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# Profitability Determinants in the Indian Drugs and Pharmaceutical Industry

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## ABSTRACT

*Present study attempts to investigate determinants of profitability of Indian drug and pharmaceutical industry which is known for historically weak research & development initiatives. The change in the economic environment brought out by the Trade Related Intellectual Property Rights (TRIPS) compliance, this industry was found to have fast adjusted to new working environment by substantially modifying its strategies. The study uses real time-series data for a period 2000-2014 and applies ordinary least square regression model with Newey-West standard errors. It has found that export intensity, A&M intensity, and time dummy have exercised positive influence on profitability. The negative and statistically significant influence of Leverage ratio and operating expenditure to total assets ratio points to the need for firms to better their efficient management of funds, and contain costs. The study suggests that firms are required to pay far more attention to optimize their operating expenditures, advertisement and marketing expenditures and improve their export orientation, as part of the long term strategy.*

**KEYWORDS:** *Indian Pharmaceutical Industry, Patent rights, Performance, Profits, Trade Related Intellectual Property Rights (TRIPS)*

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## 1 Introduction

Indian pharmaceutical industry is the world's third-largest pharmaceutical industry in terms of volume yet stands ranked at 13<sup>th</sup> position in terms of value (Annual Report, Department of Pharmaceuticals, Ministry of Chemistry and Fertilizers 2009-10). The far lower rank, in terms of value, is reflective of the fact that Indian pharmaceutical companies are primarily operating in the low priced generic products group category with wide heterogeneity in firm sizes and product mix. Fascinatingly, the emergence of Indian pharmaceutical industry on the global pharmaceutical scenario can be credited to the change from product to process patent regime after 1970. These enabled the Indian pharmaceutical companies to reverse-engineer and copycat the newest drugs launched in overseas markets through different processes, and market them in the domestic and overseas markets on very low prices. This particular step gave such a big push to Indian pharmaceutical industry that it emerged as one of the most profitable and knowledge intensive Indian manufacturing industries.

### 1.1 Statement of the Problem

Profits are one of the key concepts in the industrial growth strategies because profits effect investment choices, growth of an industry and direction of trade and, therefore, make strong impact on capacity, productivity and efficiency (Uctum, 1995). This industry, being technology and knowledge intensive, is driven more by thrust for innovations and inventions due to emergence of more aggressive variants of diseases on account of changing forms and profiles of viruses getting increasingly drug resistant. The specialty of the industry also lies in the fact that it is just not the drug but also drug delivery system that tends to influence efficacy of the drugs. These factors and ethical and legal parameters within which the drug industry has to operate have certainly added up to their costs which have already been too high. The R&D and marketing cost considerations have also led to many mergers and acquisitions worldwide, including India. Thus profitability in this industry is governed by many more factors than what applies to other knowledge intensive industries.

### 1.2 Objective of the Study

Since profitability is a key to survival and growth for any industry, the present study intend to examine determinants of Profitability in Indian pharmaceutical industry for the period ranging from 1994 till 2014, when the operating atmosphere went through a paradigm shift after implementation of trade related Intellectual property agreement of World Trade Organization (WTO).

Rest of the paper is organized as follows. Section 2 presents trends in various profits indicators of Indian pharmaceutical sector. Section 3 encompasses description of methodology. Section 4 discusses data sources and conceptual framework. Section 5 comprises results and discussions, while Section 6 concludes the study.

## 2 Trends in Profits Margins of Indian Drug and Pharmaceutical Industry

As could be discerned from Table 1, high value of the Return on Assets (ROA ratio suggests significant returns from current assets which could be a strong indication of high level of managerial and technical efficiencies. The consistently rising ROA can be observed in regard of Lupin, Ipca Laboratories, Cadila and Torrent Ltd which appears to be indicative of their good performance plausibly due to the strong growth momentum in their domestic and the export businesses on account of robust product pipelines and niche launches.

Table 1 also exhibits that domestic sales of good performers have increased over the specified time period. Lupin Ltd. has shown a consistently increasing rate of domestic sales growth and its sales increased from 8.92 billion INR in 2000-01 to 89.77 billion INR in 2013-14, showing a 10 times increase. Dr. Reddy's Labs, Cadila and Torrent's domestic sales also showed a growth of five-six times in 2013 from 2001's level of domestic sales. Relatively bad profit earners such as Cipla, Ipca Laboratories, Aurobindo and Mylan have also shown the similar level of rise in their sales growth. Only Ranbaxy has shown a decreasing rate of sales growth after its acquisition by Daiichi Sankyo in 2008. Due to loss Daiichi Sankyo sold its share to Sun Pharma, making Sun Pharma and Ranbaxy combination the fifth-largest specialty generics across the globe and the largest pharmaceutical firm in India. Export growth among these firms also depicts the similar trends of 5 to 7 times increase during 1995-2014, amongst all 10 highest profit earners except Ranbaxy, Torrent and GSK. Ranbaxy's export revenue only doubled and it demonstrated overall bad performance while GSK, being a MNC giant, seems only focused on expanding sales in local market. Torrent has performed very well on all major fronts and its global sales increased more than 20 times from a negligible 2.41 billion INR in 1995 to 44.31 billion INR in 2014. Average market share of Dr. Reddy's labs, Lupin, Aurobindo, Mylan and Cipla increased significantly over the specified time period. Ranbaxy and Torrent's market share showed a slight decrease. Ranbaxy's bad performance and failure of molecules in drug pipeline affected company's performance. Average export intensity has demonstrated declining value for all the firms except Cipla Ltd. This decline indicates the ever growing healthcare market of India. Our domestic demand for medicinal products is increasing and this gives

incentives to the company to focus more on domestic sales because of the cut throat competition within the domestic territory.

Table 1 : Major parameters of financial growth for select companies

Year	Companies									
	Dr. Reddy's Labs	Cipla Ltd.	Lupin Ltd.	Ranbaxy Labs	Aurobindo Ltd.	Mylan Labs	Cadila Ltd.	Ipca Labs	Torrent Ltd.	GSK Ltd.
<b>Average Return on Assets (in percentage)</b>										
1994-99	11.72	17.13	5.19	14.53	8.62	-3.3	8.69	7.87	7.93	18.87
2000-04	16.65	16.71	6.72	8.22	14.95	20.46	9.1	12.04	10.89	11.09
2005-09	11.19	15.19	14.2	6.92	2.76	4.42	12.58	11.23	11.1	16.66
2010-14	10.03	11.83	19.52	8.28	-4.84	10.45	14.4	16.04	14.2	10.96
<b>Total Domestic Sales, in billion INR</b>										
1994-99	17.23	4.38	27.26	62.24	19.35	1.45	15.33	14.9	17.15	41.7
2000-04	76.09	51.13	84.94	146.22	57.35	18.1	43.15	27.7	22.68	59.4
2005-09	193.8	131.5	220.5	191.66	120.81	59.37	83.82	58.9	52.72	88.3
2010-14	307.47	260.4	312.6	260.39	214.48	177.3	118.9	104	99.67	101
<b>Average Market Share, in percentage</b>										
1994-99	1.8	2.88	0.46	6.67	1.92	0.15	1.61	1.6	1.86	4.6
2000-04	4.58	5.00	2.93	8.59	3.26	1.12	2.56	1.6	1.28	3.41
2005-09	5.31	6.02	3.46	5.47	3.20	1.47	2.40	1.58	1.42	2.60
2010-14	7.70	7.45	7.06	5.41	5.71	4.27	2.90	2.59	2.64	2.09
<b>Total Export Sales, in billion INR</b>										
1994-99	5.01	2.22	4.39	27.15	8.16	0.09	1.43	6.61	2.52	2.41
2000-04	41.79	20.75	32.97	85.53	27.92	9.3	5.63	13.8	2.47	2.91
2005-09	127.96	70.17	116.8	129.07	72.8	42.64	25.41	28.2	13.58	3.92
2010-14	224.78	161.3	167.6	164.64	151.5	146.6	61.16	60.2	44.31	3.02
<b>Average Export intensity, in percentage</b>										
1994-99	29.55	50.68	15.39	43.35	40.13	8.96	9.57	43.8	13.34	5.7
2000-04	54	40.58	36.93	56.32	48.83	37.52	13.14	49.2	10.46	5.16
2005-09	65.03	53.35	52.58	67.77	59.12	67.86	28.87	47.7	24.55	4.36
2010-14	49.53	61.93	34.97	55.81	49.36	38.11	17.19	46.9	16.12	5.08

Source: Author's calculations, CMIE-Prowess Database extracted in September, 2014

Table 1 also exhibits that domestic sales of good performers have increased over the specified time period. Lupin Ltd. has shown a consistently increasing rate of domestic sales growth and its sales increased from 8.92 billion INR in 2000-01 to 89.77 billion INR in 2013-14, showing a 10 times increase. Dr. Reddy's Labs, Cadila and Torrent's domestic sales also showed a growth of five-six times in 2013 from 2001's level of domestic sales. Relatively bad profit earners such as Cipla, Ipca Labs, Aurobindo and Mylan have also shown the similar level of rise in their sales growth. Only Ranbaxy has shown a decreasing rate of sales growth after its acquisition by Daiichi Sankyo in 2008. Due to loss Daiichi Sankyo sold its share to Sun Pharma, making Sun Pharma and Ranbaxy combination the fifth-largest specialty generics across the globe and the largest pharmaceutical firm in India. Export growth among these firms also depicts the similar trends of 5 to 7 times increase during 1995-2014, amongst all 10 highest profit earners except Ranbaxy, Torrent and GSK. Ranbaxy's export revenue only doubled and it demonstrated overall bad performance while GSK, being a multinational company, seems only focused on expanding sales in local market. Torrent has performed very well on all major fronts and its global sales increased more than 20 times from a negligible 2.41 billion INR in 1995 to 44.31 billion INR in 2014. Average market share of Dr. Reddy's labs, Lupin, Aurobindo, Mylan and Cipla increased significantly over the specified time period. Ranbaxy and Torrent's market share showed a slight decrease. Ranbaxy's bad performance and failure of molecules in drug pipeline effected company's performance. Average export intensity has demonstrated declining value for all the firms except Cipla Ltd. This decline indicates the ever growing healthcare market of India. Our domestic demand for medicinal products is increasing and this gives incentives to the company to focus more on domestic sales because of the cutthroat competition within the domestic territory.

Although the ten companies which have been listed in Table 1 are indicative of the depth and direction of growth of Indian drug and pharmaceutical industry, it would be interesting to see how all the above financial ratios have figured in regard of top 100, 50 and 25 companies. This would also help to find out if what is discernible in the trend shown by the top ten companies are also reflective of what is happening in the industry in general. Figure 2 exhibits that the growth rate of Returns on Assets (ROA) for 100 top pharmaceutical companies increased from 8% in 1995 to approximately 12% in 2014. However, the stronger growth signals, albeit with fluctuations, are emitted by the top 25 firms.

After having discussed broader aspects of financial efficiency of Indian Drug and pharmaceutical industry, it would be interesting to analyze the profitability of Indian drug and pharmaceutical industry with more robust tools which may help to develop an insight into the profitability determinants of this industry.

### 3 Research Methodology

In order to study the profitability determinants of profits in the Indian D&P industry, the study uses simple Ordinary Least Squares (OLS) model and follows the Newey-West procedure to deal with the problems of autocorrelation and heteroscedasticity. Augmented Dickey Fuller and Fisher unit root tests are also applied to check for the stationarity of data.

## 4 Data Sources, Conceptual Framework and Estimation Procedure

### 4.1 Data Sources

The study uses annual real financial data from the Indian pharmaceutical industry for a period 1994-2014. In order to accomplish the research objective, secondary data was collected from Prowess database of Center for Monitoring Indian Economy (CMIE). The time span selected for this study has the purpose of looking into the determinants of profitability of this industry during the pre and post patent time periods.

### 4.2 Conceptual Framework

The subject of the conceptualization of determinants of profits is of greater research interest as such studies may help policy makers and managers to devise and implement public policies that may stimulate and support the management strategies to maximize profits in this dynamic and globally competitive industry.

The dependent variable in our study is the profit of Indian D&P industry measured as Return on Assets (ROA). This measure is an indicator of how efficient the management of a firm is, in generating income from the assets, employed by the firm. Various studies namely, Kuntluru, Muppani & Khan (2008); Stierwald (2010); San and Heng (2011) and Adjei (2012) have taken ROA as a measure of profitability in their studies. It is calculated as a ratio of net income to total assets in the given year.

Table 2 presents and defines the list of dependent and independent variables that are postulated to be affecting the profitability in ID & PI.

Table 2: Determinants of Profits in Indian D & P industry

Variables	Symbols	Description
<b>Dependent Variable</b>		
Return on Assets	ROA	Net Income as a percentage of total assets in the given year
<b>Independent Variables</b>		
Export Intensity	XI	Exports as a percentage of total sales in the given year
Leverage Ratio	LR	Total debt as a percentage of total assets in the given year
Advertising and Marketing (A&M) Intensity	AMI	Advertising and Marketing expenditure as percentage of total sales in the given year
R&D Intensity	RDI	R&D expenditure as percentage of total sales in the given year
Capital Intensity	KI	Net fixed assets as percentage of total sales in the given year
Operating Expenditure to Total Assets Ratio	OER	Operating expenditure as percentage of total assets in the given year
Time dummy for stronger patent regime	PATENTDUM	Dichotomous variable with value 1, if time period is after 2005, 0 otherwise

These variables are briefly described below.

#### Export Intensity

Bernard and Jensen (1995), in their path breaking research, investigated the relation between exports performance and productivity. Later on Wagner (2007) studied the links between export, productivity and profitability. His 'learning by exporting' theory demonstrates that highly productive exporters gain higher profitability. Some studies have reported that export intensity is directly associated with profitability (Beleska-Spasova et. al., 2002; Vogel and Wagner, 2009; and Vu et. al., 2014). In India's context, the overseas markets are far more rapidly expanding due to promotion of generics on account of steep rise in the health costs and a fast ageing population in the west. The rising exports may not only provide Indian firms with much needed

resources for upgrading their products and best management practices but shall also provide them the needed incentive to do so as to meet the regulatory and other requirements of exports. Thus it is hypothesized that export intensity may have positive impact on the profitability.

### **Leverage Ratio**

An industry with higher leverage ratio is at greater financial risk as compared to another industry with lower leverage ratio. Existing research indicates that firms have low debt because they operate in industries with high degree of business risk and thus expect a negative relation between leverage and profitability (Athanasoglou et. al., 2008; Mohapatra, 2012 and Sun et. al., 2013). However, the impact of financial variables on a given firm's profitability has not been clearly established in the literature (Oustapassidis, 1998 and Vassiliou and Frangouli 2001), as evidences have appeared on both the sides. While some studies have found leverage ratios exercising positive impact on firm's profitability (Gale, 1972 and Vassiliou and Frangouli, 2001), other studies have found negative impact (Baker, 1973 and Hurdle, 1974). Thus, in order to capture the effect of leverage on the industrial profitability, total debt as a percentage of total assets in the given year is included in the model. It is hypothesized that leverage ratio has negative impact on profitability.

### **Advertising and Marketing Intensity**

Research studies undertaken over a period of time suggest a positive relationship between advertising expenditure and profitability (Bhagwat and Bruine, 2011). Few studies, however, have also reported this relationship to be a negative and insignificant (Comenor, 1971). To study the effect of advertising on profitability with reference to pharmaceutical industry is very important because this industry follow typical model of advertising. It invests heavily in making direct contacts to medical practitioners and chemists as they can help in manipulating demand to a greater degree and secondly it also target direct consumer to create a brand image to reap out the benefit of loyalty. Basing upon prior art, it is hypothesized that advertising and marketing intensity positively impact the profitability.

### **R&D Intensity**

Existing literature indicates that R&D expenditure of a pharmaceutical firm affects its profitability positively. Earlier studies indicate that R&D expenditure has a positive influence and affect profitability appreciably in pharmaceutical firms (Simanjutak, 2011) owing to the possibility that R&D leads to innovative products, which, depending upon their reception in the market, may add tremendously to company's profits (Scherer, 2001). Present study also presupposes, based on the findings of empirical literature in this regard, a positive impact of R&D on profitability.

### **Capital Intensity**

High capital intensity demonstrates large sunk costs and possibly acts as a barrier to entry into the industry (Mc Donald, 1999 and Demir 2013). Existing literature suggests the positive and significant impact of capital intensity on industrial profitability (Fenny, 2000 and Kambhampati and Parikh, 2003). The effect of capital intensity in these studies has been accounted for, by using net fixed assets as percentage of total sales in the given year. Thus, it is hypothesized that higher capital intensity, represented by net fixed assets as percentage of total sales in the given year, leads to higher profitability.

### **Operating Expenditure to Total Assets Ratio**

Operating expenses to total assets ratio is a measure of management efficiency which demonstrates the quality of management. Managerial performance exhibited in qualitative terms such as organizational discipline, control systems, quality of staff etc., can be expressed as financial ratios (Ongore et. al., 2013). Higher operating expenses lead to lower profits and vice versa (Bourke, 1989). Earlier studies indicate that the ratio of operating expenses to total asset is found to be negatively associated with profitability (Athanasoglou et. al., 2005 and Said and Tumin, 2011). Thus, in this study, we assume relationship between operational costs and industrial profitability to be negative. This study includes operating expenses to total assets ratio as an explanatory variable to explore the relationship between operational efficiency and profitability of ID & PI.

### **Time Dummy for Stronger Patent Regime**

Stronger patent regime is expected to force the firms to commit part of their earnings for further inventions and innovations, which in turn may help them to earn more profit by using utility models in the short run and breakthrough innovations in the long run. However, stronger protection of IPRs may also have negative impact on the profitability as it may deprive the firms from any opportunity to replicate the patented drugs. The effect of stronger patent regime, in this study has been accounted for, through the application of dichotomous variable i.e., attributing the value of 1 for period after 2005, 0 otherwise. It is hypothesized that stronger patent regime may have positive impact on profitability of the firm.

### 4.3 Estimation Procedure

Three separate econometric models have been estimated to investigate the determinants of profits in Indian D&P industry. The Model specifications are as follows:

Model 1:

$$ROA_t = \alpha + \beta_1 XI_t + \beta_2 LR_t + \beta_3 AMI_t + \beta_4 RDI_t + \beta_5 KI_t + \beta_6 OER_t + \beta_7 PATDUM + \varepsilon_t \dots \dots \dots (i)$$

Model 2:

$$ROA_t = \alpha + \beta_1 LR_t + \beta_2 AMI_t + \beta_3 RDI_t + \beta_4 KI_t + \beta_5 OER_t + \beta_6 PATDUM + \varepsilon_t \dots \dots \dots (ii)$$

Model 3:

$$ROA_t = \alpha + \beta_1 XI_t + \beta_2 LR_t + \beta_3 AMI_t + \beta_4 KI_t + \beta_5 OER_t + \beta_6 PATDUM + \varepsilon_t \dots \dots \dots (iii)$$

Model 1 includes all the independent variables. In the Model 2, we consider all variables except export XI variable, and in Model 3 variable RDI has been excluded.

## 5 Results and Discussions

An empirical analysis was carried out with an estimation of the specified econometric models to find out the determinants of profits in ID&PI. However, before proceeding to the estimation, the data were examined for the non-stationarity and unit root of the times series and Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) were estimated. Results are presented in Table 3.

Table 3- Test statistics for Fisher-type unit-root test based on Augmented Dickey Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

Unit Root Tests	Augmented Dickey-Fuller with time trend		KPSS Test with Time Trend	
	Variables	ADF Test Statistics	Interpretation	KPSS Test Statistics
ROA	-0.26	Unit root	0.24**	time trend with non-stationary errors
FD_ROA#	-4.73*	No unit root	0.12	time trend with stationary errors
XI	1.2	Unit root	0.11*	time trend with non-stationary errors
FD_XI#	-2.92*	No unit root	0.09	time trend with stationary errors
LR	-2.24	Unit root	0.42*	time trend with non-stationary errors
FD_LR#	-3.28*	No unit root	0.26	time trend with stationary errors
AMI	-2.88*	No unit root	0.22**	time trend with non-stationary errors
FD_AMI#	-5.78*	No unit root	0.06	time trend with stationary errors
RDI	0.25	Unit root	0.18	time trend with stationary errors
FD_RDI#	-1.77**	No unit root	0.95	time trend with stationary errors
KI	-3.59*	No unit root	0.16	time trend with stationary errors
FD_KI#	-3.43*	No unit root	0.91	time trend with stationary errors
OER	-0.15	Unit root	0.13**	time trend with non-stationary errors
FD_OER#	-4.62*	No unit root	0.14	time trend with stationary errors
Note: (i)# First order difference of specified variable is taken. (ii) All tests use one lag. (iii) * and ** and indicates significance at 1% and 5%.				
Source: Author's own calculations				

All the variables are found containing no unit roots at first order differentiation, so all the models were estimated on the first order differentiated variables.

Table 4: Determinants of Profits in Indian D&P industry- OLS estimates with Newey-West standard errors

Independent variables	Model-1 Standardized coefficients	Model-2 Standardized coefficients	Model-3 Standardized coefficients
FD_XI	-0.16642 (0.41863)	-	0.03397** (0.24742)
FD_LR	-0.05632* (0.02294)	-0.04552* (0.01298)	-0.02137* (0.04567)
FD_AMI	0.80736 ** (0.9871)	1.62313*** (0.84918)	1.52011* (0.88715)
FD_RDI	0.35960*** (0.06227)	0.61348** (0.82801)	-
FD_KI	0.02491 (0.14217)	0.01875 (0.16130)	0.00181** (0.12524)
FD_OER	0.91717*** (0.16222)	0.95690 (0.14854)	-0.96942 ** (-0.77889)
PATENTDUM	0.40425*** (0.13854)	0.64810*** (0.75512)	0.57655** (0.84196)
F statistic (6, 12)	36.25***	39.58***	40.58***
<b>Note:</b> (i) Figures in parentheses are respective standard errors, and (ii) ***, ** and * indicates significance at 1%, 5% and 10%.			
Source: Author's estimations			

Table 4 shows the relevant results. The reported F statistics for all models depict that the estimated models are statistically significant. Model-3 turns out to be much stronger predicting model. Significance and performance of individual independent variables are discussed below.

Export Intensity showed a negative and insignificant relationship with pharmaceutical profits in the model 1. This relationship changed to a positive and significant one when R&D intensity variable was dropped in model 3. It suggests that export intensity has exercised positive impact on the profitability of the firms. The most plausible explanation could be that exports not only offer much more remunerative prices as compared to domestic market but also induce firms to adopt the best manufacturing practices and upgrade product quality to the global standard that in the long run help them to have access to many more markets apart from gaining in terms of credibility.

Leverage ratio shows negative association with industrial profits and its' coefficient is significant at 10%. This finding is consistent with existing research findings (Athanasoglou et. al. 2008; Mohpatra 2012 and Sun et. al. 2013, Schmidt .(2014) While high level of leverage increase the probability of pharmaceutical industry rather than adjusting payouts to main firm's investment plans such companies must instead borrow more or raise more equity financing. This can be realized under the conditions that the used debts are on time, with lower interest, low costs and through effective using them. In addition to the positive leverage of debt financing is not limitless.

Advertising and marketing (A&M) intensity showed a positive and significant relationship with profits in all three models. This finding implies the facts that in advertised intensive Indian D&P industry, higher expenditure on A&M helps the companies to get mind space of medical practitioners and patients which may boost up sales and consequently profitability. The impact of A&M on firm's profitability has already been explained much and the literature overwhelmingly suggests the positive influence of A&M on profitability.

As per expectations, R&D intensity has exercised a positive and significant influence on ROA. The investment in R&D was expected to improve innovation capacity of the firms leading to increase in the products range and products type, which become highly critical in intensely competitive market for branded generics. The expenditure on technology up gradation due to FDA approval requirement for export markets might have further enhanced the marketing success of the firms leading to better profitability. The R&D angle is somewhat new to Indian pharmaceutical firms which prior to 1995 were known more for preparing the copycats than coming up with their own innovative pharma products.

Capital intensity exhibits positive yet insignificant association with pharmaceutical profits in model 1 and model 2, but it turns out in a significant positive relationship with ROA when the RDI variable is dropped in model 3. Earlier studies have also reported similar findings (Demir, 2013; Fenny, 2000 and Spaventa, 1970). Insignificance of this relationship may be due to the low capital intensity and its' probable collinearity with RDI. Although, capital investment in Indian D&P industry is increasing over the years but whole pharmaceutical sector is found to be much less capital intensive as compared to the manufacturing sector (Mazumdar, 2013).

Operating Expenditure to Total Assets Ratio exhibits and significant relationship with profits in Indian D&P industry in model 1 and model 3. It validates the efficiency theory that manufacturing entities can earn more profits if they are more efficient in their operations than their competitors (Olweny and Shipo, 2011). Higher operational efficiency in Indian pharmaceutical industry has led to higher competitiveness which has furthermore increased exports and overseas profits.

Stronger patent regime dummy (PATENTDUM) has emerged as significant variable exercising positive impact on the profitability of the pharmaceutical firms. It implies that post-TRIPS, stronger patent protection have positively influenced the profitability of Indian pharmaceutical firms. It appears to be contrary to the popular belief that stronger patent protection may severely damage the competitive strength of Indian drug and pharmaceutical firms. It also entails that Indian firms have been very quickly able to adapt to radical change in the economic environment in which Indian companies had to reckon with. Towards this, they had also engaged in contract R&D, dossier-licensing, supply contracts with multinationals with enough ready capacity etc.

## 6 Conclusions

Present study has found that export intensity, A&M intensity, and time dummy have exercised positive influence on profitability. All these factors are important because they provide powerful tools to the firms to improve their performance and profitability by expanding to overseas markets, raising A&M expenditure productively even under strong patent protection regime. The negative and statistically significant influence of leverage ratio, and operating expenditure to total assets ratio points to the need for firms to improve fund management efficiency, and contain costs. While external factors such as exports and economic environments are not within the control of the firm, it could always enhance its revenue generating capacity by working far more pragmatically on A&M and operating expenditures, and debts. However, firm is likely to gain more in the long term if it has significant export orientation.

The present study is limited to 19 year period because data for longer period was not available. Therefore, result may come out more robust in the presence of larger dataset. The future research could be focused on some approaches which are not considered in this study. Firstly, some other variables including impact of mergers and acquisitions and pricing policies along with changes in regulatory framework may be considered for analyzing the profits in Indian D&P industry. Type of R&D activities undergoing in this industry may also be analyzed to find out the linkages between RDI, AMI and pricing policies. Secondly, two way relationships may also be studied in terms of profits and RDI; and profits and exports.

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