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Examining the Factors Affecting the Return on Investment with Reference to the Selected Pharma Companies in India – A Panel Data Analysis

Mr. Varun, Dr. Pujari Sudharsana Reddy

MBA, Faculty of Management Studies, CMS Business School, Jain deemed to be University, Bangalore, India

Assistant Professor, Faculty of Management Studies, CMS Business School, Jain deemed to be University,
Bangalore, India

ABSTRACT: The present research work aims to explore the factors that influence the Return on Investment (ROI) and for that ROI is taken as the dependent variable and liquidity ratios like current ratio, quick ratio and cash ratios, fund raising costs i.e., cost of equity, cost of debt and weighted average cost of capital (wacc), profitability ratios like gross profit ratio, net profit ratio, return on total assets, return on non-current assets and return on tangible non-current assets are taken as independent variables. Apart from these independent variables, age of the company and size of the board of directors are also taken as independent variables. To understand the relationship between the above mentioned dependent and independent variables, four pharma companies which are listed in the Indian stock markets are taken, they are Dr Reddy's Lab, Sun Pharma, Cipla and Divis Lab are chosen. The data regarding the variables are collected from the annual reports of the respective companies from 2006-07 to 2022-23. Panel Data regression and correlation techniques have been applied to regress the dependent variable. It is evident that the liquidity ratios are negatively influencing the ROI, profitability ratio i.e., net profit ratio and return on total assets are positively influencing the ROI and fund-raising costs i.e., cost of equity and weighted average cost of capital are also negatively influencing the dependent variable ROI.

KEYWORDS: return on investment, profitability, liquidity, fund raising costs, age of the company, size of the board

I. INTRODUCTION AND LITERATURE REVIEW

1.1 RATIONALE FOR THE STUDY AND MOTIVATION

This study aims to bring useful insights for the stakeholders who are involved in the investing business and want to make investments in the Pharmaceutical industry in India. The project aims to deliver the important factors that can help the investors to take informed decisions about investing in the Indian Pharma market. Geographical Focus: The study will pay close attention to the pharmaceutical sector in India, taking into account the enterprises that are based there. Time Scope: To guarantee consistency and usefulness of data, the research will take into account the data from 2007 to 2023 only for 4 pharma companies in India. Data gathering: For the project, financial data and pertinent information will be gathered from publicly accessible sources such annual reports, financial statements, financial websites and databases. Capital structure being represented by cost of capital and profitability indicator being net profit and WACC will be the project's two main areas of concentration.

Sample Selection: To ensure variety in terms of size, ownership structure, and financial performance, a representative sample of pharmaceutical sector enterprises will be chosen. Statistical Analysis: To ascertain the link between cost of capital and profitability and to pinpoint any important elements impacting cost of capital decisions, the research will make use of the necessary techniques.

1.2 STATEMENT OF RESEARCH PROBLEM

Project specific problems are as follows:

- 1) to investigate the cost of capital of Indian pharma sector enterprises.
- 2) to examine pharmaceutical industry businesses in India's profitability metrics.
- 3) to look at the connection between India's pharmaceutical industry's financial structure and profitability.

1.3 REVIEW OF LITERATURE

1) The study by **Suresh et al.** (2021) investigates the determinants of capital structure among firms listed on the Bombay Stock Exchange (BSE) in India, with the debt-equity ratio as the dependent variable. They employ multiple regression analysis to assess the influence of various factors, both autonomous and financial, on the capital structure decisions of these firms. Theoretical frameworks such as the Trade-Off Theory (TOT) and the Pecking Order Theory (POT) are considered in the analysis. TOT weighs the costs of financial distress against the benefits of tax shields associated with debt financing, while POT suggests that firms prioritize internal financing over external debt, resorting to debt financing only when internal funds are insufficient.

2) **Misztal** (2011), the relationship between savings and economic growth in countries with varying levels of economic development is investigated. The study employs GDP and GDS (domestic savings rate) as variables and utilizes the ordinary least squares (OLS) method for analysis. The research findings suggest a positive correlation between the domestic savings rate (the proportion of domestic savings in GDP) and the economic growth rate. Specifically, the study concludes that higher domestic savings rates tend to be associated with higher rates of economic growth. Moreover, the results of the research demonstrate consistency with economic growth theories. This indicates that the relationship between savings and economic growth observed in both advanced economies and emerging/developing economies aligns with theoretical expectations. Overall, the study provides empirical evidence supporting the notion that savings play a significant role in fostering economic growth, regardless of a country's level of economic development.

3) The study by **Agustin et al.** (n.d.) focuses on examining the determinants of capital structure among regional development banks (RDBs) in Indonesia. They utilize panel data analysis, drawing information from the banks' annual reports, covering the period from 1995 to 2010. The study employs both pooled ordinary least squares (OLS) and random effect analyses. The key findings of the study reveal that regional autonomy has a negative impact on leverage among regional development banks. This suggests that increased regional autonomy leads to a reduction in the amount of debt taken on by these banks. The authors attribute this finding to the additional funding received by RDBs from local governments, which is often kept in current accounts or utilized as additional equity. Overall, the study provides insights into the capital structure determinants of RDBs in Indonesia, highlighting the influence of regional autonomy on their financing decisions.

4) The work by **Al Ani & Al Amri** (2015d, 2015a, 2015b, 2015c) delves into the Theory of Capital Structure, with a focus on demand and cost parameters, as well as strategic variables. While acknowledging the complexity of comprehensively understanding the current state of capital structure research, the authors narrow their investigation to concentrate on capital structure theory. They refrain from conducting an exhaustive analysis of empirical literature or critiquing methodologies used in previous studies. Instead, they focus on presenting empirical findings without direct implications for specific theoretical predictions. They also compare empirical evidence with theoretical results, highlighting instances where empirical findings align with or diverge from theoretical expectations.

5) The study conducted by **Velnampy & Aloy Niresh** (2012) investigates the relationship between capital structure and profitability in listed Sri Lankan banks. The study utilizes secondary data obtained from various sources, including financial statements of sample banks, the Handbook of Listed Companies 2007, annual reports of respective banks, academic journals, textbooks, and internet search engines. Specifically, the study focuses on a balanced panel of ten listed banks in Sri Lanka, analyzing data spanning from 2002 to 2009. The main variables of interest include capital structure, profitability, debt, equity, and return on equity (ROE). Through the analysis of financial statements and relevant literature, the study aims to explore the dynamics between capital structure decisions and the financial performance of banks within the Sri Lankan context.

6) The study by **Mehzabin et al.** (2023a, 2023b, 2023c) investigates the impact of capital structure, operating efficiency, and non-interest income on bank profitability in Asia. The study employs fixed effect regression models with panel data comprising 492 banks from 28 Asian countries over a 15-year period from 2004 to 2018. Key findings of the study include:

1. Total Debt Ratio and Profitability: Increased total debt ratio is found to positively influence bank profit margins. This aligns with the agency cost theory, suggesting that higher levels of debt can lead to improved profitability due to the alignment of interests between shareholders and management.

2. Operating Efficiency: Effective cost management and reduced operating expenses are identified as factors that enhance bank profitability. This highlights the importance of operational efficiency in driving profitability for banks in the Asian context.

7) **Arjun** (2014), This examination expresses that any sort of business association requires forms of capital specially fixed capital and Working capital. Fixed capital is needed to satisfy lengthy haul intake and running capital is needed for short-time period requests. The two capitals determine effectiveness level of commercial organisation association. Better strolling capital control allows in increasing gainfulness function and productivity is essential to pay comes again to the issuer's belongings, extensively comes returned to buyers. It likewise comes to a choice liquidity role. Viable running capital control can be done through appropriate supervision over steady sources, modern-day assets and deal.

8) **Athanassopoulos, Antreas.** (1995). Performance improvement decision aid systems (PIDAS) in retailing organizations using data envelopment analysis. Journal of Productivity Analysis. This paper explores the utility of Data Envelopment Analysis (DEA) models in multi-level retail organizations for strategic thinking. The article suggests three components of market efficacy that relate to different tiers of management in a multi-level setting.

9) "Capital Structure and Firm Performance: Evidence from Retail Companies in India" by Jain et al. (2020): This study investigates the relationship between capital structure decisions and firm performance in the Indian retail sector. Although it does not directly address the cost of capital and profitability, it offers insights into how financing choices, including the cost of capital components, influence the financial performance of retail companies. By examining a sample of retail firms in India, the study provides relevant insights into the broader financial dynamics of the sector.

10) **B. Mathivanan** (2009), this study expresses that the share examination is one of the systems of coins related exam wherein proportions are carried out as a measuring stick for assessing the budgetary condition and execution of agency. Investigation and translation of numerous bookkeeping percentage offers a skilled and skilled examine advanced comprehension of the cash associated scenario and execution of the company than what he may want to have received in particular via an examination of price range summaries. This examination clarified the productiveness, liquidity studies of IT businesses.

1.4 IDENTIFICATION OF THE RESEARCH GAP

Previously the researchers could not conduct a thorough analysis of the variables affecting Return on investments such as profitability, liquidity and fund raising cost the relationship between fund raising cost and return on investment has not received enough attention in the literature. There has been some research on the relationship between fund raising cost and return on investment but the finding was conflicting. In the past, the company's age and the size of its board of directors were not taken into account. This is the present research gap for our research.

1.5 THEORETICAL UNDERPINNINGS

The Formal Concept of Cost of Capital

The conceptual framework of cost of capital is based on two main tenets. According to these assumptions, the cost of capital would be the interest rate that: 1. The company has to earn on its investment in order to keep its shares at a fair market value. 2. Investors need to draw attention to their capital and be able to guide their money toward fresh investment possibilities. It is sometimes described as the "hurdle rate" that a business must clear to start making money off of investments. We concentrate on estimating the cost of capital in these sources because debt and equity financing are the most popular forms of capital financing for the majority of businesses in the business sector. The rate of return that a lending investor would want when providing funds to a company for a new investment project serves as a proxy for the cost of debt capital. It would be the lowest rate that could be obtained by the borrowing company on the borrowed funds. This rate of debt capital is calculated on an after-tax basis because the interest that businesses pay to lenders on their loans is tax deductible.

If K_b^d is the nominal interest rate (before taxes) that is paid on debt capital, and (T) is the marginal tax rate that the firm usually pays, then the after-tax rate of debt capital K_a^d is:

$$K_a^d = K_b^d(1 - \text{Tax Rate})$$

Cost of Equity Capital:

The rate of return that investors need to get in order to purchase shares in the company and become a part owner is the cost of equity capital. Regarding the company issuing the stocks, it would be the price of increasing performance and

incorporating equity into the company's financial assets in order to obtain the highest amount of equity. Dividend payments to investors are measured on a before-tax basis because they are not tax deductible and do not lower the company's taxable income in any way. Two components go into estimating the rate of return on equity capital (K_e).

1. the opportunity cost to investors of devoting a portion of their income to purchasing stocks instead of spending it now. The interest rate on 1 Year Indian Government Bond or Yield Rate on 364 Days Treasury Bill serves as a representation for this component. Its rate of return on investment (R_f) is risk-free.

2. The amount of risk that investors assume when they decide to put money into stocks rather than other, safer investment options. The risk premium (R_p) is a representation of this aspect.

The rate of return on equity capital (K_e) can, therefore, be $K_e = (R_f + R_p)$.

There are two popular approaches for estimating K_e . The dividend evaluation technique and the CAPM. The risk-free interest rate and the financial index beta (β) can be used to estimate the risk premium (R_p) for any company in the market.

The Estimated CAPM

Using the financial index beta (β), which measures a stock's risk to the risk of all securities in the market, the capital asset pricing model (CAPM) can calculate the value of the risk premium (R_p) for any stock on the market. Thus, the cost of equity capital (K_e) can be calculated as follows:

$$K_e = R_f + R_p$$

$$K_e = R_f + \beta (R_m - R_f)$$

where the market risk premium, or the difference between the risk-free rate (R_f) and the market expected rate of return (R_m), is multiplied by the financial index β to determine the risk premium (R_p).

In general, the CAPM is a technical instrument used to examine the link between the non-diversifiable market and the predicted return of a financial asset. The capital asset pricing model's central equation can be expressed as follows: given the asset Beta, the market's required rate of return (R_m), and the riskless rate of return, which is typically the rate of return on U.S. Treasury bonds (R_f), we can calculate the required rate of return on any asset :

According to this model, the risk-free rate of return would be added to the market risk premium to determine the required rate of return for any asset, provided that 1) It is the difference between the market required rate of return and the risk-free rate of return, [$R_m - R_f$]

2) It is multiplied by beta to match it to the risk index of that asset: $\beta [R_m - R_f]$

The Weighted Marginal Cost of Capital:

Different forms of capital are used by businesses to fund their new investment initiatives. Most companies attempt to maintain an optimal capital structure, where they adopt a specific combination of debt and equity capital that would minimize the overall firm's cost of capital and maximize the market stock price. This is because each type of capital has its own cost of capital and may present a different level of risk to the company. In this scenario, the percentage of each form of capital in the firm's capital structure is used to weight the composite rate that represents the marginal cost of capital.

$$(\text{Weighted Average Cost of Capital}) = \{(\text{Weight of Equity} * \text{Cost of Equity } K_e) + (\text{Weight of Debt} * \text{Cost of debt})\}$$

II. RESEARCH METHODOLOGY

2.1 SCOPE OF THE STUDY

In order to understand the variables which, affect the return on investment of a company, we have taken 4 pharmaceutical companies like Dr. Reddy's laboratories, Sun pharma, Cipla and Divis laboratories. The data has been collected from the annual reports of the respective companies from 2006-07 to 2022-23.

2.2 RESEARCH OBJECTIVES

A) To understand the relationship among the ROI and various profitability, liquidity, fund raising cost, age of the company and size the board of directors.

B) To understand how the profitability, liquidity and fund raising cost affect the return on investments.

C) To understand how the age of the company and its size of the board of directors affect the return on investments.

2.3 FRAMING OF RESEARCH HYPOTHESIS

Null hypothesis (H_0): There is no relationship between Return on Investment (ROI) and independent variable.



$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10}$

Alternative hypothesis (H1): There is relationship between Return on Investment (ROI) and independent variable.

$H_1 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10}$

2.4 RESEARCH DESIGN

To understand the impact of various profitability, liquidity, fund raising cost, age of the company and its size of the board of directors, we collected the annual data from the respective company’s annual reports. Return on investment is calculated by taking Profit before tax and interest expense is added and then divided by total funds available. Cost of equity is calculated with the help of CAPM model and the post tax cost of debt is taken for consideration so then weighted average cost of capital is calculated. Current ratio, quick ratio and cash ratio are taken as liquidity ratios and gross profit ratio, net profit ratio, return on total assets, return on non-current assets and return on tangible non-current assets are taken as profitability ratios. Age of the company and board size also considered as important independent variables for the analysis.

Return on investment (ROI) is taken as the dependent variable and on profitability, liquidity, fund raising cost, age of the company and board size are taken as independent variables.

This is the time series data as the observations of the variables are collected with reference to time. The suitable time series modelling is Panel Regression Model and Correlation Matrix. Pre and post regression tests are to be conducted for the goodness of fit and robustness of the model.

2.5 METHODS FOR DATA COLLECTION & VARIABLES OF THE STUDY SOURCES OF DATA COLLECTION

The entire research work depends on the collection of the secondary data which is collected from the annual report of the respective company. The entire data has been sourced from the annual reports which are either available at the company’s website or BSE website.

Name of the variable	Components of the variable	Formula of the variable
Return on Investment (ROI)	Profit before tax and interest component from the income statement Total funds available = Net worth of the company+ Total book value of the company	$ROI = \frac{\text{Profit before tax} + \text{Interest expense}}{\text{Total funds available}}$
Cost of equity	Risk free rate of return (Rf) Market Return (Rm) Beta of the company	$K_e = R_f + \beta(R_m - R_f)$
Cost of debt	Interest cost All external liabilities Tax rate (30%)	Post cost tax of debt $K_d = \frac{\text{Interest expense}}{\text{Total external liabilities}} * (1 - 0.30)$
Cost of capital (WACC)	Weight of equity Cost of equity Weight of debt and Cost of debt	$WACC = (\text{weight of equity} * K_e + \text{weight of debt} * K_d)$
Gross Profit Ratio	Gross Profit = Net sales revenue minus cost of material consumed Net sales revenue	$GP \text{ Ratio} = \frac{\text{Gross profit}}{\text{Net sales revenue}} * 100$
Net Profit Ratio	Net Profit = Total Sales revenue minus total operating expenses and interest cost and tax	$NP \text{ Ratio} = \frac{PAT}{\text{Net Sales Revenue}} * 100$
Return on Total Assets (ROTA)	Profit after tax (PAT) Total Net Assets	$ROTA = \frac{PAT}{\text{Total Net Assets}} * 100$
Return on Non-Current Assets (ROTNA)	Total Non-Current Assets Profit after tax	$ROTNA = \frac{PAT}{\text{Total Non Current Assets}} * 100$



Return on Tangible Non-current Assets (ROTNCA)	Profit after tax Net value of Plant, Property and Equipment (PPE)	ROTNCA = $\frac{PAT}{\text{Net Block of Fixed Assets}} * 100$
Current Ratio (CA)	Current assets like cash in hand, cash at bank, inventories, debtors, trade receivables, short term investments, pre-paid expenses and accrued incomes Current liabilities like sundry creditors, trade payables, outstanding expenses and incomes received in advance	$Current Ratio = \frac{Current Assets}{Current Liabilities}$
Quick Ratio	Quick Assets = (Current assets – inventors and trade receivables) Current liabilities	$Quick Ratio = \frac{Quick Assets}{Current Liabilities}$
Cash Ratio	Cash and cash equivalents Current liabilities	$Cash Ratio = \frac{Cash and Cash Equiv}{Current Liabilities}$
Age of the company	Age of the company is calculated by taking the year of establishment to the respective year and then the age of the company increases by one year	
Size of the BoD	Number of members in the Board of Directors is collected from the annual reports of the respective company from the respective year	

SAMPLING

Four pharmaceutical companies listed in BSE and NSE are taken for the further analysis.

SL. NO	NAME OF COMPANIES
1	Dr Reddy’s laboratories
2	Sun Pharma
3	Cipla Limited
4	Divis laboratories



III. DATA ANALYSIS AND INTERPRETATION

3.1 TECHNIQUES FOR DATA ANALYSIS

Correlation analysis: -

Table No. 1: Correlation Matrix for all the four companies

	AGE	BOD	CASH_RA TIO	COST_OF DEBT	COST_OF EQUITY	CURRENT RATIO	NET_PRO FIT_RATIO	QUICK_RA TIO	ROI	RONCA	ROTA	ROTNCA	WACC
AGE	1.00	0.31	-0.28	0.29	-0.12	-0.24	-0.35	-0.13	-0.42	0.37	0.36	0.22	-0.11
BOD	0.31	1.00	-0.45	0.16	0.17	-0.33	-0.33	-0.15	-0.20	-0.41	-0.39	-0.26	0.18
CASH_RA TIO	-0.28	-0.45	1.00	-0.08	-0.04	0.67	0.46	0.60	0.32	0.35	0.42	0.28	-0.05
COST_OF DEBT	0.29	0.16	-0.08	1.00	-0.04	-0.23	-0.26	-0.09	-0.04	-0.14	-0.06	0.21	-0.04
COST_OF EQUITY	-0.12	0.17	-0.04	-0.04	1.00	-0.04	-0.16	-0.03	0.02	-0.22	-0.22	-0.11	0.99
CURRENT RATIO	-0.24	-0.33	0.67	-0.23	-0.04	1.00	0.71	0.63	0.53	0.18	0.15	0.06	-0.04
NET_PRO FIT_RATIO	-0.35	-0.33	0.46	-0.26	-0.16	0.71	1.00	0.33	0.71	0.16	0.12	0.12	-0.17
QUICK_RA TIO	-0.13	-0.15	0.60	-0.09	-0.03	0.63	0.33	1.00	0.14	0.18	0.21	0.17	-0.04
ROI	-0.42	-0.20	0.32	-0.04	0.02	0.53	0.71	0.14	1.00	-0.07	-0.08	0.02	0.02
RONCA	0.37	-0.41	0.35	-0.14	-0.22	0.18	0.16	0.18	-0.07	1.00	0.94	0.38	-0.21
ROTA	0.36	-0.39	0.42	-0.06	-0.22	0.15	0.12	0.21	-0.08	0.94	1.00	0.51	-0.22
ROTNCA	0.22	-0.26	0.28	0.21	-0.11	0.06	0.12	0.17	0.02	0.38	0.51	1.00	-0.11
WACC	-0.11	0.18	-0.05	-0.04	0.99	-0.04	-0.17	-0.04	0.02	-0.21	-0.22	-0.11	1.00

Regression analysis: -

Table 2. Descriptive statistics

	ROI	AGE	BOD	CASH_RA TIO	COST_OF_ DEBT	COST_OF_ EQUITY	CURRENT _RATIO	NET_PROFIT _RATIO	QUICK_R ATIO	RONCA	ROTA	ROTNCA	WACC
Mean	16.43351	42.00000	9.750000	0.518601	0.980093	7.976423	3.524168	15.63391	1.165310	17.92713	7.199359	36.73778	7.002678
Median	15.99602	32.00000	10.00000	0.161554	0.332118	7.498547	2.984693	13.03141	0.922771	13.21304	6.878271	27.28289	5.749524
Maximum	35.92919	88.00000	13.00000	4.654561	5.866174	181.1926	11.33044	33.35507	6.401476	61.44600	18.75294	329.0564	160.0820
Minimum	0.115638	17.00000	7.000000	0.014471	0.003811	-117.0096	0.188393	0.211403	-9.398118	0.304522	0.144356	0.703890	-99.40684
Std. Dev.	8.392233	22.80678	1.407602	0.927317	1.228220	45.24846	2.371171	8.462554	1.843233	15.50813	5.026559	45.44767	38.70606
Skewness	0.358598	1.026270	-0.002022	3.067631	1.496992	0.751590	1.483969	0.254901	-2.060836	1.201024	0.515760	4.170597	0.829691
Kurtosis	2.400940	2.359359	2.556683	12.50537	5.260622	7.836283	5.016297	1.904404	18.28703	3.580405	2.230766	26.41140	8.274640
Jarque-Bera	2.474187	13.09946	0.556880	362.6485	39.87735	72.67268	36.47664	4.137312	710.2643	17.30233	4.691310	1750.063	86.63024
Probability	0.290227	0.001431	0.756964	0.000000	0.000000	0.000000	0.000000	0.126355	0.000000	0.000175	0.095784	0.000000	0.000000
Sum	1117.479	2856.000	663.0000	35.26487	66.64633	542.3968	239.6434	1063.106	79.24111	1219.045	489.5564	2498.169	476.1821
Sum Sq Dev.	4718.781	34850.00	132.7500	57.61440	101.0711	137177.4	376.7044	4798.193	227.6331	16113.64	1692.842	138387.9	100376.7
Observations	68	68	68	68	68	68	68	68	68	68	68	68	68



Table 3. Results of panel regression

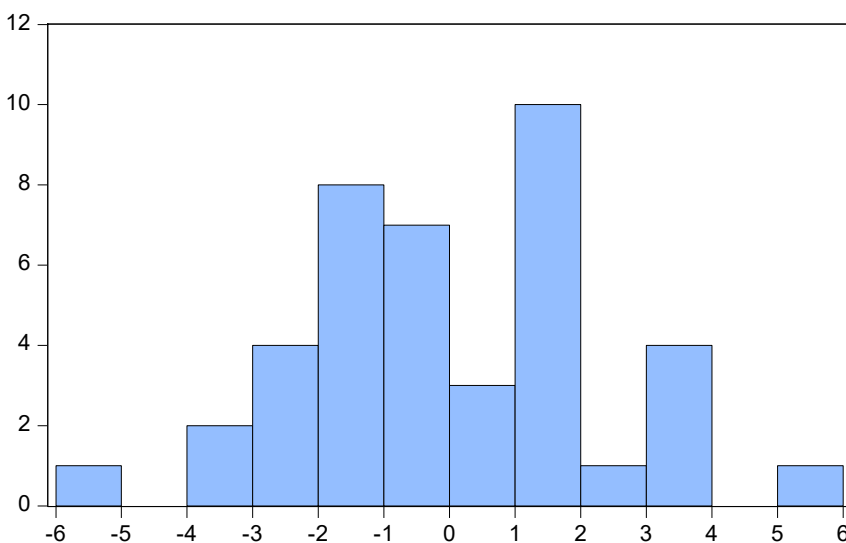
Dependent Variable: ROI
 Method: Panel Least Squares
 Date: 04/08/24 Time: 17:01
 Sample: 1 68
 Periods included: 14
 Cross-sections included: 4
 Total panel (unbalanced) observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_AGE	-0.367246	0.193883	-1.894159	0.0694
BOD	0.193371	0.497532	0.388661	0.7007
LOG_CASH_RATIO	0.114880	0.622246	0.184622	0.8550
LOG_COST_OF_DEBT	0.286621	0.416782	0.687701	0.4977
T_COST_OF_EQUITY	-17.04033	4.389163	-3.882365	0.0006
LOG_CURRENT_RATIO	1.497163	0.641548	2.333672	0.0276
LOG_NET_PROFIT_RATIO	0.016202	0.008158	1.986038	0.0577
LOG_RONCA	-0.613965	2.005705	-0.306109	0.7620
ROTA	1.122963	0.298134	3.766642	0.0009
LOG_ROTNA	-0.104979	1.478149	-0.071021	0.9439
LOG_WACC	17.73804	4.378235	4.051413	0.0004
C	40.05275	16.68767	2.400140	0.0238

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.902581	Mean dependent var	15.51212
Adjusted R-squared	0.850125	S.D. dependent var	7.602244
S.E. of regression	2.943107	Akaike info criterion	5.273040
Sum squared resid	225.2088	Schwarz criterion	5.899957
Log likelihood	-93.09733	Hannan-Quinn criterion.	5.501329
F-statistic	17.20639	Durbin-Watson stat	1.645921
Prob(F-statistic)	0.000000		



Series: Standardized Residuals	
Sample 1 68	
Observations 41	
Mean	7.04e-17
Median	-0.255646
Maximum	5.992658
Minimum	-5.946704
Std. Dev.	2.372809
Skewness	0.058306
Kurtosis	3.088282
Jarque-Bera	0.036545
Probability	0.981893



Table no. 4 Results of Residual Cross-Section dependence test

Residual Cross-Section Dependence Test
 Null hypothesis: No cross-section dependence (correlation) in Residuals
 Equation: Untitled
 Periods included: 14
 Cross-sections included: 4
 Total panel (unbalanced) observations: 41
 Test employs centered correlations computed from pairwise samples

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	2.876343	6	0.8242
Pesaran scaled LM	-0.901722		0.3672
Bias-corrected scaled LM	-1.101722		0.2706
Pesaran CD	-0.051096		0.9592

3.2 HYPOTHESIS TESTING AND METHOD

- Correlation (A statistical measure that characterises how much two variables change together is called correlation. Stated differently, it measures the degree and direction of the association between two variables.)
- Panel Regression (Panel regression is a statistical technique used to examine data sets containing observations over several time periods and/or across several people, groups, or entities. It is also referred to as pooled regression or longitudinal regression.)

3.3 DATA INTERPRETATION

Result of the correlation matrix:-

Age of the company and ROI for all the four companies is negatively associated with each other as per the correlation matrix where the degree of correlation is -0.42. ROI and size of the board of directors is negatively associated for all four companies whose degree of correlation is -0.20. The fund raising costs i.e., Cost of equity and weighted average cost of capital both are positively associated with ROI and cost of debt is negatively associated with ROI but their degree of relationship is insignificant. The net profit ratio is highly correlated with ROI whose degree of correlation is 0.71 but return on total assets and return on non current assets is negatively associated with ROI whose degree of correlation is insignificant. Liquidity ratios are positively correlated with ROI.

Result of the regression matrix:-

Checking normality of the variable is a pre-requisite for running Ordinary Least square (OLS) regression technique. Table no. 1 shows the basic characteristics of the data set the P value of the Jarque Bera test is considered for understanding whether the variables are normally distributed or not

$$H_0 = \text{the variable is normally distributed}$$

$$H_1 = \text{the variable is not normally distributed}$$

Since the P value of all the values is greater than 5% (0.05), we cannot reject the null hypothesis rather it should be accepted, meaning that all the variables are normally distributed and the variables satisfied the pre-condition of normally distributed.

Results of Panel regression test:-

Table no. 3 shows the Panel regression results. Age of the company and the cost of equity are having negative influence on the dependent variable ROI. When the age of the company increases by one year the return on investment comes down by 0.36 units vice-versa. For every one-unit increase in the cost of equity the return on investment comes down by 17.04 units vice-versa. Current ratio, net profit ratio, return on total assets and weighted average cost of capital are positively influencing the dependent variable ROI. For every one-unit increase in current ratio, net profit ratio, return on total assets and weighted average cost of capital, the ROI will come down by 0.11 units, 0.016 units, 1.12 units and 17.73 units respectively.

The adjusted R-squared value is 0.850125 (85.0125) which is more than the acceptable level of 60% meaning that all the selected variables will explain 85.0125% variation in the dependent variable ROI and rest is explained by unknown variables. The P value of the f statistics shows the robustness of the model which is highly significant.

Cross-section dependence (correlation) is tested with the help of Breusch-Pagan LM test, Pesaran Scaled LM test and displayed in Table no. 4, where the P value of the Breusch-Pagan LM test and Pesaran Scaled LM test are more than 5%, we cannot reject the null hypothesis of no Cross-Section dependence of the variables.

IV. FINDINGS AND RECOMMENDATIONS

4.1 RESEARCH OUTCOMES AND FINDINGS

- ✓ Net profit ratio and return on tangible non-current assets are positively correlated with return on investments hence the management has to concentrate on improving these ratios in order to increase the ROI.
- ✓ Return on total assets and return on non-current assets are negatively correlated with ROI since the company is making more investment on current assets. These results strongly supporting the finance theory has the more investment on current assets leading to lowering the ROI.
- ✓ The liquidity and the profitability are negatively associated with each other as per finance theory. When more investments on the current assets the less will be the ROI and vice-versa. So here, all the liquidity ratios like current ratio and quick ratio though they are positively associated with ROI but they are significant. Meaning that the company is managing proper balance between the investments on current and non-current assets.
- ✓ Finance theory demonstrates that the WACC and ROI are negatively associated with each other. ROI always depends on the WACC which is independent in nature. The weight of the equity of all the four companies on an average is 80% meaning that they highly equity oriented firms. That's why, cost of debt is negatively associated with ROI. If all the companies will increase their debt size, they will get tax advantage so that ROI will go up.
- ✓ Except Cipla company remaining three companies i.e., Dr Reddy's laboratories, Sun pharma and Divis laboratories the average age of these three companies is 30 years, but Cipla company's age is 80 years. Three are growing companies and the one is matured company that's why the age of the company is negatively associated with the ROI.
- ✓ Board diversification increases the size of board of directors who will take the right decisions which will enhance the performance of the company the average number Board of directors for all the four companies for all the years on an average is 9. Lower diversification of board of directors leading to lowering the return on investments that is evident in the correlation matrix.

4.2 MANAGERIAL IMPLICATION

All the four companies are doing well during the study period. The net profit ratio and return total assets are positively influencing the ROI. It is advisable to the management of all four companies to maintain the same so in order to increase the return on investments.

It is evident that all the four companies are maintaining a balance between the liquidity and profitability meaning that companies are wisely investing on current and non-current assets that is evident in the regression results. Current ratio is positively influencing the return on investments.

All the four companies are highly equity oriented firms that's why the cost of equity is negatively influencing the return on investments.

4.3 LIMITATIONS

The research uses secondary data that is mostly obtained from websites that provide financial data and annual reports from businesses. But given that this data might be window dressing, there is reason for concern about its accuracy. This approach has the potential to misrepresent the actual financial standing of the investigated companies, which include Dr Reddy's lab., Cipla, Sun pharma, and Divis lab. Even though the data provides insightful information about these companies' performance, it is important to recognise the potential for manipulation and proceed with caution when interpreting the results. It might be essential to take extra verification steps to guarantee the accuracy and consistency of the data.

The results of four companies cannot be generalized.

4.4 CONCLUSION

To conclude that Return on Investment (ROI) is a measure of overall performance of an entity and which is influenced by different factors over a period of time. It is evident that the results are strongly support the finance theory as well as the past research results, i.e., the liquidity ratios are negatively influencing the ROI, profitability ratios are positively influencing the ROI and fund raising costs are negatively associated with ROI during the study period of these four companies. Hence the management of the four companies has to focus on the variables which are significant in influencing the ROI.

4.5 SCOPE OF FUTURE REPORT

Subsequent investigations may extend their range to incorporate additional variables not covered in this work. These variables include corporate governance practices, the proportion of independent directors on the board, the number of women serving on the board, technological advancements, and the impact of pandemic situations. They also include political and economic factors. Examining these factors could offer a more comprehensive comprehension of the dynamics affecting the profitability-cost of capital relationship in the context of the chosen Indian two-wheeler companies.

Future studies may provide more profound understandings of the complex relationship between organisational performance and its determinants by examining these variables.

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