VALUE CREATION IN INDIAN PHARMACEUTICAL INDUSTRY: A REGRESSION ANALYSIS

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ABSTRACT

Maximizing shareholders wealth is becoming the new corporate standard in India. The corporates, which gave the lowest preference to the shareholders' inquisitiveness, are now bestowing the utmost inclination to it. Shareholders' wealth is measured in terms of the returns they receive on their investment. Traditionally, the yardsticks used to measure the efficiency and profitability of a business organization were accounting based measures like ROI, ROE, ROCE, EPS, RONW and financial ratios. But, now a days value added measures have emerged as a replacement of the traditional accounting based measures. The reason behind this is that the financial performance of a business organization is measured from the shareholders' value point of view. Value added represents the wealth created by an enterprise during a specified period. No companies can survive and grow, if it fails to generate value to its shareholders. Hence, value added is a basic measure which is used for measuring the financial performance of an enterprise. Most recently, creating value for firm's shareholders- widely accepted objective for the firm has been incorporated into the strategic management literature through value based planning. By keeping this in mind, this study is an attempt to analyze the value creation in Indian Pharmaceutical Industry from 1997-98 to 2006-07 by using regression analysis.

KEY WORDS: Value Creation, Economic Value Added, Market Value Added and Productivity

INTRODUCTION

The equity shareholders are real owners of company form of business organizations. They all invest their money in equity shares of a company with the primary motive of achieving good capital appreciation and regular & stable return (i.e., dividends). The investors' objectives are purely based on the profitability and financial performance of the company. So, investors before taking their investment decisions, they consider several factors which influence the corporate performance. For measuring the corporate financial performance, there are accounting profitability measures and shareholders' value based measures. Accounting profitability measures include ROI, ROE, EPS, ROCE and DPS etc., Shareholders valued based measures include EVA and MVA.

Maximizing the shareholder value is considered as one of the fundamental goals of all businesses. In United States, top management is expected to maximize shareholder value. There are a number of value based management (VBM) frameworks, shareholder value analysis (SVA) Rapport (1986) and Economic Value Analysis (EVA) developed by Stern Stewart (1990) are the two well-known ones. Maximizing shareholders value is becoming the new corporate standard in India. The corporates, which gave the lowest preference to the shareholders' inquisitiveness, are now bestowing the utmost inclination to it. Shareholders' wealth is measured in terms of the returns they receive on their investment. The returns can either be in the form of dividends or in the form of capital appreciation or both. Capital appreciation in turn depends on the subsequent changes in the market value of shares. This market value of shares is influenced by a number of factors, which can be company specific, industry specific and macro-economic in nature.

To help corporates to generate value for shareholders, value based management systems have been developed. Indeed, value based management, which seeks to integrate finance hypothesis with strategic economic philosophy, is considered as one of the most significant contribution to corporate financial planning in the last two decades or so. For measuring the corporate financial performance, there are accounting profitability measures and shareholders' value based measures. Accounting profitability measures include ROI, ROE, EPS, ROCE and DPS etc., Shareholders valued based measures include EVA and MVA. This study is an attempt to analyze the value creation in Indian Pharmaceutical Industry from 1997-98 to 2006-07 by using regression analysis.

PHARMACEUTICAL INDUSTRY AND ITS IMPORTANCE

With 14% of annual growth the Pharmaceutical Companies in India is worth USD 3.1 billion. It is the largest standard drugs producer in the world and has substantial contribution towards meteoritic growth of India. The pool of 'Pharmaceutical Company' is dominated by standard manufacturers. Although, some first line companies are slowly shedding 'Generic' tag and dawning 'Innovator' tag to get a global footage, but still generic drugs accounts for 80% of revenue. 'Pharmaceutical Companies in India ' is getting technologically strong and self reliant. 'Pharmaceutical Companies in India ' are armed with:

- Low costs of production & R&D costs (around 70% less than their Western counterparts).
- Highly innovative scientific manpower.
- Hosts of national and private laboratories.
- A strong IPR regime following WTO and WIPO norms.

Pharmaceutical Market in India is actively partnering with Government, NGOs and other Healthcare providers to improve the health and quality of life by innovating and developing safe,

cost-effective and quality medicines. It also aims to increase the access of medicines to people in rural areas and those living at or below the poverty line. Companies like Ranbaxy, Dr. Reddy's Lab, Lupin Lab, Torrent Pharmaceuticals, Glen mark etc are performing excellently at the global level also. Ranbaxy has recently won a fierce battle against infringement (Norway) involving key Norwegian patents on Atorvastatin (a cholesterol-lowering drug marketed by Pfizer). MNC ' Pharmaceutical Companies in India ' are aggressively forging collaboration, acquisitions and even cross- licensing with foreign firms for greater reach, both in domestic and world market. 'Pharmaceutical Company in spite of registering fabulous growth is still laced with some negative market imperatives. 'Pharmaceutical Companies Operating in India ' is a pool representing about 250 large Pharmaceuticals manufacturers, suppliers and about 8000 Small Scale Pharmaceutical & Drug Units. To be one of the largest and most advanced in the world ' Pharmaceutical Market in India ' must address the issues of exporters, manufacturers and suppliers. 'Pharmaceutical Companies in India ' offers tremendous growth opportunities in years to come especially in the areas of Biological Sciences Research (particularly genomics and proteomics), Clinical Research & Development and Innovative Process Chemistry.

LITERATURE REVIEW

Kramer and Pushner (1997) [i] tested the hypothesis that EVA is highly correlated with MVA. The study concluded that no clear evidence to support the contention that EVA is the best internal measure of corporate success in adding value to shareholder investments. On the contrary, the market seems more focused on 'Profit' than EVA. The study found that there is no clear advantage to shareholders in looking at EVA, as the accounting return on their investment is NOPAT.

Banerjee (1997) [ii] has conducted an empirical research to find the superiority of EVA over other traditional financial performance measures. Ten industries have been chosen and each industry is represented by four/five companies. ROI and EVA have been calculated for sample companies and a comparison of both has been undertaken, showing the superiority of EVA over ROI. Indian companies are gradually recognizing the importance of EVA. Some of such companies are Ranbaxy Laboratories, Samtel India Ltd and Infosys Technologies Ltd.

KPMG-BS Study (1998) [iii] assessed top companies on EVA, sales, PAT (Profit after Tax), and MVA criteria. The survey has used the BS 1000 list of companies using a composite index comprising sales, profitability and compounded annual growth rate of those companies covering the period 1996-97. Sixty companies have been found able to create positive shareholder value whereas 38 companies have been found to destroy it. Accounting numbers have failed to capture shareholder value creation or destruction as per the findings of the study. 24 companies have destroyed shareholder value by reporting negative MVA.

Pattanayak and Mukherjee (1998) [iv] discussed that there are traditional methods to measure corporate income or known as accounting concept and there is also a modern method to measure corporate income or known as economic concept. EVA, which is based on economic concept, is professed to be a superior technique to identify whether the organization's NOPAT (Net Operating Profit after Tax) during a period is covering its WACC (Weighted Average Cost of Capital), thus generating value for its owners. But it is very tricky to calculate EVA. Companies trying to implement EVA are asked to incorporate 164 amendments to their financial accounts.

Anand, et.al. (1999) [v] revealed that EVA, REVA (Refined Economic Value Added) and MVA are better measures of business performance than NOPAT and EPS in terms of shareholders' value creation and competitive advantage of a firm. Since conventional management compensation systems emphasize sales / asset growth at expense of profitability and shareholders' value. Thus, EVA is a measure that shifts focus on an organizational culture of concern for value.

Madhu Malik (2004) [vi] examined the relationship between shareholder wealth and certain financial variables like EPS, RNOW and ROCE. By using correlation analysis, it was found that there was positive and high correlation between EVA and RONW, ROCE. There was a positive but low correlation between EVA and EPS. By using co – efficient of determination (r^2), EVA was compared with Traditional performance measures and it was found that not a single traditional performance measure explains to the fullest extent variation in shareholder wealth.

Karam Pal Singh and Mahesh Garg (2004) [vii] examined the disclosure of EVA in Indian corporates. The study revealed that out of 50 companies, only 32 companies have generated positive EVA and 18 companies have destroyed their shareholders' wealth in 1998. In 2000, only 29 companies have generated positive EVA. In 2001, only 34 companies have generated positive EVA. And the same trend continued in 2002. The study also found that one – third of total companies are reporting negative EVA throughout the period and another one – third companies are generating positive EVA. It also revealed that only two – three industries are reporting negative EVA and rest are generating positive EVA.

Singh (2005) [viii] examined an appropriate way of evaluating bank's performance and also found out which Indian banks have been able to create (or destroy) shareholders' wealth since 1998-1999 to 2002-2003. This study is based on 28 Indian private and public sector banks that are listed on the Bombay Stock Exchange (BSE). The study suggested that the relationship between EVA and MVA is statistically significant. The study showed impressive performance in terms of EVA by banks such as State Bank of Bikaner and Jaipur, Jammu and Kashmir Bank, Global Trust Bank and Indusind Bank.

Ghanbari and Sarlak (2006) [ix] studied economic value added in Indian automobile industry. The objectives of the study are: to compute and analyze Economic Value Added (EVA) of firms in the automobile industry and to identify the EVA trend of the industry the period of the study. The study found that the Economic Value Added (EVA) of only 30 % of the selected companies is positive and 70 % of the selected companies have destroyed their shareholders wealth by negative EVA. The study concluded that there has been a significant increasing trend in EVA of the Automobile Industry firms which means that companies have a positive trend to improve their firm values.

Ramachandra Reddy and Yuvaraja Reddy (2007) [x] examined the effect of selected variables on MVA. This study was conducted with 10 cement companies in India and the objective of this study was to examine the effect of select variables on MVA. For this purpose, Multiple Regression technique has been used to test the effect of select variables on MVA. The study found that none of the factors is found to have impact on MVA and EPS is found to have negative and significant impact on MVA. The study concluded that the performance of select cement companies in terms of profitability cannot be increased unless the improved problems like modernization, cost reduction, control taxes etc., are solved.

IV. OBJECTIVES OF THE STUDY

- To study the impact of EVA (Economic Value Added) and Productivity on Value Creation in Indian Pharmaceutical Industry.
- To study the impact of financial and economic variables on Value Creation on Indian Pharmaceutical Industry.

V. RESEARCH METHODOLOGY

Sources of Data:

This study is based on the secondary data. For the purpose of present study, Required financial data of sample companies of Indian pharmaceutical industry were collected from

"Capitaline Plus" Database of Capital Market Publishers India (Pvt) Ltd.

Sample Design:

The sample size of the present study is '15' pharmaceutical companies from Indian Pharmaceutical Industry. These companies were selected as sample companies by considering the constituent companies in BSE 200 Index whose shares are traded continuously on all market days are considered for the sample selection.

Data Analysis:

To understand the central tendency and relative deviation as well as homogeneity in the data over the time period, basic descriptive statistics like mean, standard deviation and coefficient of variation is calculated. To further test the significant impact of EVA and Productivity on value creation, ANOVA and simple regression analysis are used.

To analyse the impact of financial and economic variables on value creation, a multivariate technique, multiple linear regression models has been applied. Another multivariate technique – Factor analysis is considered for two purposes. First, the factor analysis is applied to group the highly correlated explanatory variables into underlying constructs in order to use the identified construct as explanatory variable in the regression analysis. Next, it is used for identifying the similarities among explanatory variables in determining the value creation.

VI. IMPACT OF EVA (Economic Value Added) ON VALUE CREATION

The concepts of Economic Value Added (EVA) and Market Value Added (MVA) or shareholder value creation or simply called value creation were developed in order to reflect corporate performance more accurately. Many researchers have supported EVA as the best internal determinant of MVA. The most important benefit of the implementation of an EVA system is given and in conclusion there is a discussion of some criticisms offered by different researchers and practitioners on EVA as a measure of shareholder value creation. According to Stewart, a company's EVA is the fuel that fires up its MVA.

Fatemi et al categorized companies according to their ability to generate EVA and MVA. Companies with high EVA and MVA are called "winners", companies with a high EVA and low MVA are "problem children", companies with a low EVA and a high MVA are "holders of real options" and companies with a low EVA and MVA are typified as "losers". In this scenario, here in this chapter an attempt is made to identify the relationship between EVA and MVA (value creation) in Indian context.

In this section, the relationship between value creation (MVA) and EVA is analysed in two ways. At first, time series data of companies under each industry for 10 years are pooled together and categorised into three groups based on 30^{th} and 70^{th} percentiles of EVA. That is, EVA below its 30^{th} percentile is formed into one group, between 30^{th} and 70^{th} percentile as another group and EVA above its 70^{th} percentile as third group. The first one is identified as low EVA group, second one as moderate and the third group as high EVA group. The mean MVA across these three groups are compared using one way ANOVA in order to find out whether MVA differ significantly with difference in the level of EVA.

The next part of analysis for identifying the relationship between MVA and EVA is carried out using simple regression technique. This regression technique is adopted to evaluate the strength of relationship of EVA on MVA on yearly basis for each industry as well as for all selected industries. Further, Durbin Watson (DW) statistic is considered for identifying the existence of serial

correlation between MVA and EVA. As a rule of thumb DW stat value less than 1 indicates positive serial correlation while value above three 3 reveals negative serial correlation between two variables. The results of the analysis are tabulated and discussed in details in the remaining part of this section.

The difference in value creation (MVA) with respect of change in EVA of companies under Pharmaceutical industry is evaluated using one-way ANOVA and the results of the analysis are presented in Table 1.

Table 1: Results of ANOVA Showing the Difference in Value Added among Company Groups with Low, Moderate and High EVA under PHARMACEUTICAL Industry

Level of Economic Value Added (EVA)	N	Market Value Added (MVA)		F Value	p Value
		Mean	SD		
Low	46	35.01	193.01		
Moderate	59	46.89	294.37	8.61***	0.0003
High	45	1607.80	3852.46		
All	150	511.52	2224.02		

SD – Standard Deviation; ***Significant at 1% level.

It can be observed from the table that value creation tend to increase with increase in the levels of EVA for companies under pharmaceutical industry. The companies with high level of EVA are very highly valued and differ from valuation of companies with low and moderate EVA groups.

Further, the above difference is statistically significant as F value obtained from the analysis, 8.61 is significant at 1 per cent level. So, it is clear that there is significant association between MVA and EVA for companies under pharmaceutical industry.

Table 2 provides the results of regression on yearly basis and also for all years between MVA and EVA for companies under pharmaceutical industry. From the perusal of the results, it is evident that correlation between MVA and EVA (R values) is above 0.40 in 1999-00, 2002-03, 2004-05, 2005-06. Also the fit of the regression models for these years is also significant providing evidence of significant influence of EVA on MVA. However, adjusted R square values of the insignificantly fitted models for 1997-98, 1998-99, 2000-01 and 2003-04 are found to be negative, in turn providing evidence of poor association between the two variables. No serial correlation between the two is identified in all the years as DW statistic values are in the indecisive / no auto correlation range.

On the other hand, the regression model for all years is fitted significantly (F value = 26.36, $p < 0.01$) with R, R^2 and Adjusted R^2 values of 0.389, 0.151 and 0.146 respectively. This provides

evidence for strong association between MVA and EVA. On the whole, value of shareholders of the companies under pharmaceutical industries has gone up based on their EVA leading to the conclusion strong association between MVA and EVA.

VII. IMPACT OF PRODUCTIVITY ON VALUE CREATION

The role of productivity in accelerating the pace of economic growth is well recognized in the literature on growth. In the neo-classical growth accounting framework, the growth of output is the sum total of the growth of capital accumulation, growth of labor and the growth of productivity or efficiency. Thus, for a given combination of factor inputs (capital and labor), the shifts in the production frontier are engendered by the improvements in productivity or efficiency. That is, productivity is nothing but excess growth of output over that of input(s) over time.

According to Rappaport[xi] (2001), productivity is the basis for the creation of competitive advantage. A company creates competitive advantage when the value of its sales on the long term is higher than the total cost. When the market evaluates a company, it takes its long-term productivity generating capacity into account. Thus competitive advantage and the creation of value for shareholders are supported by productivity. Hence, in this section, it is tried to empirically investigate the value-relevance of relationship between shareholder value creation and growth in total productivity in Indian pharmaceutical companies.

Measurement of Productivity

Generally, two productivity growth measures are widely used by the researchers. They are, total factor productivity and total productivity. While total factor productivity measures the growth in Gross Value Added (GVA) in excess of the growth of a weighted combination of the two inputs capital and labor. For measuring output in form of gross value added all intermediate inputs are deducted. Thus, gross value added only provides the value that is actually added in the production process by using the two primary inputs of production: capital and labor. Total Productivity Growth, in contrast, relates gross value of output (VO) to the four input factors capital, labor, energy and materials. Since it accounts for intermediate inputs as well as primary inputs, Total productivity is considered as productivity growth measure in this study.

For estimating Total Productivity growth for the selected companies, Kendrick Index formula, as given below, is used.

$$A_t = \frac{Y_t}{s_K K_t + s_L L_t + s_E E_t + s_M M_t}$$

Where

A_t = Total Productivity Growth Index

Y_t = Value of Gross Output

S_i (i = K,L,E,M) indicates the share of ith factor in the value of gross output.

This index is a fixed weight index. The factor shares used as weights are base year shares. The relationship between value creation (measured as MVA) and Productivity (measured as Total Productivity based on Kendrick Index) is evaluated using statistical techniques, one way ANOVA and Simple Regression. For ANOVA, the selected companies across each industry are segmented into three mutually exclusive groups based on the level of Productivity Index (PI). A company with PI value equal to or less than its 30th percentile is considered as low productivity company and a company with PI value equal to or greater than 70th percentile is treated as high productivity company. A company with PI value in between 30th and 70th percentile is categorized under moderate productivity group. The mean MVA across these three categories are compared and the significance of the difference in group means are ascertained with the help of F value obtained from the ANOVA test.

The effect of productivity on value creation in each selected year is tested using simple regression technique with MVA as dependent variable and TFP as independent variable. This analysis is carried out for each industry separately and for all industries combined as well. The results of the analysis are well tabulated and discussed in detail hereunder.

The mean value creation (MVA) by company groups with low, moderate and high total productivity under Pharmaceutical industry is compared using one-way ANOVA and the results of the analysis are shown in Table 3.

Table 3: Comparison of Value Creation among Low, Moderate and High Productivity Companies under PHARMACEUTICAL Industry

Total Productivity	N	Market Value Added (MVA)		F Value	p Value
		Mean	SD		
Low	46	160.33	419.68		
Moderate	60	317.74	1319.65	2.63*	0.0754
High	44	1142.91	3738.09		
All	150	511.52	2224.02		

SD – Standard Deviation; *Significant at 10% level.

An examination of the table shows that value creation tend to increase with increase in the levels of productivity for companies under pharmaceutical industry. The mean MVA of high productivity group is much higher (MVA = 1142.91) than that of low (MVA = 160.33) and moderate (MVA = 317.74) productivity groups. That is, the companies with high total productivity are highly

valued. From the significant F value of 2.63 ($p < 0.10$), it is strongly concluded that there is significant difference in mean value creation across low, moderate and high total productivity for pharmaceutical companies.

The simple regression results for each year of the study period and also for all years between MVA and productivity for pharmaceutical companies are given in Table 4. It is evident from the table that fit of the year-wise regression models are insignificant and adjusted R^2 values for all years except 2006-07 is negative. For pooled years, regression between MVA and productivity is fitted significantly at 5 per cent level but with very low explained variance in the dependent variable (R^2 = 0.0341, F value = 5.22, $p < 0.05$). The adjusted R^2 value of the model for pooled years is positive. Hence, it is found that total productivity does not have explanatory power on value creation in short-term, but it has some influence on value creation in the long-run in respect of pharmaceutical companies.

VIII. IMPACT OF FINANCIAL AND ECONOMIC VARIABLES ON VALUE CREATION

The time, when growing sales always brought promised profits, has ended. It became necessary for the industries in any country to have the strategy to withdraw unprofitable projects and to invest management resources intensively into profitable projects. It was also necessary to find efficient investment strategies and to monitor how the strategies affect the company value. Applying finance theory and evaluating the strategies with numerical values helped the firm to find ways to maximize their value. The era in which the industries need to keep in mind how they create corporate value has come. Generally value creation of a firm is based on their overall performance. The overall performance of a firm, on the other hand, is often measured and monitored using various financial ratios determined from its financial records. Hence, analyzing the role of financial characteristics of the firms on their value creation is very important and could give many implications to the corporate world. In addition to financial variables, consideration of macro economic variables is also important as it would help identify role of government financial policy on value creation of companies.

Financial and Macro-Economic Variables Considered For Analysis

For studying of the effect of financial and macro-economic variables on value creation for companies across various industries in India, fifteen different financial ratios and four important macro-economic variables, which are listed in Tables 5 and 6, are considered.

Table 5: Financial Ratios Considered for the Analysis

Sl.No.	Financial Ratios	Formula
Liquidity Ratios		
1	Current Ratio (CR)	Current Assets / Current Liability
2	Quick Ratio (CR)	Quick Assets / Current Liability
3	Cash Ratio (ACR)	(Cash + Marketable Securities) / Current Liability
Profitability Ratios		
4	Gross Profit Margin (GPM)	Gross Profit / Net Sales

5	Operating Profit Margin (OPM)	Operating Profit / Net Sales
6	Net Profit Margin (NPM)	Net Profit / Net Sales
7	Return on Investments (ROI)	Net Profit / Total Assets
8	Return on Equity (ROE)	Net Profit / Share Holders' Equity
9	Earning Per Share (EPS)	Net Profit / Number of Equity Shares
Activity Ratios		
10	Asset Utilization (ASTUTI)	Net Sales / Total Assets
11	Fixed Assets Turnover Ratio (FATO)	Net Sales / Net Fixed Assets
Leverage Ratios		
12	Debt to Assets Ratios (TDTA)	Total Debt / Total Assets
13	Net Fixed Assets to Equity (NFAEQ)	Net Fixed Assets / Share Holders' Equity
14	Total Assets to Equity (TAEQ)	Total Assets / Share Holders' Equity
15	Interest Coverage Ratio (ICR)	Operating Profit / Interest

Table 6: Macro-Economic Variables Considered for the Analysis

Sl. No.	Macro-Economic Variables
1	Interest Rate (IR)
2	Gross Domestic Product (GDP)
3	Money Supply (Narrow Money) (MS)
4	Whole Price Index (WPI)

The correlations among selected financial ratios as well as among selected macro economic variables are presented in Tables 7 and 8.

Table 7: Correlation Matrix for Financial Ratios

Ratios	CR	QR	ACR	GPM	OPM	NPM	ROI	ROE	EPS	ASTUTI	FATO	TDTA	NFAEQ	LEV	ICR
CR	1.00														
QR	**0.99**	1.00													
ACR	0.58	0.60	1.00												
GPM	0.17	0.18	0.12	1.00											

OPM	0.31	0.32	0.22	**0.85**	1.00									
NPM	0.11	0.12	0.05	**0.98**	**0.73**	1.00								
ROI	0.28	0.30	0.21	0.25	0.37	0.19	1.00							
ROE	0.02	0.03	0.03	-0.02	-0.04	-0.01	0.18	1.00						
EPS	0.02	0.04	0.09	0.07	0.09	0.06	0.24	0.09	1.00					
ASTUTI	-0.25	-0.25	-0.12	-0.03	-0.28	0.04	0.17	0.06	0.07	1.00				
FATO	0.01	0.02	0.13	0.00	-0.19	0.06	0.26	0.05	0.06	**0.77**	1.00			
TDTA	-0.23	-0.24	-0.20	-0.19	-0.25	-0.13	-0.59	0.02	-0.11	-0.01	-0.11	1.00		
NFAEQ	-0.09	-0.09	-0.09	0.00	0.04	-0.01	0.01	-0.59	-0.02	-0.03	-0.12	0.04	1.00	
TAEQ	-0.04	-0.04	-0.08	-0.03	0.01	-0.02	0.00	-0.60	-0.05	-0.04	-0.03	0.07	**0.95**	1.00
ICR	0.30	0.33	0.50	0.07	0.10	0.05	0.27	0.06	0.15	0.02	0.21	-0.15	-0.06	-0.06	1.00

High Correlation Values are bold-faced

Table 8: Correlation Matrix for Macro-Economic Variables

Macro-Economic Variables	INTEREST RATE	GDP	MONEY SUPPLY	WPI
INTEREST RATE	1.0000			
GDP	**-0.8295**	1.0000		
MONEY SUPPLY	**-0.9423**	**0.9408**	1.0000	
WPI	**-0.9202**	**0.9493**	**0.9963**	1.0000

High Correlation Values are bold-faced

From Table 7, in which the correlation among financial ratios and macro-economic variables are presented, it can be seen that there exists high correlation between CR and QR (Liquidity ratios),

GPM - OPM, GPM - NPM and OPM – NPM (Profitability ratios), ASTUTI and FATO (Activity Ratios) and between TAFQ and NFAFQ (Leverage Ratios). Similarly from Table 8, the high correlation among macro-economic variables can be observed. The high correlation among the some of the financial variables and the all of macro economic variables has indicated the existence of multi- collinearity in the data.

Because of the redundancy in the selected ratio and macro-economic variables, they cannot be used as it is in the regression analysis. The results of regression will be spurious, if redundant data are used in the analysis. On the one hand if all ratios were used, the decision model would contain repetitive-redundant data, while on the other hand if only fully independent ratios were included the information content of the semi-independent ratios would be lost.

The identification of those ratios, which contain complete information about a firm and also minimize duplication, "cannot be achieved purely by logic" (Barnes, 1987, p.456), in fact, it is largely an empirical matter in which correlational independence is used as a statistical criterion.

Ezzamel *et al*[xii] have recommended the more careful approach to ratio selection of seeking to re-identify the nature and magnitude of factor patterns. This decision to use factor analysis is supported by Dimitras *et al* [xiii] (1996) and they argued that the reduction or elimination of multicollinearity can be achieved by using factor analysis.

Factor Analysis

Therefore, in order to avoid the multi-collinearity problem and to have the information content of all the selected ratios that are highly correlated with each other in the subsequent analysis, a statistical technique called Factor analysis with principal component method is applied. The results of the factor analysis are presented in Tables 9 and 10.

Table 9: Extracted Factors and Total Variance Explained by each Factor Before and After Varimax Rotation

Factor	Initial (Before Roation)			After Varimax Rotation		
	Eigenvalue	% of Total Variance	Cumulative % of Total Variance	Eigenvalue	% of Total Variance	Cumulative % of Total Variance
1	3.97	20.90	20.90	3.84	20.19	20.19
2	3.66	19.26	40.16	2.75	14.47	34.66
3	2.55	13.42	53.58	2.45	12.89	47.55
4	2.15	11.30	64.88	2.81	14.79	62.34
5	1.94	10.23	75.10	1.89	9.96	72.30
6	1.13	5.95	81.05	1.66	8.75	81.05
7	0.97	5.08	86.14			
8	0.75	3.95	90.08			
9	0.61	3.20	93.28			
10	0.40	2.12	95.40			
11	0.30	1.56	96.96			

12	0.19	1.00	97.96			
13	0.17	0.89	98.85			
14	0.14	0.72	99.57			
15	0.04	0.19	99.75			
16	0.03	0.16	99.91			
17	0.01	0.06	99.97			
18	0.00	0.02	99.99			
19	0.00	0.01	100.00			

Table 9 presents the results of factor analysis showing the variance explained by each factor extracted initially. The number of factors extracted initially is generally the same as the number of variables used in the factor analysis. However, not all 19 factors are retained for further analysis. Only those factors whose eigenvalue greater than 1.00 (eigenvalue is the variance explained by a factor in the actual data) are considered as interpretable factors based on the Kaiser criterion. The rationale for this criterion is straightforward. Each observed variable contributes one unit of variance to the total variance in the data set. Any component that displays an eigenvalue greater than 1.00 is accounting for a greater amount of variance than had been contributed by one variable. Such a component is therefore accounting for a meaningful amount of variance, and is worthy of being retained.

From the table, it can be observed that there are six factors with eigenvalue greater than 1.00. So, number of meaningful factors, which are to be interpretable, produced by the factor analysis is six. The variation explained by all these six factors together in the actual data set amount to 81.05 per cent. In total variation in the data, 20.90 per cent, 19.26 per cent, 13.42 per cent, 11.30 per cent, 10.23 per cent and 5.95 per cent of the variation is explained by first, second, third, fourth, fifth and sixth factors respectively. The extracted factors are then rotated using Varimax method in order to maximize the variance of each factor so that the total amount of variance accounted for is redistributed over these extracted factors. After maximization of the variance of each factor, 20.19 per cent, 14.47 per cent, 12.89 per cent, 14.79 per cent, 9.96 per cent and 8.75 per cent of the variation is explained by first, second, third, fourth, fifth and sixth factors respectively. The loadings (correlation) of original variables on the extracted factors after Varimax rotation are presented in Table 10.

Table 10: Factor Loadings with Original Variables

Variables	Extracted Factors					
	1	2	3	4	5	6
INTRATE	-0.95					
GDP	0.95					
MONSUP	0.99					
WPI	0.99					
GPM		0.99				
OPM		0.86				
NPM		0.97				
ROE			0.79			

NFAEQ			-0.95			
TAEQ			-0.96			
CR				0.91		
QR				0.92		
ACR				0.79		
ICR				0.54		
ASTUTI					0.90	
FATO					0.94	
ROI						0.79
EPS						0.59
TDTA						-0.72

From the perusal of the Table 10, it is apparent that first factor is highly loaded with macro-economic factors, second factor with GPM and NPM, third factor with TAEQ and NFAEQ, fourth factor with QR and CR, fifth factor with FATO and sixth factor with ROI respectively. The INTRATE on first factor, NFAEQ and TAEQ on third factor and TDTA on sixth factor are negatively loaded. Based on the variables with high loadings, the first factors is labeled as Macro-Economic Factor (ECOVAR), second one as Profit Margin (PRFTMRGN), third factor as Leverage (LEV), fourth factor as Liquidity, fifth one as Asset Utilization (ASTUTI), and sixth and final one is named as Return on Investment (ROI). The factors scores of each extracted factors are saved as variables and used as independent variables along with EVA (Economic value added) in the multiple regression analysis with MVA (Market Value Added, a proxy for value creation) as dependent variable. The regression analysis is carried and the results of the analysis are presented in the table Table 11.

To find out the factors associated with change in MVA for Pharmaceutical companies, regression using three models is run and the results of the regression analysis are depicted in Table 11.

Table 11: Regression Results Showing Determinants of MVA for Pharmaceutical Industry

Independent Variables	Regression Model		
	1	2	3
Intercept	-36.01 -(0.14)	-57.59 -(0.26)	-12.49 -(0.06)
EVA	17.51*** (4.83)	17.29*** (5.14)	17.19*** (5.13)
ECOVAR	32.61 (0.16)		
PRFTMRGN	237.15 (0.21)		
LEVERAGE	-215.19 -(0.12)		
LIQUIDITY	-59.51		

ASTUTI	-(0.21) 35.28 (0.09)		
ROI	105.66 (0.27)	114.12 (0.46)	
R^2	0.1530	0.1524	0.1512
Adjusted R^2	0.1112	0.1409	0.1455
F Value	3.66***	13.22***	26.36***
Degrees of Freedom	7, 142	2, 147	1, 148

Figures in parenthesis are t-values for beta coefficient. ***Significant at 1% level.

It can be seen from the table that the fit of the first model with all explanatory variables, second and third models with specific variables after eliminating variables with very weak influence step by step are all significant at 1 per cent level. The coefficient of the determination after adjusting for degrees of freedom is 11.12 per cent, 14.09 per cent and 14.55 per cent together by explanatory variables in first, second and third models respectively. Third model with only one explanatory variable explain maximum variation in the dependent and therefore considered for final interpretation.

According to model 3, the beta coefficient of EVA is positive and significant at 1 per cent level (β = 17.19, t = 5.13, p < 0.01). It seems that EVA is only variable which has unique influence on MVA of Pharmaceutical companies. Hence, it is concluded that Economic value added has positive significant impact on Value Creation for Pharmaceutical companies.

IX. CONCLUSION

On the whole, from the inferences of the entire results, it is found that the companies with high level of EVA are very highly valued and differ from valuation of companies with low and moderate EVA groups. So, it is clear that there is significant association between MVA and EVA for companies under pharmaceutical industry.

It is strongly concluded that there is significant difference in mean value creation across low, moderate and high total productivity for pharmaceutical companies. In regression analysis, it is found that total productivity does not have explanatory power on value creation in short-term, but it has some influence on value creation in the long-run in respect of pharmaceutical companies.

It is found that EVA is only variable which has unique influence on MVA of Pharmaceutical companies. Hence, it is concluded that Economic value added has positive significant impact on Value Creation for Pharmaceutical companies.

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Table 2: Results of Simple Regression Showing the Relationship between EVA and MVA for Pharmaceutical Industry from 1997-98 to 2006-07.

Year	Intercept		EVA		R	R^2	Adjusted R^2	SE Estimate	F Value	DW Stat
	Value	't' Value	Beta	't' Value						
1997-98	-56.123	-1.12	4.903	0.98	0.263	0.069	-0.002	108.88	0.97^{NS}	1.84
1998-99	-35.658	-0.62	-0.738	-0.13	0.037	0.001	-0.076	124.54	0.02^{NS}	1.98
1999-00	18.852	0.52	-4.422**	-2.35	0.545	0.297	0.243	105.48	5.50**	1.70
2000-01	103.642	1.16	-1.697	-0.49	0.135	0.018	-0.057	259.29	0.24^{NS}	1.36
2001-02	203.142	1.33	8.212	1.40	0.362	0.131	0.065	478.29	1.97^{NS}	1.67
2002-03	-103.319	-0.83	6.838***	2.83	0.618	0.382	0.334	360.28	8.03***	1.62
2003-04	235.317	0.36	7.610	0.62	0.169	0.029	-0.045	1836.40	0.38_{NS}	1.64
2004-05	-69.021	-0.18	9.889**	2.39	0.553	0.306	0.252	1208.10	5.72**	1.16
2005-06	183.291	0.34	10.855*	1.83	0.453	0.205	0.144	1490.40	3.36*	1.34
2006-07	1300.243	0.72	27.076	1.52	0.388	0.151	0.086	5816.70	2.31^{NS}	1.32
All Years	-12.486	-0.06	17.192***	5.13	0.389	0.151	0.146	2055.90	26.36***	1.79

*Significant at 10% level. **Significant at 5% level. ***Significant at 5% level.

Table 4: Results of Regression for MVA with Productivity for Pharmaceutical Industry from 1997-98 to 2006-07.

Year	Intercept		MVA		R	R^2	Adjusted R^2	F Value	DW Stat
	Value	't' Value	Beta	't' Value					
1997-98	-0.3064	-0.09	0.0025	0.08	0.0230	0.0005	-0.0764	0.01	1.95
1998-99	0.9727	1.06	-0.0101	-1.24	0.3244	0.1053	0.0364	1.53	1.29
1999-00	-0.0367	-0.06	-0.0010	-0.19	0.0514	0.0026	-0.0741	0.03	1.84
2000-01	0.5492	0.90	-0.0026	-0.48	0.1322	0.0175	-0.0581	0.23	2.42
2001-02	3.8164	1.70	-0.0201	-0.95	0.2552	0.0651	-0.0068	0.91	1.53
2002-03	1.0719	0.18	0.0132	0.27	0.0749	0.0056	-0.0709	0.07	1.38
2003-04	-4.7980	-0.44	0.0773	0.89	0.2388	0.0570	-0.0155	0.79	1.98
2004-05	0.2834	0.04	0.0226	0.42	0.1159	0.0134	-0.0625	0.18	2.44
2005-06	1.6670	0.26	0.0367	0.65	0.1784	0.0318	-0.0426	0.43	2.44
2006-07	-0.8068	-0.06	0.1171	1.17	0.3076	0.0946	0.0250	1.36	1.40
All Years	-2.5607	-0.99	0.0497**	2.29	0.1846	0.0341	0.0276	5.22**	1.50

**Significant at 5% level.

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