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Assessing the Various Components of the Dupont Model in the Financial Performance of the Indian Pharmaceutical Industry

Gaurav Sharma
Research Scholar,
Department of Management Studies, Amity Business School
Amity University Haryana
Prof. (Dr.) Vikas Madhukar
Pro Vice Chancellor,
AUH, Dean Faculty of Management Studies
Director, Amity Business School, Amity University Haryana
Dr. Ranjana Kothari
Professor,
Shri Ram Institute of Management, Jabalpur

ABSTRACT
This study attempts basically to measure the financial performance of the Pharmaceutical Industry taking the top five Indian companies like Sun Pharmaceutical Industries Limited, Divis Laboratories Limited, Cipla Limited, Aurobindo Pharma Limited, and Torrent Pharmaceuticals Limited for the period 2017-2022. In order to achieve the goals in this paper, the researcher have measured the ratios of ROE, ROA applying the DuPont analyses, which have been demonstrated with the aim of tables to show the change periodically. DuPont analysis (ROI and ROE)) is an important tool for judging the operating financial performance. It is an indication of the earning power of the firm. DuPont Model which is based on analysis of Return on Equity (ROE) & Return on Investment (ROI). The return on equity disaggregates performance into three components: Net Profit Margin, Total Asset Turnover, and the Equity Multiplier. Return on Investment consists of Assets Turnover and Profit Margin. The return on investment consists of Assets Turnover (Operating Income X Total Assets) and Profit Margin (EBIT X Operating Income). From the study, it is found that Sun pharmaceutical Financial performance is high followed by Cipla, Divis, Aurobindo Pharma, and then Torrent pharma. The five companies are significant at their level. In conclusion, ROE & ROI is the most comprehensive measure of profitability of a firm. It considers the operating and investing decisions made as well as the financing and tax-related decisions.

Keywords*: DuPont Analysis, Return on equity, Return on Investment, Financial Performance, Pharmaceutical Industry*

I. Introduction
DuPont analysis is a method of performance measurement that was started by the DuPont Corporation in the 1920s (Kang and Ahn SG, 2008; Osteryoung and Constand, 1992; Liesz and Maranville, 2008). With this method, assets are measured at their gross book value rather than at net book value to produce a higher return on equity (ROE). It is also known as DuPont identity. The elegance of ROA being affected by a profitability measure and an efficiency measure led to the DuPont method becoming a widely-used tool of financial analysis Liesz (Liesz and Maranville, 2008). In the 1970s, emphasis in financial analysis shifted from ROA to return on equity (ROE), and the DuPont model was modified to include the ratio of total assets to equity. Three distinct versions of DuPont have been created and used to help unravel the underlying drivers of profitability and return over time, beginning nearly 90 years ago. The DuPont Model is a useful tool in providing both an overview and a focus for such analysis. It can be used as a compass in the process by directing the analyst toward significant areas of strength and weakness evident in the financial statements (Yang and Yoon, 2005). This study

attempts basically to measure the financial performance of pharmaceutical companies. The main objective is to find out the ratios of ROE and ROI for five pharmaceutical companiesfor a period of 8 years from 2013-2021. The aim of the study is to see the financial performance of pharmaceutical companies based on DuPont analysis which includes ROE and ROI.

Currently, the Indian Pharmaceutical industry is valued at approximately 90,000 Crores or US $ 20 billion (1 US $ = 45), constituting 1.8% of the GDP and expected to grow more than 11% going forward. The country now ranks 3rd worldwide by volume of production and 14th by value thereby accounting for around 10% of the world's production by volume and 1.5% by value. Globally, it ranks 4th in terms of generics production and 17th in terms of export value of bulk actives and dosage forms. Through 2015 and 2020, India's pharmaceutical market will post local currency CAGRs of 14.6% and 13.5% respectively. It increases the value of shareholdersin the market and makes them earn more. This is the reason the researcher attempts to evaluate the financial performance of the pharmaceutical industry in India using DuPont Analysis.

II. Literature review

Financial Performance

Financial ratios express relationships between financial statement items. Although they provide historical data, management can use ratios to identify internal strengths and weaknesses and estimate future financial performance. Investors can use ratios to compare companies in the same industry. Ratios are not generally meant as standalone numbers, but they are meaningful when compared to historical data and industry averages. Financial Performance Ratios are used to depict the performance of a business. These ratios are derived from the items of a financial statement (Yang and Kim, 2008). To derive a financial ratio, one variable of the financial statement is divided by the other. It illustrates the relationship between two financial variables. A financial ratio is an important tool for small business firms and managers to measure the progress in achieving the targeted goals. Financial Analysis is the summarizing of large quantities of financial data for the purpose of evaluation and comparison of the performance of a company over time, it’s more or less the process of reducing a large amount of historical financial data, taken from financial accounting statements to a smaller set of information more useful for decision making Archer. This analysis is usually done through the use of accounting ratios otherwise known as Financial Ratio (Chong and Koo, 2004).

Concept of DuPont Model

For any business in the private sector there are numerous of models to describe how well the business is running. Among these the DuPont model was created in the early 1900s but is still a model valid to use for assessment of the profitability. Remarkably it has not been used in the security community for risk prioritization or impact analysis. The product of two often-computed ratios, net profit margin and total asset turnover, equals return on assets (ROA). The elegance of ROA being affected by a profitability measure and an efficiency measure led to the DuPont method becoming a widely-used tool of financial analysis(Liesz and Maranville, 2008). In the 1970’s, emphasis in financial analysis shifted from ROA to return on equity (ROE), and the DuPont model was modified to include the ratio of total assets to equity (Chong et al., 2009). Choi et al (2007) concludes that returns derived from capital are more persistent because of the larger frictions to the movement of capital through an economy. The focus of this study, however, explores the use of the information in these components by those who have a vested interest in the prediction of future earnings. Numerous studies have explored how market participants, either stock investors or analysts, incorporate the information in earnings into their decisions.

DuPont analysis, a common form of financial statement analysis, decomposes return on net operating assets into two multiplicative components: profit margin and asset turnover (Liesz and Maranville, 2008; Choi et al., 2007). These two accounting ratios measure different constructs and, accordingly, have different properties. Prior research has found that a change in asset turnover is positively related to future changes in earnings. DuPont analysis takes into account three indicators to measure firm profitability.

Return on Assets(ROA)- ROA offers a different take on management effectiveness and reveals how much profit a company earns for every dollar of its assets (Kang and Ahn, 2008; Osteryoung and Constand, 1992). Assets include things like cash in the bank, accounts receivable, property, equipment, inventory and furniture. Only a few professional money managers will consider stocks with a ROA of less than 5%.

$$\text{ROA} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total asset}} = \frac{\text{Net income}}{\text{Total assets}}$$

Net income=net income after taxes

Return on Equity(ROE)- It is a basic test of how effectively a company's management uses investors' money. ROE shows whether management is growing the company's value at an acceptable rate. Also, it measures the rate of return that the firm earns on stockholder's equity. Because only the stockholder's equity appears in the denominator, the ratio is influenced directly by the amount of debt a firm is using to finance assets (Choi et al., 2007, Hawawini and Viallet, 1999). ROE ratio is a measure of the rate of return to stockholders. Decomposing the ROE into various factors influencing company performance is often called the DuPont system (Chong et al., 2009):

$$\text{ROE} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \frac{\text{Net income}}{\text{Equity}}$$

ROE=(Net Profit Margin) ×(Total Asset Turnover)×(Equity Multiplier)
ROE is calculated by taking the profit after tax and preference dividends of a given year and dividing it by the book value of equity (ordinary shares) at the beginning of the year. Average equity can also be used. Equity would consist of issued ordinary share capital plus the share premium and reserves (Hawawini and Viallet, 1999). ROE can also be stated as:

$$\text{ROE} = \frac{\text{Net income}}{\text{Pretax income}} \times \frac{\text{Pretax income}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \frac{\text{Net income}}{\text{Equity}}$$

EBIT=Earnings before interest and taxes

ROI = Assets Turnover (Operating Income X Total Assets) X Profit Margin (EBIT X Operating Income) Hawawini and Viallet (1999) offered yet another modification to the DuPont model. This modification resulted in five different ratios that combine to form ROE and ROI. In their modification they acknowledge that the financial statements firms prepare for their annual reports (which are of most importance to creditors and tax collectors) are not always useful to managers making operating and financial decisions) This study attempts basically to measure the financial performance of the Indian pharmaceutical companies for the period 2017-2022 by using the DuPont system of financial analysis which is based on analysis of return on equity model and return on investment model. The return on equity model

disaggregates performance into three components: net profit margin, total asset turnover, and the equity multiplier. It was found that the financial performance of the Indian pharma companies is relatively steady and reflects minimal volatility in the return on equity.

III. Methodology

A descriptive method has been conducted in the research. Five pharmaceutical companies have been selected to assess the financial performance of the Indian pharmaceutical industry using DuPont Model. Sun Pharmaceutical Industries Limited, Divis Laboratories Limited, Cipla Limited, Aurobindo Pharma Limited, and Torrent Pharmaceuticals Limited are the companies selected between 2017-2022. The data has been collected from the annual reports of companies of the same time period in order to calculate the return on equity (ROE) and return on investment (ROI).

Mean and standard deviation has also been calculated to know the variations in the financial performance of the pharma companies for different periods with significance value which has been significant at a 5% level ($t<0.05$).

IV. Objectives

- To examine the financial performance of the selected Indian pharmaceutical industry
- To calculate the financial performance of the selected Indian pharmaceutical industry using DuPont Model between the time period of 2017-2022.

V. Results

i. Sun Pharmaceutical Industries Limited

Return on Equity

Year	Total Assets (a)	Common stock equity (b)	Financial leverage C=(axb)	NPM (d)	TAT (e)	ROA (d/e)	ROE= FL*ROA
2017-2018	614,102.4	1106.66	1.65	15.76	18.94	14.27	33.71
2018-2019	645,163.5	1582.14	1.23	12.24	20.91	21.66	22.41
2019-2020	646,938.1	2221.08	1.45	19.97	29.30	26.63	15.36
2020-2021	682,524.6	2512.05	1.32	18.95	0.87	25.81	26.17
2021-2022	676,667.3	1786.63	1.67	19.17	10.86	5.66	36.16
Mean	**653079.18**	**1841.71**	**1.46**	**17.22**	**16.18**	**18.81**	**26.76**
Std.	**27581.66**	**548.63**	**0.20**	**3.21**	**10.78**	**8.83**	**8.45**
T value	**52.95**	**7.51**	**16.75**	**11.98**	**3.36**	**4.76**	**7.08**
Sig. (2-tailed)	**(0.000)**	**(0.002)**	**(0.000)**	**(0.000)**	**(0.028)**	**(0.009)**	**(0.002)**

Source: Annual Reports of Sun Pharmaceutical Industries Limited, 2017-2022

Return on Investment

Year	Operating Income (a)	Total assets (b)	Assets turnover C=(a/b)	EBIT (d)	Operating Income (e)	Profit margin F=(d/e)	ROI= (C*F)
2017-2018	397.45	4562.31	0.12	113.36	297.45	1.32	0.16
2018-2019	273.48	7089.54	0.26	661.65	723.48	1.11	0.28
2019-2020	255.42	7906.68	0.25	563.41	915.42	1.13	0.29
2020-2021	636.38	2346.08	0.15	1238.3	632.38	1.66	0.17
2021-2022	556.29	17813.46	0.04	2033.32	185.29	1.35	0.09
Mean	**423.80**	**7943.61**	**0.16**	**922.01**	**550.80**	**1.31**	**0.20**
Std.	**169.11**	**5935.28**	**0.09**	**739.15**	**302.99**	**0.22**	**0.04**
T value	**5.60**	**2.99**	**3.97**	**2.79**	**4.06**	**13.26**	**5.19**
Sig. (2-tailed)	**(0.005)**	**(0.040)**	**(0.017)**	**(0.049)**	**(0.015)**	**(0.000)**	**(0.007)**

Source: Annual Reports of Sun Pharmaceutical Industries Limited, 2017-2022

From the above table ROE it is clear that mean value is 26.76, Std.dev is 8.45, the t-value is 7.08 and it is significant at 5% level of significance (0.002) which is significant at 5% level. In table of ROI it shows that the mean value is 0.20, std.dev is 0.04, the t-value is 5.19 and it is significant at 5% level of significance (0.04).

ii. Divis Laboratories Limited

Return on Equity

Year	Total Assets (a)	Common stock equity (b)	Financial leverage C=(axb)	NPM (d)	TAT (e)	ROA (d/e)	ROE= FL*ROA
2017-2018	2452.31	1606.66	1.53	12.22	10.94	10.27	15.71
2018-2019	2823.54	1882.14	1.50	20.24	22.91	22.66	33.41
2019-2020	3599.68	2321.08	1.55	20.97	22.80	22.63	22.15
2020-2021	4187.08	2509.05	1.67	13.95	12.87	5.81	16.27
2021-2022	2616.06	1553.63	1.68	18.17	0.86	15.66	26.36
Mean	**3135.73**	**1974.51**	**1.59**	**17.11**	**14.08**	**15.41**	**22.78**
Std.	**734.02**	**426.27**	**0.08**	**3.86**	**9.22**	**7.47**	**7.39**
T value	**9.55**	**10.36**	**42.60**	**9.90**	**3.41**	**4.61**	**6.89**

Sig. (2-tailed)	**(0.001)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.0027)**	**(0.010)**	**(0.002)**

Source: Annual Reports of Divis Laboratories Limited, 2017-2022

Return on Investment

Year	**Operating Income (a)**	**Total assets (b)**	**Assets turnover C=(a/b)**	**EBIT (d)**	**Operating Income (e)**	**Profit margin F=(d/e)**	**ROI= (C*F)**
2017-2018	297.45	2452.31	0.12	393.36	297.45	1.32	0.16
2018-2019	723.48	3599.54	0.26	801.65	723.48	1.11	0.28
2019-2020	915.42	7036.68	0.25	603.41	915.42	1.13	0.29
2020-2021	256.38	7956.08	0.15	1138.3	632.38	1.66	0.17
2021-2022	414.29	12013.46	0.04	1833.32	185.29	1.35	0.09
Mean	**521.40**	**6611.61**	**0.16**	**954.01**	**550.80**	**1.31**	**0.20**
Std.	**286.33**	**3792.78**	**0.09**	**562.94**	**302.99**	**0.22**	**0.09**
T value **Sig. (2-tailed)**	**4.07** **(0.015)**	**3.90** **(0.018)**	**3.97** **(0.017)**	**3.79** **(0.019)**	**4.06** **(0.015)**	**13.26** **(0.000)**	**5.19** **(0.003)**

Source: Annual Reports of Divis Laboratories Limited, 2017-2022

From the above table ROE it is clear that mean value is 22.76, Std.dev is 7.39, the t-value is 6.89 and it is significant at 5% level of significance (0.002). In table of ROI it shows that the mean value is 0.20, std.dev is 0.09, the t-value is 5.19 and it is significant at 5% level of significance (0.003).

iii. Cipla Limited

Return on Equity

Year	**Total Assets (a)**	**Common stock equity (b)**	**Financial leverage C=(axb)**	**NPM (d)**	**TAT (e)**	**ROA (d/e)**	**ROE= FL*ROA**
2017-2018	1044.31	724.66	1.44	18.22	0.94	17.15	24.71
2018-2019	1411.54	890.14	1.59	18.24	0.91	16.66	26.41
2019-2020	1817.68	1070.08	1.70	16.97	0.80	13.63	23.15
2020-2021	220.08	1264.05	1.76	15.95	0.87	13.81	24.27

2021-2022	2616.06	1553.63	1.68	18.17	0.86	15.66	26.36
Mean	**1421.93**	**1100.51**	**1.63**	**17.51**	**0.88**	**15.38**	**24.98**
Std.	**890.18**	**323.46**	**0.12**	**1.02**	**0.05**	**1.61**	**1.40**
T value	**3.57**	**7.61**	**29.37**	**38.22**	**36.82**	**21.35**	**39.81**
Sig. (2-tailed)	**(0.023)**	**(0.002)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**

Source: Annual Reports of Cipla Limited, 2017-2022

Return on Investment

Year	Operating Income (a)	Total assets (b)	Assets turnover C=(a/b)	EBIT (d)	Operating Income (e)	Profit marginF=(d/e)	ROI= (C*F)
2017-2018	233.45	1044.31	0.22	255.91	233.45	1.10	0.25
2018-2019	306.48	1411.54	0.22	334.65	306.48	1.10	0.24
2019-2020	319.42	1817.68	0.18	345.41	319.42	1.90	0.19
2020-2021	422.38	2220.08	0.19	448.3	422.38	1.70	0.20
2021-2022	505.29	2616.06	0.19	581.32	505.29	1.15	0.22
Mean	**357.40**	**1821.93**	**0.20**	**393.12**	**357.40**	**1.39**	**0.22**
Std.	**106.65**	**624.96**	**0.02**	**125.48**	**106.65**	**0.38**	**0.03**
T value	**7.49**	**6.52**	**23.90**	**7.01**	**7.49**	**8.15**	**19.30**
Sig. (2-tailed)	**(0.002)**	**(0.003)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.001)**	**(0.000)**

Source: Annual Reports of Cipla Limited, 2017-2022

From the above table ROE it is clear that mean value is 24.98, Std.dev is 1.40, the t-value is 39.81 and it is significant at 5% level of significance (0.000). In table of ROI it shows that the mean value is 0.22, std.dev is 0.03, the t-value is 19.30 and it is significant at 5% level of significance (0.000).

iv. Aurobindo Pharma Limited

Return on Equity

Year	Total Assets (a)	Common stock	Financial leverage C=(axb)	NPM (d)	TAT (e)	ROA (d/e)	ROE= FL*ROA

		equity (b)					
2017-2018	1024.31	784.66	1.44	18.22	0.94	17.15	24.71
2018-2019	1231.54	700.14	1.59	18.24	0.91	16.66	26.41
2019-2020	1926.68	1160.08	1.70	16.97	0.80	13.63	23.15
2020-2021	398.08	2494.05	1.76	15.95	0.87	13.81	24.27
2021-2022	1678.06	2543.63	1.68	18.17	0.86	15.66	26.36
Mean	**1251.73**	**1536.51**	**1.63**	**17.51**	**0.88**	**15.38**	**24.98**
Std.	**595.43**	**913.46**	**0.12**	**1.02**	**0.05**	**1.61**	**1.40**
T value Sig. (2-tailed)	**4.70 (0.009)**	**3.76 (0.020)**	**29.37 (0.000)**	**38.22 (0.000)**	**36.82 (0.000)**	**21.35 (0.000)**	**39.81 (0.000)**

Source: Annual Reports of Aurobindo Pharma Limited, 2017-2022

Return on Investment

Year	**Operating Income (a)**	**Total assets (b)**	**Assets turnover C=(a/b)**	**EBIT (d)**	**Operating Income (e)**	**Profit margin F=(d/e)**	**ROI= (C*F)**
2017-2018	393.45	1044.31	0.22	255.91	233.45	1.10	0.25
2018-2019	316.48	1411.54	0.22	334.65	306.48	1.10	0.24
2019-2020	489.42	1817.68	0.18	345.41	319.42	1.90	0.19
2020-2021	502.38	2220.08	0.19	448.3	422.38	1.70	0.20
2021-2022	689.29	2616.06	0.19	581.32	505.29	1.15	0.22
Mean	**478.20**	**1821.93**	**0.20**	**393.12**	**357.40**	**357.40**	**0.22**
Std.	**140.18**	**624.96**	**0.02**	**125.48**	**106.65**	**0.38**	**0.03**
T value Sig. (2-tailed)	**7.63 (0.002)**	**6.52 (0.003)**	**23.90 (0.000)**	**7.01 (0.002)**	**7.49 (0.002)**	**8.15 (0.001)**	**19.30 (0.000)**

Source: Annual Reports of Aurobindo Pharma Limited, 2017-2022

From the above table ROE it is clear that mean value is 24.98, Std.dev is 1.40, the t-value is 39.81 and it is significant at 5% level of significance (0.000). In the table of ROI it shows that the mean value is 0.22, std.dev is 0.03, the t-value is 19.30 and it is significant at 5% level of significance (0.000).

v. Torrent Pharmaceuticals Limited

Return on Equity

Year	Total Assets (a)	Common stock equity (b)	Financial leverage C=(axb)	NPM (d)	TAT (e)	ROA (d/e)	ROE= FL*ROA
2017-2018	3324.31	384.66	1.56	19.22	0.76	16.15	23.71
2018-2019	3341.54	400.14	1.60	20.24	0.79	17.66	26.41
2019-2020	4566.68	3160.08	1.76	21.97	0.80	18.63	27.15
2020-2021	4788.08	3494.05	1.80	25.95	0.86	19.81	29.27
2021-2022	5678.06	4543.63	1.89	30.17	0.89	20.66	30.36
Mean	**4339.73**	**2396.51**	**1.72**	**23.51**	**0.82**	**18.58**	**27.38**
Std.	**1008.85**	**1899.39**	**0.14**	**4.52**	**0.05**	**1.77**	**2.59**
T value Sig. (2-tailed)	**9.62 (0.001)**	**2.82 (0.048)**	**27.77 (0.000)**	**11.63 (0.000)**	**34.35 (0.000)**	**23.42 (0.000)**	**23.60 (0.000)**

Source: Annual Reports of Torrent Pharmaceuticals Limited, 2017-2022

Return on Investment

Year	Operating Income (a)	Total assets (b)	Assets turnover C=(a/b)	EBIT (d)	Operating Income (e)	Profit margin F=(d/e)	ROI= (C*F)
2017-2018	390.45	1144.31	0.19	455.91	343.45	1.11	0.21
2018-2019	393.48	1511.54	0.20	434.65	356.48	1.15	0.25
2019-2020	408.42	1917.68	0.22	445.41	369.42	1.36	0.30
2020-2021	512.38	2120.08	0.29	548.3	412.38	1.65	0.31
2021-2022	619.29	2516.06	0.30	681.32	515.29	1.70	0.37
Mean	**464.80**	**1841.93**	**0.24**	**513.12**	**399.40**	**1.39**	**0.29**
Std.	**99.91**	**532.30**	**0.05**	**104.34**	**69.77**	**0.27**	**0.06**
T value Sig. (2-tailed)	**10.40 (0.000)**	**7.74 (0.002)**	**10.42 (0.000)**	**11.00 (0.000)**	**12.80 (0.000)**	**11.37 (0.000)**	**10.56 (0.000)**

Source: Annual Reports of Torrent Pharmaceuticals Limited, 2017-2022

From the above table ROE it is clear that mean value is 27.38, Std.dev is 2.59, the t-value is 23.60 and it is significant at 5% level of significance (0.000). In table of ROI it shows that the

mean value is 0.29, std.dev is 0.06, the t-value is 10.56 and it is significant at 5% level of significance (0.000).

VI. Conclusion

The company profitability for most investors is a landmark in terms of earnings they could obtain by placing capital. Profits earned by a company, taken the absolute amount, provides an overview of a company's activity without giving details about the extent to which the company manages dividends, debts, liabilities or other indicators.

This paper, it is tried to demonstrate with the help of profitability ratios like ROI and ROE that the comparison of performance and condition of a company against its competitors, analyzing trends in the returns of a company in the context of trends of the components and forecasting the returns of a company based on forecasts of the components.

From the above analysis, it is found that Sun pharmaceutical's ROE and ROI has highest returns on equity and Investment followed by Divis. The third position secured by Aurobindo pharma then Torrent pharma. This shows torrent pharma is concentrating on its financial performance by reducing its expenses and cost. In conclusion, the Du Pont analysis that we made (by calculating ROI and ROE) for the top 3 most profitable pharmaceutical companies in India emphasize that absolute measurements are not relevant every time. Therefore, to have a common basis of comparison between several companies and to compose ranks the relative sizes for measuring efficiency are necessary when calculating the ratio.

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