized technical skills. The first step toward the industry's advancement was taken when, in the most recent Union Budget, the government of India acknowledged the cold chain industry as a subsector of the infrastructure sector. It has committed more resources to the construction of new cold storage facilities. The private sector is encouraged to expand its cold chain operations by implementing various cutting-edge technological solutions.

The largest obstacle was raising the initial funds necessary to build a cold chain unit. But with careful planning, the government may encourage additional PPP projects in this area, boosting India's cold chain business expansion.

Future Prospects

It is anticipated that Foreign Direct Investment (FDI) in Retail will soon be permitted, as numerous international food and retail brands are interested in entering the Indian market. In addition, the government is supporting a

measure that would call for the construction of additional cold chain and storage facilities to cut down on the amount of wasted food. The Indian cold chain industry is anticipated to grow at a compound annual growth rate (CAGR) of 28% over the next three years and 2017; the market size may reach $13 billion in 2017. Due to the changing lifestyle of Indian consumers and the future expansion of the road and rail infrastructure, international businesses have a significant opportunity to participate in the Indian cold chain industry. In this area, the government can act as a catalyst. For the transportation and storage of commodities that need to be kept at specific temperatures, cold chains have now been integrated into supply chain management systems worldwide.

The following list includes some potential actions that the government may take:

- Offering the necessary assistance, such as reducing finance costs to construct cold chain infrastructure facilities.

- Supporting campaigns to raise consumer awareness of cold chain facilities' value and inform consumers.

- State governments can promote the construction of cold storage facilities by offering subsidized electricity rates, as electricity makes up a sizable amount of operational expenses.

- Supporting more advanced and effective cooling techniques lengthens perishable goods' shelf life (Kulkarni Sateesh, 2016).

Research Methodology

Objectives of the Study:

Managing several areas of Rajasthan's chosen retail outlets' cold chain for overall profitability

Research Type

 In a systematic inquiry, inductions and deductions are both conceivable. We have utilized induction and deduction research study techniques in the current investigation.

Research Design

Because there has been very little previous research on the topic of the current study, which is about Cold Chain Management specifically in Rajasthan (India), at selected outlets, the exploratory type of research was used in the first step of the study. This was followed by the descriptive type of research used in the subsequent steps of the study.

Sampling Techniques

The two main types of sampling techniques are probability sampling and nonprobability sampling. Snowball and judgmental sampling, both nonprobability types, were used in the current study.

Procedure for Data Collection

Primary data were gathered by having the store managers of several locations in Rajasthan fill out questionnaires.

Sample Size

From 94 retail/store managers, 112 respondents for the current study were selected. They were questioned, and they responded to questionnaires.

Methodology

Using the proper statistical methods, the information gathered through surveys was examined. A master data sheet was created after the completed surveys had been coded. Across all, 112 questionnaires were gathered from 94 different stores in Rajasthan where the study was conducted. The information was tallied and categorized according to independent and dependent factors. The acquired data's summary statistics were presented methodically. After that, some different null hypotheses were formulated to ascertain the effect of particular independent variables on the effectiveness of cold chains for the distribution of frozen food items. There have been many hypotheses formulated and examined. Statistical tests, regression, multicollinearity, and VIF (Variation Inflation Factor) analysis will be utilised throughout the analysis. The Likert scale with five points was applied.

Analysis of Effectiveness of various aspects of management of Cold Chain for profitability in selected retail Store

A cold chain contains several components necessary for handling perishables and can potentially increase the store's profitability. The ensuing factors have been narrowed down and given further consideration. This part determines whether or not all employees, including store managers, assistant managers, and/or the person in charge of the shop's second in command, are happy with the level of effectiveness that has been maintained. These factors, which include managing air quality levels such as carbon dioxide, oxygen, and humidity, temperature control, management of product storage according to shelf life, electricity consumption, time temperature indicator, displays and marketing, transportation management system (refrigerated transport), supply chain management, insulated shipping container, and food processing (freezing of certain products), explain how effectively a cold chain is managed in a retail setting.

Table 1. Consolidated Mean values for the Variables of Effectiveness

SL. No.		Mean value out of 5	Std. Deviation
1	**Management of Air quality levels like carbon dioxide, oxygen, humidity**	**3.60**	**0.88**
2	Temperature Control	2.80	1.27
3	Management/Storage as per the Shelf Life of the Product	3.19	1.00
4	**Electricity consumption**	**3.69**	**1.34**
5	Time-temperature indicator	3.23	0.92
6	Displays and Marketing	3.17	1.16
7	**Transportation management system (Refrigerated transport)**	**3.91**	**1.25**
8	Supply chain Management	3.43	1.17
9	Insulated shipping container	3.30	1.29
10	Food processing (freezing of certain processed food)	3.08	1.27
11	Training to the Staff involved in Cold chain management	2.78	1.22
12	**Technical Ability of the Staff handling cold chain aspects**	**3.76**	**1.27**

	Overall Effectiveness of the cold chain in your store	4.29	0.88

The responses of the employees working in the store were ambiguous regarding the mean values of the factors linked to the effectiveness of a cold chain. The management of the cold chain in retail stores is most effective regarding the transportation management system (refrigerated transport), with a mean value of 3.91. This is followed by the technical proficiency of the staff handling the cold chain, which has a mean value of 3.76, electricity consumption, which has a mean value of 3.69, and the management of air quality levels such as carbon dioxide, oxygen, and humidity, which has a mean value of 3.91. In addition, the mean values for insulated shipping containers and supply chain management showed promise, coming in at 3.30 and 3.43, respectively.

Impact of Effective Cold Chain Management on Profitability of the Store:

It has been discovered and discussed which elements of a cold chain influence a store's profitability. To check the significance of those variables, Multiple Regression (stepwise) has been applied with dependent variables – **Overall Effectiveness of the cold chain management in your store.** The related hypotheses were formulated. There were 11 of these theories. **All alternative hypotheses were directional hypotheses.**

Test for Multicollinearity

Multicollinearity is a concern since there shouldn't typically be so significant correlations between two independent variables. Utilizing the Variance Inflation Factor (VIF) value, multicollinearity was examined. In this study, VIF was computed using SPSS, and variables having more than three VIF values were eliminated. Using the other independent variables and one independent variable as the dependent variable, the VIF is computed. This procedure is continued until each independent variable has received turn-by-turn treatment as a dependent variable. Each variable has a dependent and independent role in the cross-VIF computation. One independent variable was used as the dependent variable in the VIF computation, leaving the other independent variables to be used only as independent variables.

It only displayed the results of two aspects before the procedure was halted due to two variables, EFF 4 and EFF 9, having VIF values greater than 3. (4.92, 4.86 and 4.2 and 4.22, respectively). It demonstrates the multicollinearity and significant correlation between EFF4 and EFF9. Between these two variables, there is a strong correlation (r =.765), which is extremely significant. VIF has been discarded since EFF4's value is greater. The procedure of rechecking VIF for the remaining variables was carried out after deleting EFF 4.

Stepwise Multiple Regression Analysis:

We utilized stepwise regression, as well as regression models in which the selection of the predictive variables was automated. Using the stepwise regression model's algorithm, each independent variable is considered one at a time as it is added. It began with one, which explained maximum variation in the **"Overall Effectiveness of the cold chain management in your store"** (the dependent variable) and continued to add more independent variables to the regression, one by one. Once the regression model was refined, variables stopped being added, and the model was checked at each stage for the best fit (Paul et al., 2016). Five stages of the forward stepwise regression were necessary to achieve model optimization for how the benefits of a cold chain impact the earnings of retail establishments.

According to the model summary, five steps were done to optimize the model and its output. In the fifth phase, the R square value is found to be.411 and indicates that the model accounts for around 41% of the variance, which is quite a considerable amount. The modified R Square value is a little lower. However, that is also acceptable.

It was determined using the ANOVA statistics if the independent variable substantially influenced the dependent variable. The value in the signature column is.000, which is below the threshold of p -.05.

As a result, independent factors significantly affect the dependent variable. With the value in sig. Column (e) is also added with .000, which means that it is significant when the five independent variables, namely predict the dependent variable **- Electricity consumption, Management/Storage as per the Shelf Life of the Product, Displays and Marketing, Supply chain Management, Technical Ability of the Staff handling cold chain aspects**. The dependent variable is -**Overall Effectiveness of the cold chain in your store.** Out of the total of 11 independent factors, the coefficients table indicated the five variables above as having a substantial impact on the dependent variable. Other factors were noted in the omitted factors or factors that did not significantly affect the earnings of retail establishments.

Results of the Hypotheses testing:

Only five factors had a meaningful impact on the dependent variable.

Ho 2 Effective Electricity consumption has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha 2 Effective Electricity consumption has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value of the significant column is.005, which is lower than the value of "p" when comparing results at a significance level of 5%. As a direct consequence, the alternative hypothesis is chosen to be true, whereas the null hypothesis is chosen to be false. Because of this, it is feasible to conclude that an increase in the Effectiveness of Overall Cold Chain Operations at a Retail Store is Caused by an increase in the Effectiveness of Effective Electricity Consumption.

Ho 3 Effective Management/Storage as per the Shelf Life of the Product has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha 3 Effective Management/Storage as per the Shelf Life of the Product has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value of the significant column is.005, which is lower than the value of "p" when compared at a significance level of 5%. (.05). As a direct consequence, the alternative hypothesis is chosen to be true, whereas the null hypothesis is chosen to be false. As a result, it is possible to conclude that successful display and marketing contribute to the cold chain's overall effectiveness in a retail setting.

(Variable 4 was dropped due to Multicollinearity, hence the hypothesis has not been formulated here for variable 4)

Ho 6 Effective Displays and Marketing through Cold chain has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha 6 Effective Displays and Marketing through Cold chain has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value of the significant column is.005, which is lower than the value of "p" when compared at a significance level of 5%. (.05). As a direct consequence, the alternative hypothesis is chosen to be true, whereas the null hypothesis is chosen to be false. As a result, it is possible to conclude that effective display and marketing contribute to the cold chain's overall effectiveness in a retail setting.

Ho 8 Effective Supply chain Management has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha 8 Effective Supply chain Management has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value of the significant column is.005, which is lower than the value of "p" when compared at a significance level of 5%. (.05). As a direct consequence, the alternative hypothesis is chosen to be true, whereas the null hypothesis is chosen to be false. As a result, it is possible to conclude that successful display and marketing contribute to the cold chain's overall effectiveness in a retail setting.

Ho11 Effective Training to the Staff involved in Cold chain management has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha11 Effective Training to the Staff involved in Cold chain management has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value validates the assumption that there is no difference between the two groups beneath the significant column is.400, which is higher than the value of "p" at the 5% significance level. Therefore, it is feasible to claim that excellent training for staff members participating in cold chain management does not influence consumers who enter a shop since these customers do not participate in the management of the cold chain. Customers who enter a store do not touch the cold chain.

Ho12 Effective Technical Ability of the Staff handling cold chain aspects has no impact on Overall Effectiveness of a Cold Chain in the Retail Store

Ha12 Effective Technical Ability of the Staff handling cold chain aspects has a positive impact on Overall Effectiveness of a Cold Chain in the Retail Store

The value of the significant column is.005, which is lower than the value of "p" when compared at a significance level of 5%. (.05).

As a direct consequence, the alternative hypothesis is chosen to be true, whereas the null hypothesis is chosen to be false. As a result, it is possible to conclude that successful display and marketing contribute to the cold chain's overall effectiveness in a retail setting.

Conclusion

The sector of the economy that will be the primary driver of economic expansion in the years to come will be the food processing industry, which has a growth rate of 13.7%. As a result of the fact that the typical Indian spends more than half of his income on food, the food processing industry in India is poised to enter an era fraught with the possibility of enormous growth. Consumer tastes and inclinations have changed noticeably, not just in metropolitan regions but also in rural ones. Due to its diverse climatic circumstances, Rajasthan produces a wide range of fruits, vegetables, poultry, milk products, and other food items. As a result, the retailers can purchase a wide range of items locally, store them, and then sell them when necessary, utilizing their cold chains. The study has determined five factors that substantially impact a retail store's profitability to have better cold chain management. Utilization of electricity, product administration and storage according to shelf life, displays and marketing, supply chain management, and technical expertise possessed by staff members handling issues about the cold chain are some of the things that fall under this category. Thus, there is a chance to improve the cold supply chain since customer tastes are changing quickly, and consumers' awareness of nutrition and high-quality foods is expanding.

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An Empirical Analysis of a Study on Corporate Leverage and Pharmaceutical Industry Profitability in India

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Abstract

This study aims to determine the impact corporate leverage has on the profitability of the Indian pharmaceutical industry. The analysis for this study included a decade's worth of time, from 2004–2005 to 2013–2014. The study only uses secondary sources for its data. 37 pharmaceutical firms that trade on the National Stock Exchange (NSE) are considered and examined throughout the study. Regression and correlation analysis were the statistical methods employed in this investigation. Financial Leverage (FL), Operating Leverage (OL), and Combined Leverage were the independent variables (CL). Earnings per share (EPS), Return on Assets (ROA), and Return on Equity (ROE) were the dependent variables (EPS). The study's findings indicate that CL and OL significantly impact profitability (ROA, ROE, and EPS). The pharmaceutical sector in India selected the topic for the research period based on the fact that CL and OL have a significant influence on profitability.

Keywords: Capital structure, operating leverage, financial leverage, combined leverage.

Introduction

According to Jensen (1986), companies with more internally generated funds than positive net present value investment opportunities may be forced to use those funds to service debt rather than invest in negative net present value projects, which would be against the interests of shareholders.

Matt (2000) stated, "Financial Leverage (FL) is the final component of return on equity. FL measures how much a firm uses equity and debt to finance its assets. As debt increases, FL increases. Management prefers equity financing over debt since it carries less risk." Pandey (2006) described the use of the fixed-charge sources of funds, such as debts and preference capital along with the owner's equity in the capital structure, as financial leverage or gearing or trading on equity.

Significance of The Study

The financial management would find this study very helpful in understanding the factors influencing the debt-to-equity ratio of the Indian pharmaceutical business.

The study's findings are crucial for lending institutions since they enable them to prevent and minimize non-performing assets while providing loans and other financial support to Indian pharmaceutical companies.

The study's findings also stand to benefit shareholders. They might adjust their portfolio properly after realizing the extent of leverage used by the pharmaceutical industry.

Scope of The Study

The analysis is limited to the pharmaceutical industry, and it only includes companies listed on either the national stock market or the Bombay stock exchange at some point during the ten years beginning in 2004–2005 and ending in 2013–2014.

Objectives of The Study

The following goals of the study have been outlined to how leverage affects the profitability of a certain segment of the Indian pharmaceutical business.

- To assess the connection between leverage and profitability in the Indian pharmaceutical sector.

- To investigate how leverage affects profitability.

- To assess the profitability of the pharmaceutical industries in India during the study period and the growth and trend of various measures of CL.

Hypotheses Developed for The Study

- H01: Operating leverage does not have an impact on ROA.

- H02: Operating leverage does not have an impact on ROE.

- H03: Operating leverage does not have an impact on EPS.

- H04: Financial leverage does not have an impact on ROA.

- H05: Financial leverage does not have an impact on ROE.

- H06: Financial leverage does not have an impact on EPS.

- H07: Financial leverage does not have an impact on ROA.

- H08: Financial leverage does not have an impact on ROE.

- H09: Financial leverage does not have an impact on EPS.

- H010: Corporate leverage and Profitability (ROA, ROE, and EPS) do not have a significant relationship.

Research Methodology for The Study

The secondary source of data is the foundation of the study. The National Stock Exchange (NSE) (www.nseindia.com) provided the pertinent data for the measurement of the variables and money control (www.money control.com).

Population

In India, 74 pharmaceutical companies are listed on the NSE. For better analysis, it was first planned to consider that all pharmaceutical industries are listed on the NSE. It was discovered that although some businesses only had acceptable data for the previous ten years, others did not. The study's ultimate sample size is restricted to 37 companies whose data are sufficiently available over the previous 10 years, from 2004–2005 to 2013–2014. In this investigation, the multistage sampling method was employed. 37 companies were thus taken into consideration for this analysis.

Sampling Design

The theories above have been developed and tested for the present goals. Using the multi-stage sampling approach, the sample companies for the current study were chosen from the pharmaceutical business in India that is listed on the NSE. Because the NSE is one of the biggest stock exchanges in India, it was decided to choose these companies from the NSE listing flag.

Sampling Techniques

This study is about the Indian pharmaceutical industry. These businesses were chosen because it was simple for them to access the data or financial statements. For the study, practical sampling techniques have been used.

Figure 1. A Multi-Stage Sampling Technique
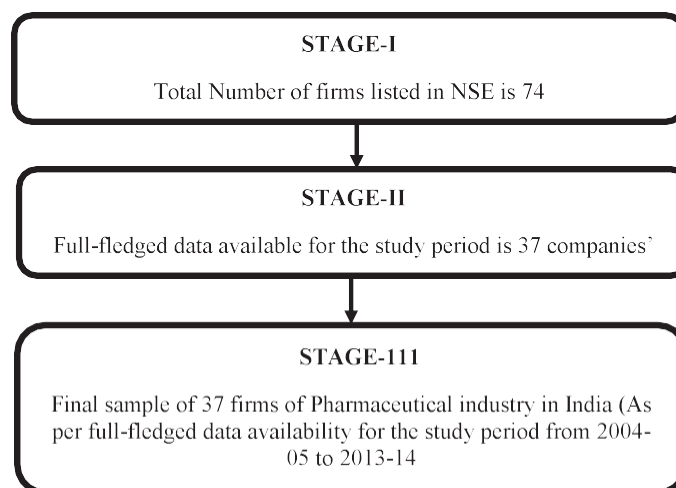
Source: Compiled data collected from NSE

Review of Literature

Veni and Narayanan (2002) studied "Leverage, Capital Structure, Dividend Policy and Practices — the management Accountant" and the Leverage, Capital Structure dividend Policy and practices on Coromandel Fertilizers ltd. This study demonstrates the impact of leverage, dividend policy, and the debt-to-equity ratio. Mohanty (2003) found in the study entitled, "Are view of research on the practices of corporate finance" that the firm's value both within the industry and the Indian economy and leverage is negatively related to profitability. Additionally, it was discovered that businesses spend a lot of money on advertising, while research and development expenses are the least leveraged. Aivazian (2005) analysed the "The impact of leverage on firm's investment Canadian evidence" impact of leverage on investment on Canadian industrial companies covering the period from 1982 to 1999. They discovered a bad correlation between investment and leverage and that low-growth enterprises are likelier to experience this correlation than high-growth ones.

Narender and Sharma (2006) concluded in the study entitled "Determinants of Capital Structure in Public Enterprises", and the study found that the tangibility of assets influenced the leverage in the price-earnings ratios. Singh and Chitto (2008) analyzed in the study "Does financial leverage influence Investment Decision. The case of Mauritian Firms?" the study inferred that leverage has a significant negative effect on investments and suggested it is not the case for the high-growth firm.

Kumamangalam and Govindasami (2010) have examined the impact of leverage on the profitability of selected cement companies in India. It describes the connection between the debt-equity ratio and earnings per share, as well as the efficiency with which the company uses debt financing. The study's findings suggested a positive relationship between leverage, profitability, and growth and that leverage affected a firm's profitability. Virani (2010), in the study "impact of leverage on the profitability of pantaloon retail India Ltd," stated that finance decision was concerned with selecting the correct mix of debt and equity in its capital structure. According to the study's findings, for the company to prepare for future growth, it should restructure its capital structure and how it utilizes its capacity. Peswani (2011) found that Marico industry Ltd is more highly leveraged than Britannia Industries Ltd. Even though both companies had similar levels of profitability, the stockholders of the highly leveraged company received a significantly higher return on their equity investment.

Khalid (2012) examined "the determinants of leverage of listed companies" in the study. It was discovered that there was no meaningful connection between industries and services. The study's conclusions showed a strong correlation between leverage, growth rate, liquidity, and tangibility. Olayinka and Taiwo (2012) examined "Profitability and leverage: Evidence from Nigerian firms" the study analyzed the profit profile of firms in Nigeria and found that leverage impacts profitability.

Khushbakht (2013) observed in the study and concluded that there is a positive correlation between ROA and DFL, while there is a negative correlation between ROA and DOL. The relationship between DFL and ROI is the opposite, and the link between DOL and ROI is equally adverse. According to the correlation results, DFL and EPS have a strong association, but DOL and EPS have a negative correlation. The conclusion demonstrates that DFL and DOL have no appreciable impact on ROA, ROE, ROI, or EPS. Khaled et al. (2013) examined in the study entitled "Impact of Leverage and Managerial Skills on Shareholders' Return" A sample research paper entitled "Leverage, governance and wealth effects of asset purchasers" The research, which focused on 670 different companies, concluded that announcement-period returns decrease with the Z-score of the seller. This suggests that buyers benefit from the lower liquidity of assets sold by sellers who are in greater financial distress and have a lower debt capacity.

Patel (2014) delineated in the study entitled "Impact of leverage on profitability: A study of sabar dairy". The study's conclusions demonstrated that Sabar Dairy has effectively used operating, financial, and total leverage. Edwin et al. (2014) inferred in the study titled "financial leverage and performance variance among banks. Evidence of tier commercial banks listed on Nairobi security exchange Kenya" that the analysis showed a negative correlation between debt asset ratio and ROAC and ROCE though not found significant. Yadav (2014) examined the study entitled "Determinants of the capital structure and financial leverage: Evidence of selected Indian companies". The study discovered a connection between capital structure determinants and financial leverage.

Pandey and Prabhavathi (2016) found in the study and the result of the simple and multiple regression inferred return on capital employed, return on equity, return on debt, net worth, reserve fund, borrowings, investment as well as gross fixed assets have a significant impact of financial leverage which means that the debt cost is strongly associated with the returns of the firms. Pandey et al. (2016) investigated in the study that there is a significant and negative relationship between leverage and firms' profitability.

Analysis and Interpretation Regression Model used for Analysis

A statistical method known as regression analysis can be used to estimate the connections that exist between different variables. When the focus is placed on the relationship between a dependent variable and one or more independent variables (also known as "predictors"), it encompasses various modelling and analysis approaches for multiple variables.

The statistical technique known as regression investigates the likelihood of a connection between a single response variable (typically denoted by Y) and several other factors subject to change. It considers both the independent and dependent variables and measures their effects.

Correlations Analysis

Both correlation and regression analysis determines how the relationships between various variables are structured. A correlation coefficient is a statistical tool that helps determine the strength of a linear relationship between two variables. The correlation coefficient always returns values in the range of -1 to +1.

Correlations are useful because they may illuminate a hypothesised link and demonstrate how that hypothesis can be implemented.

The following table presents the sample units' average, standard deviation, and compound annual growth rate (CAGR) of the ROA, ROE, and EPS. This information may be found in the column headings. The standard deviation is a statistical measure of variety or variability used in probability theory and statistics. It indicates

the variation or dispersion from the average value (mean or expected value). If the standard deviation is low, this suggests that the data points frequently fall close to the mean, as opposed to a large standard deviation, which shows that the data points are distributed throughout a broad range of values.

The compound annual growth rate is an average (CARG). The term "growth rate" refers to the geometric average of annual growth rates calculated over some years.

$$\text{CAGR} = ((\text{Ending value/Starting value})^{(1/\text{Number of years})} - 1)$$

The compound annual growth rate (CAGR) is a metric that can show an investor how one company has performed to other stocks in the same industry or a market index. The compound annual growth rate (CAGR) can also be used to compare the historical returns of equities to those of bonds or savings accounts. When utilizing the CAGR, it is necessary to keep two things in mind: Because CAGR does not take into account the risk of an investment, one must use the same periods. A negative CAGR indicates that there may be large fluctuations from one year to the next and that volatility is not reflected in the CAGR figure. The compound annual growth rate (CAGR) is a pro forma number that provides a "smoothed" annual yield. Its purpose is to demonstrate a steady growth rate even though the value of the underlying investment can fluctuate significantly. When making investment decisions, it is essential to consider volatility, also known as investment risk.

Operating leverage

It gauges the rate at which rising sales translate into rising operating income. It is a gauge for leverage and the riskiness or volatility of an organization's operating income.

$$OL = \frac{EBIT}{SALES}$$

Financial leverage:

It measures the proportion of a company's total assets invested in fixed-income securities such as debt and preferred stock. The use of more debt financing by a company leads to a greater degree of financial leverage.

$$FL = \frac{DEBT}{EQUITY}$$

Combined leverage:

The leverage ratio is a metric that quantifies the combined effect of operational leverage (OL) and financial leverage (FL) on profits per share. This metric is calculated based on a given change in sales.

$$CL = FL * OL$$

Return on Asset:

It is a measurement of how profitable a company is compared to its total assets. The ROA provides insight into the efficiency with which management generates profits from its assets. ROA is typically presented as a percentage and is arrived at by dividing the annual earnings of a business by the sum of all of its assets. The phrase "return on investment" is another name for this concept.

$$ROA = \frac{\text{Profit Before Tax}}{\text{Total Asset}}$$

Return on Equity:

The percentage of total shareholder equity was repaid from the company's net income as a whole. A

corporation's profitability can be determined by examining its return on equity, the profit it generates from the money shareholders have invested in the company.

$$ROE = \frac{\text{Profit Before Tax}}{\text{Equity}}$$

Earnings per share:

A portion of a company's profit is allocated to each share of common stock currently outstanding. Earnings per share are one measure that can be used to evaluate a company's profitability. It is deducted directly from the account that details profits and losses.

Figure 1

The trend of operating leverage of the pharmaceutical industry in India over the period under study
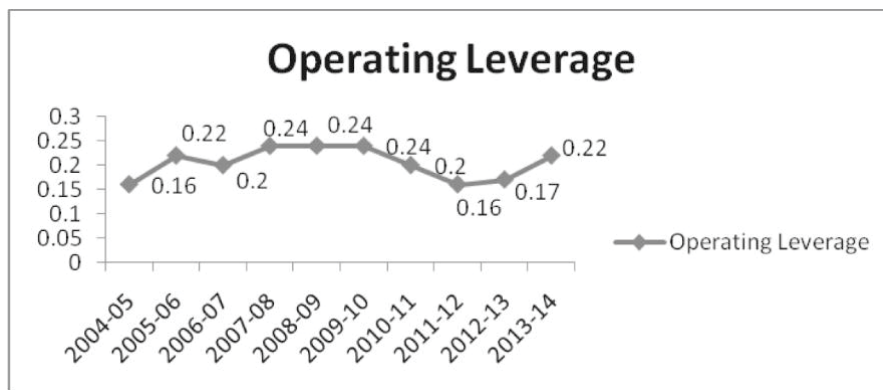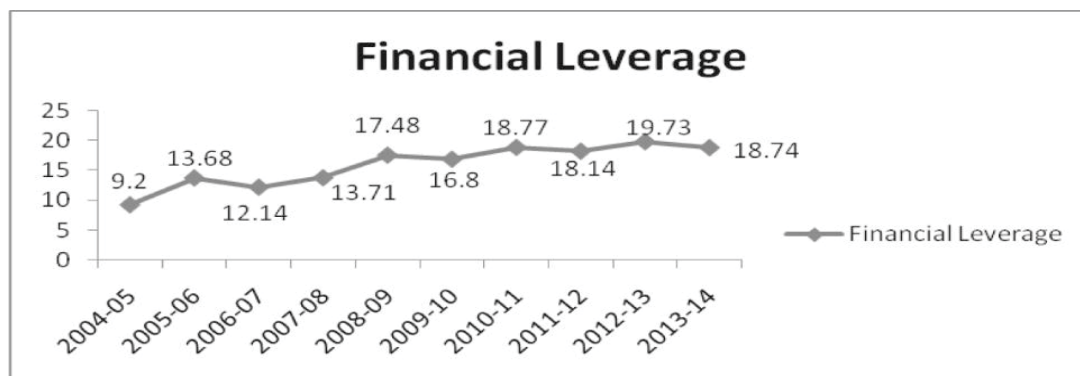

Source: Computed results based on compiled data collected from moneycontrol.com

Figure 1 shows that operating leverage fell precipitously between 2010 and 2011. Following that, corporate leverage fell in the following year, 2011–2012, while operating leverage rises in the following year, 2012–2013. Throughout the research period, did every sample unit have a positive value? Following a sharp decline in operational leverage in the years 2004–2005, there was an increase in operating leverage in 2005–2006, as well as a return to normal operating leverage in the years 2007–2008, 2008–2009, and 2009–2010.

Figure 2

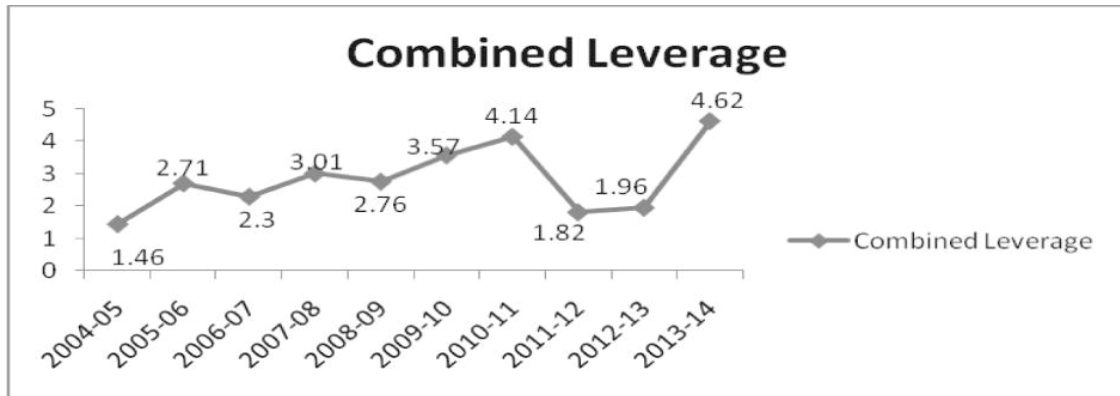**The trend of Financial leverage of the Pharmaceutical industry in India over the period under study**

Source: Computed results based on compiled data collected from money control

Figure 2 demonstrates that financial leverage fell precipitously between 2005 and 2006. Then, throughout 2011–

12 and 2008–09, there was a decline in financial leverage and an increase in operating leverage, respectively. Throughout the research period, every sample unit has a positive value. After a sharp decline in operational leverage in 2009–2010, financial leverage increased in 2010–2011, and operating leverage returned to normal in 2011–2012, 2012–2013, and 2013–2014.

Figure 3

The trend of combined leverage of the pharmaceutical industry in India over the period under study
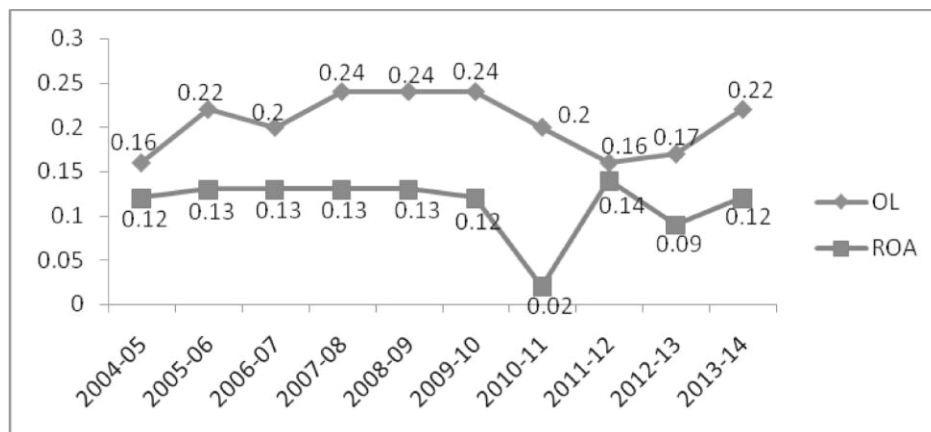

Source: Computed results based on compiled data collected from money control

Figure 3 demonstrates a sharp decline in total leverage from 2011 to 2012. The combined leverage then decreases in the following year, 2012–2013, and increases in the following year, 2013–2014. Throughout the research period, every sample unit has a positive value. Following a sharp decline in operating leverage in 2006–2007, financial leverage increased in 2007–2008, and combined leverage continued to climb in 2009–2010 and 2010–2011.

Figure 4

The trend of Operating leverage and return on asset of the pharmaceutical industry in India over the period under study
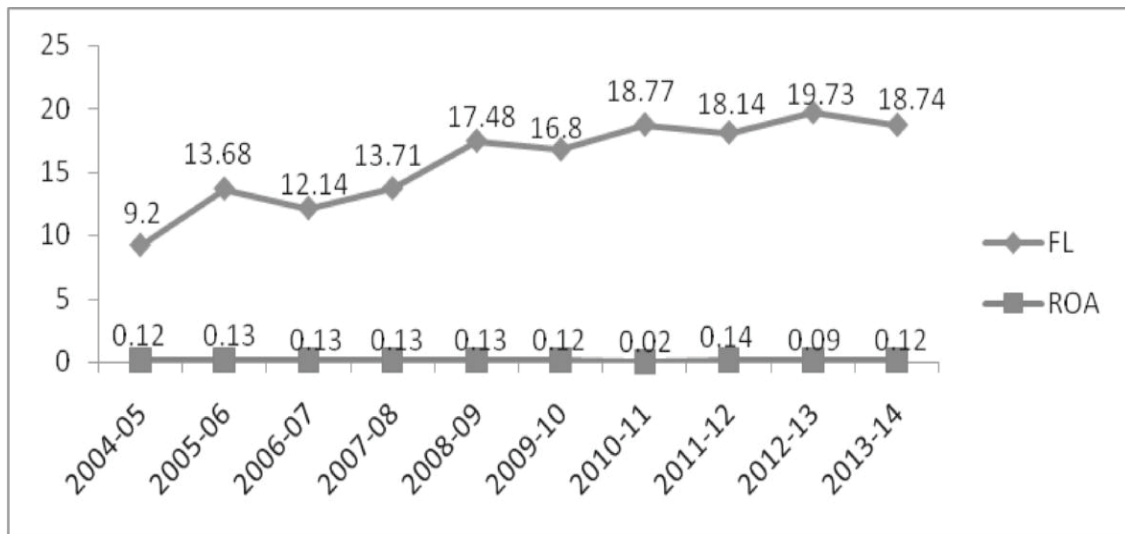

Source: Computed results based on compiled data collected from money control.

Operating leverage and Return on Asset have a positive connection, as seen in Figure 4. In 2005–2006, there was a significant increase in OL, and in the years 2010–11 and 2011–12, there was a slight decline. Additionally, the ROA remained consistent from 2004–2005 to 2009–2010. ROA increases as OL decreases and vice versa. When the ROA was raised, OL for 2010–2011 decreased. However, ROA shows a slight decline in the following years, followed by an increase, while OL gradually rises in the following years.

Figure 5

The trend of Financial leverage and return on asset of the Pharmaceutical industry in India over the period under study
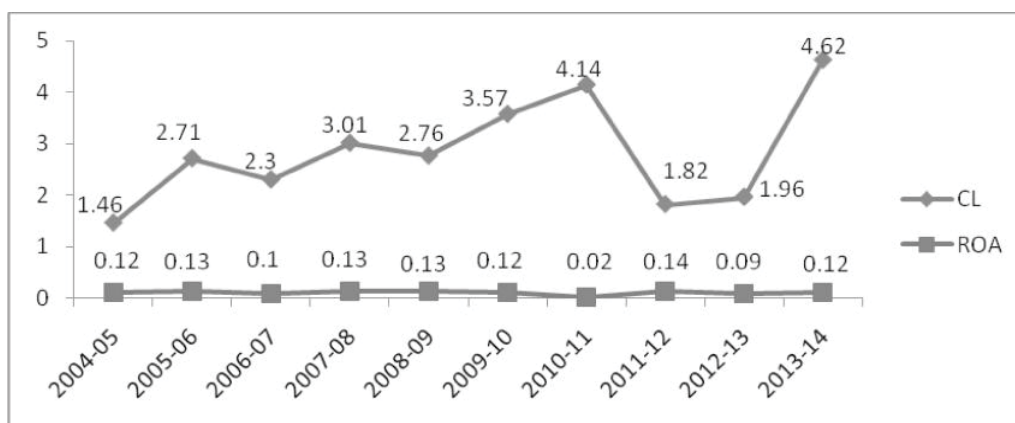

Source: Computed results based on compiled data collected from money control.

   As can be seen in Figure 5, there is a positive correlation between the use of financial leverage and the return on assets. i.e., ROA will rise when FL rises and vice versa. The FL indicates a sharp spike in 2007–2008 and an increase in the following years. The FL for the previous year indicates a decline in 2009–2010, a reduction in the first year 2004–2005, and a little gain in the second year 2005–2006. Following that, ROA stays constant till the years 2008 and 2009.

Figure 6

The trend of Combined leverage and return on asset of the Pharmaceutical industry in India over the period under study

Source: Computed results based on compiled data collected from money control.

Figure 6 demonstrates the positive link between CL and ROA, which means that when CL decreases, ROA rises and vice versa. The CL indicated a significant decline in 2011–2012. and rise in the years to follow. Both the CL and ROA showed increases in 2013–2014. and a sharp decline in 2006–07, whereas ROA increased in 2007–08 and only slightly increased in 2005–06. The following years see little change in ROA, and 2010–11 sees a decline.

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Figure 7

The trend of Operating leverage and Return on Equity of the Pharmaceutical industry in India over the period under study
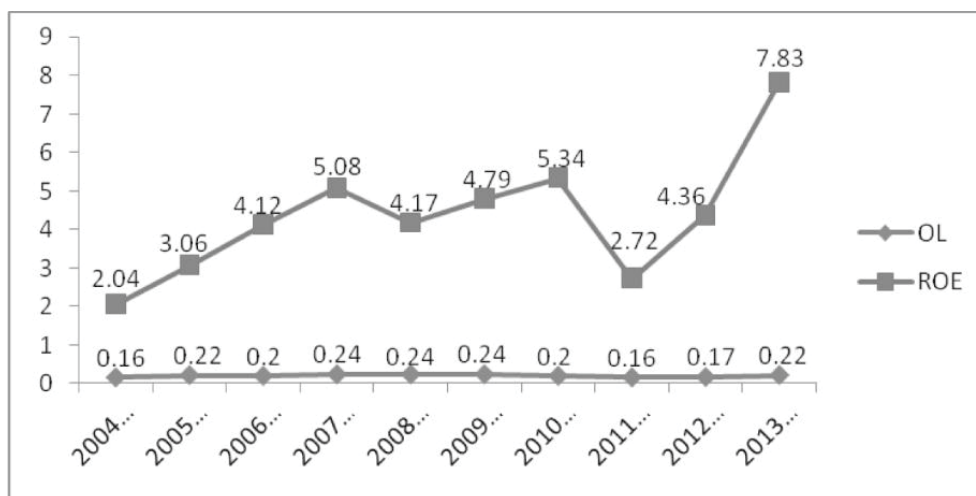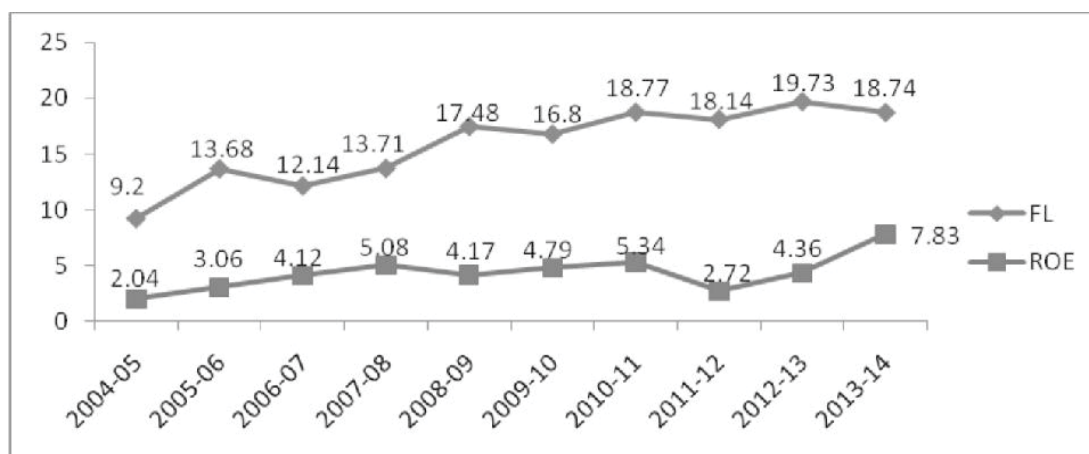

Source: Computed results based on compiled data collected from money control.

Figure 7 demonstrates the positive link between OL and ROE. The years 2013–2014 see a significant increase. And in the years 2011–2012, there was a tiny decline. In 2010–2011, the ROE increased while the OL decreased, and vice versa. ROE decreases as OL increases. Additionally, during the research period, OL is unchanged. The ROE shows a sharp increase from 2004–05 to 2007–08, followed by a modest decline the following year.

Figure 8

The trend of Financial leverage and Return on Equity of the Pharmaceutical industry in India over the period under study

Source: Computed results based on compiled data collected from money control.

Figure 8 demonstrates the favourable relationship between FL and ROE. The FL demonstrates a significant increase in 2010–11, followed by a decrease in the year. This year, the ROE is growing, although the FL is going down, and vice versa. In the years that followed, both FL and ROE suffered an increased number of highs and lows.

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Figure 9

The trend of Combined leverage and Return on Equity of the Pharmaceutical industry in India over the period under study

Source: Computed results based on compiled data collected from money control.

Figure 9 demonstrates the favourable association between CL and ROE. In 2013–2014, that was the time when CL progressively increased in ROE. While CL declined in 2011–12, ROE is also declining in the same year, indicating that CL and ROE will experience similar ups and downs over the next years. Next was a sharp decline in CL in 2008–2009, and there were similar levels of volatility in CL and ROE in the following year, 2009–2010.

Figure 10

The trend of Operating leverage and Earnings per share of the Pharmaceutical industry in India over the period under study
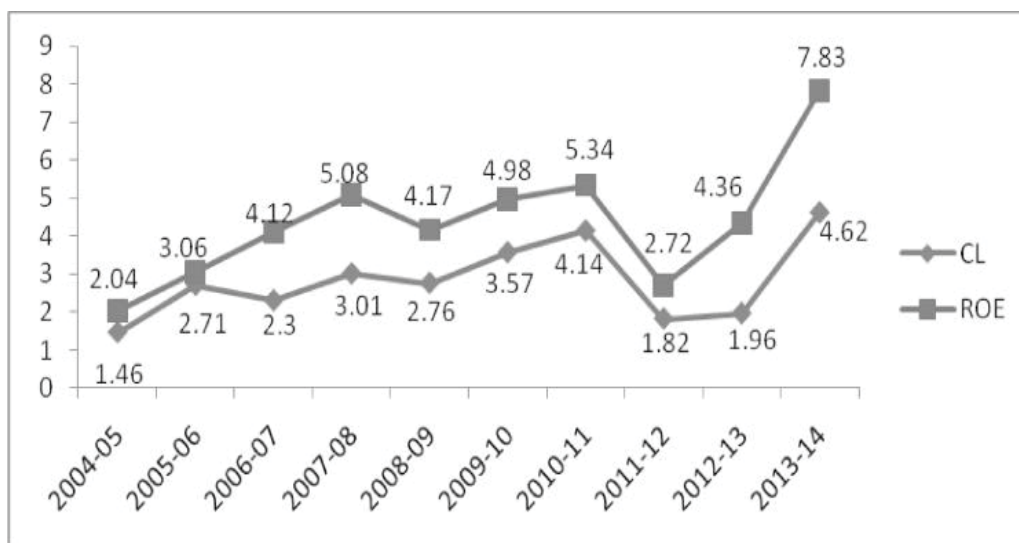

Source: Computed results based on compiled data collected from money control.

Figure 10 demonstrates the favourable association between OL and EPS. EPS significantly increased in 2007-2008 and somewhat decreased in 2009-2010. And during the research time, the OL is unchanged. OL declines as EPS rises and vice versa. However, the OL shows a tiny decline in the next years before remaining unchanged, but the EPS steadily rises in the following years.

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Figure 11

The trend of Financial leverage and Earnings per share of the Pharmaceutical industry in India over the period under study

Source: Computed results based on compiled data collected from money control.

Figure 11 displays the EPS, demonstrating that it increased in the first year when the FL increased by an identical amount. However, the EPS fluctuates more in the following years compared to FL. The EPS fell significantly in the 2012–2013 fiscal year while FL increased, and vice versa. And a small change during the following years.

Figure 12

The trend of Combined leverage and Earnings per share of the Pharmaceutical industry in India over the period under study

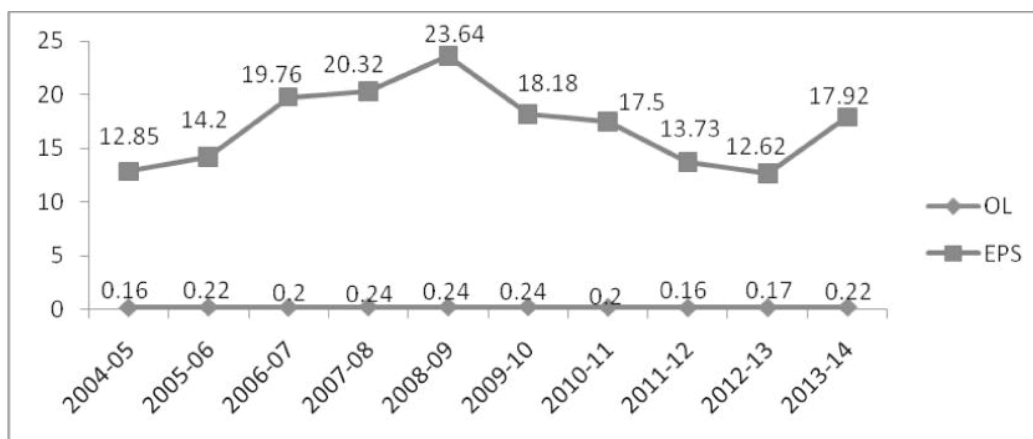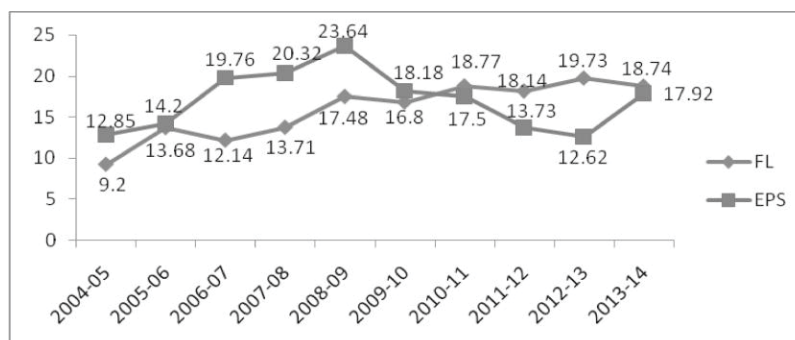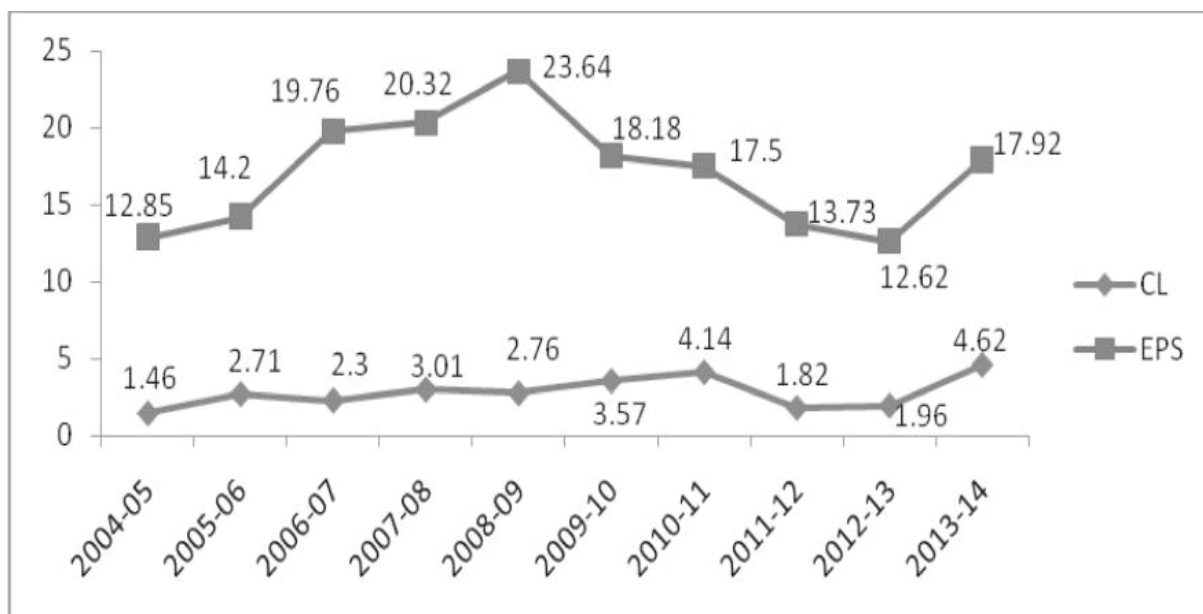**Source:** Computed results based on compiled data collected from money control.

Figure 12 demonstrates the favourable association between CL and EPS. The EPS indicates a sharp increase in 2008–2009 and a decline in the following year. Following a severe decline the previous year, the EPS increased in 2013–2014. Additionally, EPS decreased in 2012–2013, whereas CL increased in 2010–11.

Regression analysis

Table 1

Regression analysis of corporate leverage (CL) with Profitability of Pharmaceutical Industry.

Model	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ROA	-0.055	0.319		-0.171	0.865
OL	0.582	0.137	0.584	4.254	0.000
R^2					0.341
Adjusted R^2					0.322
F-Static					18.095
Durbin-Watson					2.156

Source: Computed results based on compiled data collected from NSE

According to Table 1, OL has a sizable positive coefficient (4.254) on ROA in India's pharmaceutical business. H01: "Operating Leverage does not have an impact on ROA" is rejected at 1% level: with Adjusted R2 0.322. In the overall regression model, the changes in ROA are represented by R2 at a rate of 34%. According to the F statistics (18.095), which are significant at the 1% level, the variance in the predictor variable is responsible for explaining a significant portion of the variance in the response variable.

Table 2

Regression Results of OL on ROE of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ROE	-1.015	15.528		-0.065	0.948
OL	21.817	6.656	0.485	3.278	0.000
R^2					0.235
Adjusted R^2					0.213
F-Static					10.743
Durbin-Watson					2.079

Source: Computed results based on compiled data collected from NSE

According to Table 2, OL has a sizable positive coefficient (3.278) on ROA in the Indian pharmaceutical industry. H02: "Operating Leverage does not have an impact on ROE" is rejected at 1% level: with Adjusted

R2 0.213. The changes in ROA that R2 accounts for in the overall regression model make up 23% of the total. According to the F statistics (10.743), which are significant at the 1% level, the variance in the predictor variable can largely explain the variance in the response variable.

Table 3

Regression Results of OL on EPS of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
EPS	11.015	51.245		0.215	0.831
OL	78.277	21.967	0.516	3.563	0.001
R^2					0.266
Adjusted R^2					0.245
F-Static					12.698
Durbin-Watson					2.378

Source: Computed results based on compiled data collected from NSE

According to Table 3, OL has a sizable positive coefficient (3.563) on EPS in the Indian pharmaceutical business. H03: "Operating Leverage does not have an impact on EPS" is rejected at 1% level: with Adjusted R2 0.245. R2 denotes the overall regression model, responsible for 26% of the variations in EPS. According to the F statistics (35.915), which are significant at the 1% level, the variance in the predictor variable significantly explains the variance in the response variable. This is the case even though the significance level is only 1%.

Table 4

Regression Results of FL on ROA of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ROA	1.349	0.233		5.78	0.000
FL	-0.001	0.001	-0.248	-1.516	0.139
R^2					0.062
Adjusted R^2					0.035
F-Static					2.298
Durbin-Watson					1.563

Source: Computed results based on compiled data collected from NSE

According to Table 4, FL has a non-significantly negative coefficient (-1.516) on EPS in the Indian pharmaceutical business. H04: "Financial Leverage does not have an impact on ROA" is accepted, with Adjusted R2 0.035. The overall regression model's representation provided by R2 is responsible for 6% of the variations in ROA. The significance of the F statistic, which was calculated to be 2.298, demonstrates that the variance in the predictor variable significantly explains the variance in the response variable.

Table 5

Regression Results of FL on ROE of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ROE	39.337	10.822		3.635	0.000
FL	0.026	0.042	0.106	0.628	0.534
R^2					0.110
Adjusted R^2					-0.170
F-Static					0.395
Durbin-Watson					1.617

Source: Computed results based on compiled data collected from NSE.

Table 5 demonstrates that FL has a negligible coefficient (0.628) on ROE in the Indian pharmaceutical industry. H05: "Financial Leverage does not have an impact on ROE" is accepted with Adjusted R2 (-0.170). R2 can represent the overall regression model and is responsible for 11% of the variations in ROE. According to the F statistics (0.395), which are significant, the variance in the predictor variable can significantly explain the variance in the response variable.

Table 6

Regression Results of FL on EPS of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
EPS	181.94	36.543		4.979	0.000
FL	-0.071	0.141	-0.084	-0.502	0.619
R^2					0.070
Adjusted R^2					-0.210
F-Static					0.252
Durbin-Watson					1.892

Source: Computed results based on compiled data collected from NSE

According to Table 6, FL has a non-significantly negative coefficient (-0.502) on EPS in the Indian pharmaceutical industry.   H06: "Financial Leverage does not have an impact on EPS" is accepted with Adjusted R2 (-0.210). The percentage of change in EPS that can be attributed to R2's representation in the overall regression model is 7%.   According to the F statistics (0.252), which indicate a significant significance level, the variance in the predictor variable significantly explains the variance in the response variable.

Table 7

Regression Results of CL on ROA of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
ROA	1.275	0.243		5.245	0.000
CL	-0.005	0.005	-0.155	-0.929	0.359
R^2					0.240
Adjusted R^2					-0.040
F-Static					0.863
Durbin-Watson					1.527

Source: Computed results based on compiled data collected from NSE

Table 7 demonstrates that the impact of CL on ROA in the Indian pharmaceutical industry is non-significantly negative (-0.929). H07: "Combined Leverage does not have an impact on ROA" is accepted at a 5% level: with Adjusted R2 (-0.040). The overall regression model, which R2 represents, is responsible for 24% of the variations in ROA. The fact that the F statistic has a significance level of 0.863 indicates that the variance in the predictor variable significantly explains the variance in the response variable.

Table 8

Regression Results of CL on ROE of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
ROE	32.841	10.749		3.055	0.000
CL	0.376	0.24	0.256	1.566	0.126
R^2					0.650
Adjusted R^2					0.390
F-Static					2.451

Durbin-Watson	1.652

Source: Computed results based on compiled data collected from NSE

Table 8 demonstrates that CL has a non-significant Coefficient (1.566) on ROE in the Indian pharmaceutical sector. H08: "Combined Leverage does not have an impact on ROE" is accepted with Adjusted R2 (0.390). R2 denotes the overall regression model and is responsible for predicting 65% of the variations in ROE. According to the F statistics, a significant amount of the variance found in the predictor variable can be accounted for by the variance found in the response variable.

Table 9

Regression Results of CL on EPS of Automobile Industry in India from 2005 to 2014

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
EPS	163.92	37.428		4.38	0.000
CL	0.24	0.836	0.048	0.287	0.776
R^2					0.020
Adjusted R^2					-0.026
F-Static					0.082
Durbin-Watson					1.919

Source: Computed results based on compiled data collected from NSE

Table 9 shows CL's non-significant Coefficient (0.287) on EPS in India's pharmaceutical industry. H09: "Combined Leverage does not have an impact on EPS" is accepted with Adjusted R2 (-0.026). R2 denotes the overall regression model, responsible for 2% of the variations in EPS. According to the F statistics, which show that the value of 0.082 is significant, it can be concluded that the variance in the predictor variable significantly explains the variance in the response variable.

Table 10

Pearson Bivariate correlation of Corporate Leverage on Profitability of Pharmaceutical Industry in India from 2005 to 2014.

		OL	FL	CL	ROA	ROE	EPS
OL	Pearson Correlation	1					
	Sig. (2-tailed)						
FL	Pearson Correlation	-0.082	1				
	Sig. (2-tailed)	0.631					

CL	Pearson Correlation	0.117	.904**	1			
	Sig. (2-tailed)	0.490	0.000				
ROA	Pearson Correlation	.584**	-0.248	-0.155	1		
	Sig. (2-tailed)	0.000	0.139	0.359			
ROE	Pearson Correlation	.485**	0.106	0.256	.626**	1	
	Sig. (2-tailed)	0.002	0.534	0.126	0.000		
EPS	Pearson Correlation	.516**	-0.084	0.048	.753**	.778**	1
	Sig. (2-tailed)	0.001	0.619	0.776	0.000	0.000	
**. Correlation is significant at the 0.01 level (2 -tailed).							

Table 10 demonstrates the link between the numerous independent and dependent variables utilized in the study in the table above. H010: "There is no significant relationship between corporate leverage and Profitability (ROA, ROE, and EPS)." It explains that there is a positive correlation between OL, ROA, and ROE, as well as EPS, which means that as OL increases, so do ROA, ROE, and EPS. In other words, a higher OL leads to higher ROA, ROE, and EPS. The study found a negative correlation between FL, ROA, and EPS, indicating that FL will increase while ROA and EPS will decrease. As a result of the negative correlation between CL and ROA, an increase of 1% in CL will result in a 1% decrease in ROA.

Results of Descriptive Statistics

- Out of the 37 pharmaceutical companies picked in India, Exide Industries has the highest Operating Leverage of 5.61, equating to a greater marginal profit. This is because Exide Industries has a larger customer base.

- One of the 37 pharmaceutical enterprises in India was selected because it had the highest financial leverage (984.09), which indicates a substantial reliance on fixed-income securities.

- The organization has the biggest combined leverage of 141.46 out of the 37 pharmaceutical businesses in India that were examined, which shows that the company's fixed expenditures allow the organization earn considerable profits.

- One of India's 37 pharmaceutical companies achieved the highest return on assets, at 5.02 percent.

- Out of the 37 different Indian automakers, the business that has generated the highest return on equity (225.97)

- The selected 37 Indian pharmaceutical businesses had the greatest earnings per share (598.65), indicating that each individual asset's price in the pharmaceutical sector would rise.

The theories created to investigate the effects of particular financial factors on corporate Regression and correlation models were used to evaluate leverage. Regression and correlation model outcomes demonstrate that:

Findings of Regression Model:

- The H01: Operating Leverage does not affect Return on Asset at a 1% level is rejected since Operating

Leverage (OL) is a key predictor of Return on Asset (ROA).   Thus, it may be said that OL significantly "impacts" ROA.

- The H02: Operating Leverage does not have a major influence on Return on Equity at a 1% level is rejected since Operating Leverage (OL) is a significant predictor of Return on Equity.   Therefore, it may be concluded that OL significantly "impacts" ROE.

- The H03: Operating Leverage does not influence Earnings per Share significantly at 1% level is rejected since Operating Leverage (OL) is a substantial predictor of Earnings per Share (EPS). As a result, it is discovered that OL significantly affects EPS.

- Accepting the H04: Financial Leverage Does Not Affect Return on Asset as Financial Leverage (FL) is Not a Significant Determinant of Return on Asset (ROA). Therefore, it may be said that FL does not affect ROA.

- Financial leverage (FL) does not significantly influence Return on Equity (ROE), supporting the hypothesis (H05) that financial leverage does not affect Return on Equity. Therefore, it may be concluded that FL does not affect ROE.

- Financial leverage (FL) does not significantly influence earnings per share (EPS), supporting hypothesis 6, that financial leverage does not affect earnings per share. As a result, it is determined that FL does not affect EPS.

- The H07: Combined Leverage Does Not Affect Return on Asset is accepted because combined leverage (CL) is not a significant predictor of return on asset (ROA). Therefore, it may be said that CL does not affect ROA.

- The H08: Combined Leverage Does Not Affect Return on Equity is accepted because combined leverage (CL) is not a significant predictor of return on equity (ROE). Therefore, it may be concluded that CL does not affect ROE.

- The H09: Combined Leverage Does Not Affect Earnings Per Share is accepted since the combined leverage (CL) is not a significant predictor of earnings per share (EPS). As a result, it is determined that CL does not affect EPS.

Findings of Correlation Model:

The OL's corporate leverage is positively correlated with ROA, ROE, and EPS, whereas the FL's corporate leverage is negatively correlated with ROA, EPS, and the CL's corporate leverage is similarly negatively correlated. H010: Corporate leverage and profitability have no appreciable link (ROA, ROE, and EPS). Consequently, it may be said that OL with ROA, ROE, and EPS have positive correlations whereas FL with ROA, EPS, and CL with ROA have negative correlations.

Conclusion

According to the data shown above, it is possible to conclude that FL and CL do not significantly impact profitability measures. On the other hand, OL does have a significant impact on the ROA, ROE, and EPS of the pharmaceutical sector in India.

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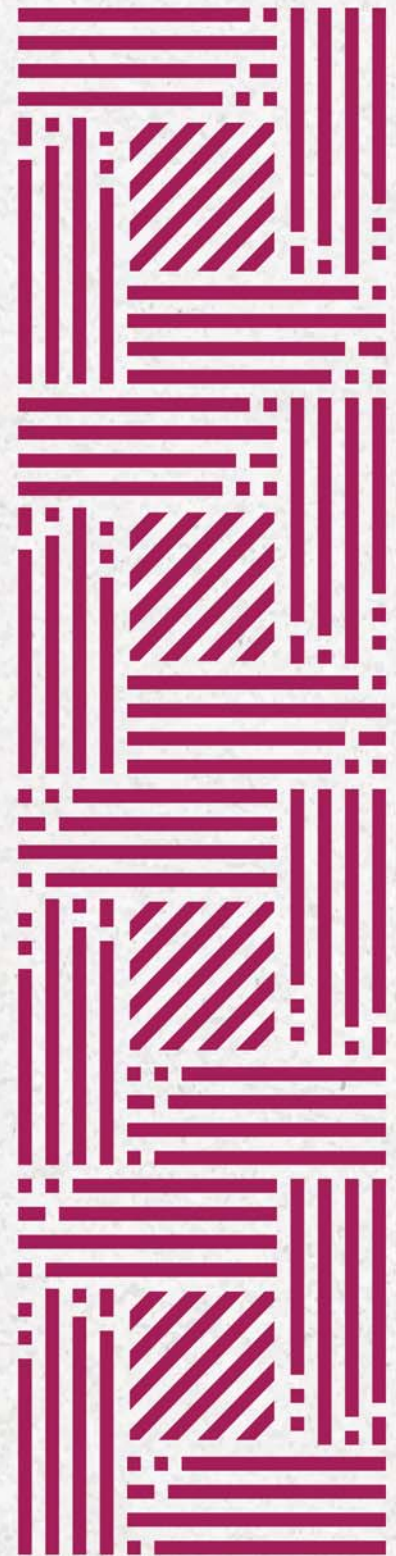## OF INDIA ON THEIR MARKET VALUE AND PROFITABILITY

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