

A Study on Determinants of Financial Efficiency of Selected Pharmaceutical Companies in India: Panel Data Analysis

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Abstract

In today era one of the most difficult problems being faced by finance manager is to increase the financial efficiency. Looking the importance of the issues, researcher has made an attempt to study determinants of financial efficiency. Researcher has taken profitability as a measure of financial efficiency. Many researchers have done work on this topic but most of them belong to other parts of the world, only few researches have been carried out in India. Therefore researcher has taken up this topic. Researcher has selected five pharmaceutical companies with study period of 9 years from 2012-2013 to 2020-2021. Data have been analyzed by using Descriptive statistics, Correlation matrix, unit root test, OPL regression, redundant fixed effect test, fixed effect model and Panel cross section dependency test. Researcher has concluded that Descriptive statistics explains that ROCE, EPS, Growth rate and Tobin's q are satisfactory. Correlation matrix explains that ROCE has significant relationship with DPS, EV and ROA. Unit root test explain that ROCE, DPR, Lev and ROA are stationary variables whereas DPS, EPS, Growth rate Tobin's q and firm size are non stationary variables. The adjusted R² is 0.672 which means that all independent variables have caused 67.20% variance in ROCE. Researcher also concluded that ROA has been the determinants of ROCE and other independent variables have been insignificant to ROCE.

Keyword: Financial efficiency, Profitability, Panel data analysis, Pharmaceutical industry

Introduction

Financial efficiency increases the wealth of firms and stakeholders. Utilization of resources of the firm depends on the financial efficiency. Wasting resource do not bring financial efficiency. The main objective of the financial efficiency is to decrease the cost of capital and enhances the earning per share. Shareholders expect that their money should be utilized effective and efficiently in the firm. Finance department has to analyze the available options to raise the funds from the market. Finance

manager has to take fund from those sources where cost of fund is minimum. Moreover fund of the shareholders should be utilized for the purpose for which the firm procured fund from investors. Using fund for other purpose other than proposed by the firm then there would be a conflict which is also called agency problem. Financial efficiency is also related to earning capacity of the firm. Earning capacity of the firm brings profitability. Thus profitability is the final measure of financial efficiency. Profitability is measure by accounting ratio called return on capital employed and profitability of determined by many factors like earning per share, return on assets, dividend per share, dividend payout ratio, size of the firm and Tobin's q. Researcher has selected pharmaceutical companies because during corona pandemic their business have flourished.

Review of literature

Bhayani Sanjay (2020) worked on determinants of profitability in Indian cement industry during the study period of 2001 to 2008. The researcher used secondary data. Statistical tools like descriptive statistics, correlation matrix, multiple regressions. He concluded that liquidity, age of the firm, operating profit ratio, interest rate and inflation rate are the significant determinants of profitability in cement industry in India. **Adebayo Sayedoyin Ifeduni and Onyeiwu Charles (2018)** studied determinants of profitability of manufacturing firms in Nigeria during the study period of 2011 to 2015. The researchers used statistical techniques like correlation matrix, regression analysis. They concluded that ROE is significantly impacted by leverage. Wherein other model ROA is affected by Size of the firm. Thus ROE and ROA are the two major determinants of the profitability. **Maja Pervan, Ivica Pervan & Marijana Ćurak (2019)** studied on Determinants of firm profitability in the Croatian manufacturing industry during the study period of 2006 to 2015. The researchers concluded that profitability has been significantly affected by age of the firm, labour cost, GDP growth and inflation. Bhayani Sanjay & Butalal Ajmera (2021) worked on effect of productivity on profitability of selected cement manufacturing companies in India during the study period of 2015-2016 to 2019-2020. Researchers

have used panel data analysis to examine the effect of productivity on profitability. Two measures like ROCE and Net profit ratio were taken as the measure of profitability. Researcher concluded that ROCE as measure of profitability has been affected by material productivity ratio, labour productivity ratio and overhead productivity ratio and total productivity ratio. However the effect has not been statistically significant. Net profit ratio has been taken as another measure of profitability which has also been affected significantly by material productivity ratio. Other variables have affected insignificantly on Net profit ratio. **Didik Susilo, Sugeng Wahyudi, and Irene Rini Demi Pangestuti (2020)** worked on profitability determinants of manufacturing firms in Indonesia during the study period 2010 to 2017. The researcher has selected 350 manufacturing firms as sample. The study concluded that working capital and firm growth have been positively correlated with profitability. But two variables like capital structure and non-debt tax shield have no effect on profitability. **Nicolae Petria, Bogdan Capraru And Iulian Ihnatov (2015)** have done a research work titled "Determinants Of Banks' Profitability: Evidence From Eu27 Banking Systems". In this study they all have assessed the main and important determinants of banks' profitability in EU 27 over the period of 7 years starting from 2004 to 2011. They have divided the factors that have influenced the banks' profitability in two criteria. Bank specific factors as well as industry specific and micro economics factors former was known as internal factors and later was indicated as external factors. They have concluded that the market concentration/competition, management efficiency, Credit and liquidity risk, the diversification of business, and the economic growth have influence on bank profitability, both on ROAA and ROAE. **Zeeshan Fareed, Zahid Ali, Farrukh Shahzad, Muhammad Imran Nazir and Assad Ullah (2016)** have conducted a research work titled "Determinants Of Profitability: Evidence From Power And Energy Sector". They have examined the effect of various key determinants of profitability such as firm age, firm size, growth of firm, productivity of firm, and financial leverage on power and energy sector in broader sense. They have collected panel data of 16 firms for the period of 12 years starting from 2001

to 2012. At the end they have concluded that productivity and size of firm both were strongest determinants of profitability that affect the power and energy sector in the selected area. **Ioannis Asimakopoulos, Aristeidis Samitas And Theodore Papadogonas (2009)** have done a research study titled “Firm-Specific And Economy Wide Determinants Of Firm Profitability”. The purpose of this study was to examine the determinants of profitability for a sample of non-financial firm of Greek firm listed in Athens stock exchange. The time period of this study was 1995-2003. They have employed panel data estimation techniques. The findings of this research work indicated that the profitability of firm was positively affected by sales growth, size and investment as well as negatively affected by leverage and current assets. Darush Yazdanfar (2013) had conducted a research work titled “Profitability Determinants among Micro Firms: Evidence from Swedish Data”. The main aim of this study was to discover the variable affecting firm profitability for that researcher has collected the data of approximately 87000 sample observations covering 12530 non-financial micro firms which were operating in 4 industry sectors. The findings have indicated that growth, lagged profitability, firm size and productivity influenced profitability positively as well as industry affiliation and age of firm affected it negatively. **Enrique Claver, Jose Molina and Juan Tari (2002)** have conducted a research work titled “Firm and Industry Effects on Firm Profitability: A Spanish Empirical Analysis”. The time period of this research work was from 1994 to 1998, the main aim of this research work was to examine the relative importance (firm effect) firm resources and (industry effect) industry membership in explaining the profitability of a firm for a set of non-diversified manufacturing companies in Spain. Their results had revealed that more significant industry effect for large- and medium-sized firms compare to small companies. **S. M. Imamul Haque and Mohd Atif Afzal (2017)** worked on an appraisal of financial performance of the fast-moving

consumer goods industry in India during the study period of 2012-2012 to 2015 -2016. The researcher concluded that profitability has been satisfactory during the study period. They also concluded that sales have significant impact on profitability and liquidity. **S. Felix Sophia and J. Gayathri (2018)** worked on Firm Size and Performance with special reference to Multinational Pharmaceutical Firms during study period 2007 to 2016. The researcher concluded that independent variables like Total forex earnings, Profit intensity, total imports and export intensity have an effect on performance of selected multinational pharmaceutical firms during the study period.

After the review researcher has found that there is no any such specific study has been conducted to measure the financial efficiency of Indian pharmaceutical industry. So researcher has undertaken this study.

Objectives of the study;

- 1) To Analyze financial efficiency of the selected pharmaceutical companies
- 2) To examine the correlation between selected variables of financial efficiency of selected pharmaceutical companies.
- 3) To study the determinants of financial efficiency of selected pharmaceutical companies in India
- 4) To give appropriate suggestions to the policy makers

Methodology of the study: Researcher has selected title “A study on determinants of financial efficiency of selected pharmaceutical companies in India”. Researcher has collected data from annual reports of respective companies. Researcher has used secondary data of nine years from 2012-2013 to 2020-2021. Convenient sampling method was used by researcher. Besides, annual reports, moneycontrol.com, icidirect.com and capitaline data have been used to collect the data. To interpret and analyze the data, descriptive statistics, Correlation matrix, multiple regression and fixed effect and random effect model were used. Researcher has used SPSS package and E-views software for Statistical techniques.

Model for financial efficiency measure

ROCE	B 0	+β1(DPR)	+β2(DPS)	+β3(EPS)	+β4(EV)	+β 5(ROA)
		+β6(Growth)	+β7(size)	+ β 8(tobin’s q)	+β9(Lev)	+Error term

Definition of selected variables

ROCE	Ratio of EBIT/Capital Employed*100	Dependent variable
DPR	DPS/EPS*100	Independent variable
DPS	Total Dividend paid / number of share	Independent variable
EPS	Net profit/ Shares outstanding	Independent variable
EV	Enterprise value= Market capitalisation+Debt+Preferred stock-cash	Independent variable
ROA	Ratio of Net Profit After Tax/Total Assets	Independent variable
Growth	(Current year's sales – Last year's sales)/Last year's sales *100	Independent variable
Size	Natural logarithm of total assets	Independent variable
Tobin's q	Total Asset Value of Firm / Total Market Value of Firm	Independent variable
Lev	Financial leverage= EBIT/EBT	Independent variable

Descriptive statistics: Researcher has calculated descriptive statistics by using SPSS package.

Table-1 Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
ROCE	45	-3.57	48.90	16.461	11.12	.903	1.18
DPR	45	-688.64	100.24	1.609	108.76	-6.037	39.08
DPS	45	1.00	35.00	10.767	9.60	1.079	0.22
EPS	45	-13.66	177.23	42.787	39.64	1.233	1.91
EV	45	3.79	5.18	4.629	0.25	-.731	3.02
ROA	45	-20.44	35.61	11.601	10.54	-.043	1.14
LEV	45	0.00	1.24	0.242	0.29	1.852	3.39
GROWTH	45	-38.28	161.41	63.978	46.91	-.165	-0.75
Tobin's q	45	0.06	15.46	4.604	3.17	1.827	3.73
SIZE	45	3.39	4.50	4.039	0.29	-.454	-0.23

Table No.-1 shows mean of ROCE 16.46 with range of (-3.57) to (48.90). ROCE of the pharmaceutical companies has been very good and shows very good profitability. Value of the skewness is less than +1 which shows that the distribution is moderate and Kurtosis shows the distribution is leptokurtic. Average of DPR is 1.61 which is ranged between -688.64 to 100.24. The range shows very high fluctuation. DPR is considered low. Skewness is less than -1.0 which shows that the distribution is left skewed. The kurtosis shows that leptokurtic the distribution of DPR. DPS is ranged between 1.00 to 35.00 with a mean of 10.76. The DPS is quite good. As per skewness, data is right skewed. Whereas kurtosis is less than +1 which also shows data is platykurtic distributed. Mean of EPS has been very

satisfactory with range of (-13.66) to 177.23. Skewness shows that the data have been right skewed and kurtosis shows that the data have been platykurtic. Enterprise value is also satisfactory with a mean of 4.62. ROA has been only 11.60 percentage which also good and skewness shows that data have been left skewed. Financial leverage has been 0.242 shows less financial risk. Growth in sales has been very good during the study period. Tobin's q is whether selected firms are overvalued or undervalued. Mean of Tobin's q is 4.60 which are greater than one which shows that selected firms are overvalued. Size of the firms matter a lot for financial efficiency. Mean of size is 4.03 which are also satisfactory.

Table-2 Correlation Matrix

	ROCE	DPR	DPS	EPS	EV	ROA	LEV	GROWTH	Tobin's Q	SIZE
ROCE	1									
DPR	0.246	1								
DPS	.334*	0.189	1							
EPS	.491**	0.193	.757**	1						
EV	-.300*	-0.053	-0.206	-0.065	1					
ROA	.799**	0.213	.432**	.582**	-.371*	1				
LEV	-0.049	0.077	.456**	0.041	-0.26	0.041	1			
GROWTH	0.146	-0.177	-.299*	-0.181	0.218	0.153	-0.239	1		
TOBIN'S Q	-0.081	-0.098	-0.228	-0.277	0.15	-0.212	-0.056	-0.099	1	
SIZE	-0.239	0.01	-0.101	0.064	.639**	-0.263	-.335*	.327*	-.318*	1

*. Correlation is significant at the 0.05 level (2 -tailed).

** . Correlation is significant at the 0.01 level (2 -tailed).

Table-2 shows correlation between dependent variable and independent variables. Independent variables like DPR and EPS have been positively correlated with statistically significance. EV and ROA have been negatively correlated but statistically both variables have been insignificant. DPR has positive and insignificant correlation with ROCE. Tobin's q and size of the firms have negative correlation. EPS and DPS have positive and significant correlation. ROA and DPS have also positive and significant correlation. Financial leverage and DPS have been significantly correlated. Growth and DPS have significant

and negative correlation. EPS and ROA have significant correlation. Size and enterprise value have been significantly correlated. Size and financial leverage have been negatively but significantly correlated. And last but not least size and Tobin's q are negatively correlated.

Table No. 3. Results of Unit Root Test: It is assumed that all independent variables must be having stationary before running variables into regression model. Researcher has used Levin, Lin & Chu, Breitung-t state, IPS W stat, ADF and Fisher chi-square test in two ways (1) individual intercept and (2) Trend and intercept

Hypothesis of the unit root test

Ho: All selected variables are non- stationary

Ha: All selected variables are stationary

Level of significance: 5%

Table No. 3. Results of Unit Root Test

Variables	Model form	P. value					Inference
		LLC	Breitung	IPS	ADF	PP	
ROCE	Individual Intercept	0.0038	---	0.2293	0.1757	0.4819	Stationary
	Trend and Intercept	0.0001	0.3430	0.4020	0.2067	0.0305	Stationary
DPR	Individual Intercept	0.0000	----	0.0018	0.0013	0.0001	Stationary
	Trend and Intercept	0.0006	0.2200	0.1866	0.0281	0.0007	Stationary
DPS	Individual Intercept	0.8864	-----	0.9491	0.6916	0.5871	Non Stationary
	Trend and Intercept	0.6088	0.9994	0.7926	0.8247	0.3741	Non Stationary

	P. value						
EPS	Individual Intercept	0.1061	-----	0.3774	0.2791	0.1936	Non Stationary
	Trend and Intercept	0.0000	0.2857	0.2536	0.0591	0.0013	Non Stationary
EV	Individual Intercept	0.0000	-----	0.1503	0.1015	0.1445	Stationary
	Trend and Intercept	0.0163	0.1466	0.5128	0.5073	0.1832	Stationary
Growth	Individual Intercept	0.0022		0.3533	0.3702	0.0091	Non Stationary
	Trend and Intercept	0.0000	0.1006	0.5424	0.5789	0.2625	Non Stationary
LEV.	Individual Intercept	0.0000		0.0000	0.0006	0.0000	Stationary
	Trend and Intercept	0.0000	0.2133	0.0113	0.0004	0.0000	Stationary
TOBIN_S_Q	Individual Intercept	0.1005		0.2671	0.2554	0.0309	Non Stationary
	Trend and Intercept	0.2322	0.4862	0.5798	0.6494	0.1621	Non Stationary
ROA	Individual Intercept	0.0261		0.4510	0.5015	0.4736	Stationary
	Trend and Intercept	0.0000	0.1453	0.0093	0.0002	0.0006	Stationary
SIZE	Individual Intercept	0.0089		0.7924	0.8708	0.2136	Stationary
	Trend and Intercept	0.0014	0.2086	0.4632	0.3592	0.1389	Stationary

Table No-3 shows that Null hypothesis of unit root is rejected for selected variables like ROCE, DPR, EV, Lev and ROA at 5% level of significance. Researcher also found conflicting result in some of the variables like DPS, EPS, Growth, TOBIN_S_Q and SIZE.

Table No. – 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.820 ^a	.672	.588	7.13641	1.433
a. Predictors: (Constant), SIZE, DPR, EPS, LEV, GROWTH, Tobin's q, EV, ROA, DPS					
b. Dependent Variable: ROCE					

Table No.-4 show model summary of multiple regression model. R square 0.675 which means that independent variable combine caused the effect of 67.5% on dependent variable.

Table No-5 ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3656.377	9	406.264	7.977	.000 ^b
	Residual	1782.492	35	50.928		
	Total	5438.870	44			
a. Dependent Variable: ROCE						
b. Predictors: (Constant), SIZE, DPR, EPS, LEV, GROWTH, tobin's q, EV, ROA, DPS						

Table No.-5 shows ANOVA test of multiple regression. The F test shows significant result which means that model is fit.

Table No-- 6 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	27.739	26.904		1.031	.310
	DPR	.012	.011	.114	1.099	.279
	DPS	.022	.230	.019	.096	.924
	EPS	.035	.057	.124	.605	.549
	EV	-2.368	6.652	-.053	-.356	.724
	ROA	.697	.171	.661	4.077	.000
	LEV	-4.068	5.170	-.106	-.787	.437
	GROWTH	.027	.031	.116	.895	.377
	tobin's q	.342	.432	.097	.791	.434
	SIZE	-3.091	6.571	-.081	-.470	.641

a. Dependent Variable: ROCE

Table no.5 shows coefficient of dependent and independent variables. The result shows that ROA has significant and positive effect on ROCE. Enterprise value and financial leverage and size of the firm have been negative factors for ROCE with insignificant effect. DPR, DPS, EPS, ROA, Growth and Tobin's q have positively affected to ROCE but their effect has been insignificant to the ROCE.

Residuals vs. Dependent

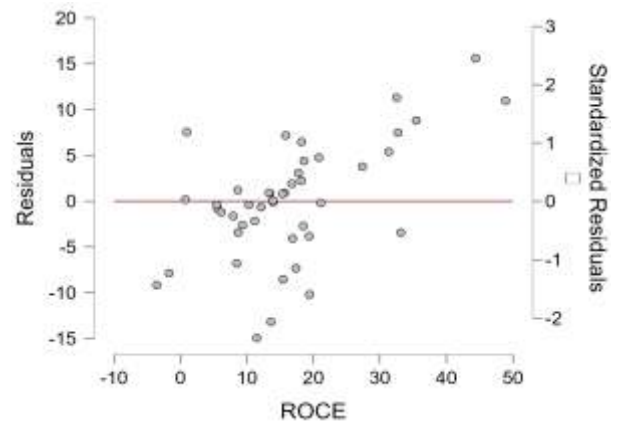


Figure 2

Residuals vs. Predicted

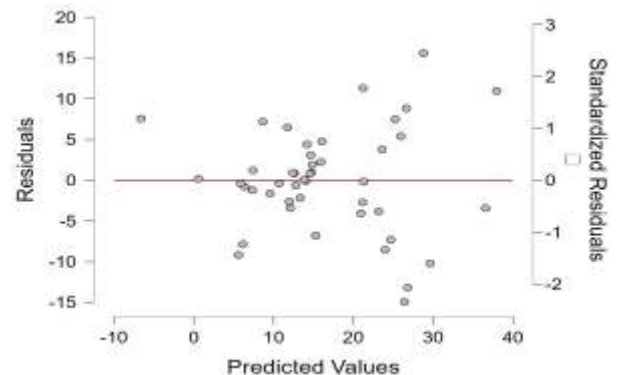
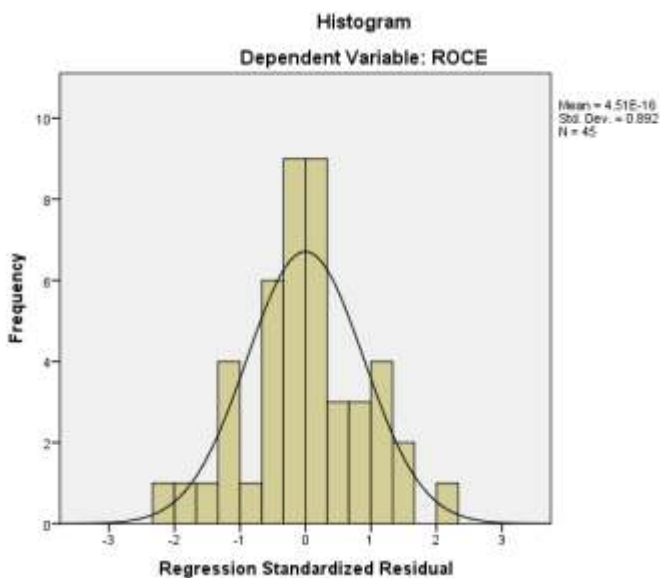


Figure 3



1 Graph

To decide whether fixed effect of POLS model is best, Redundant Fixed Effects Tests has been performed and the result is significant and hence we use fixed effect model.

Table- 7 Redundant Fixed Effects Tests

Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	6.338364	(4,31)	0.0008
Cross-section Chi-square	26.894537	4	0.0000

Table No-7 shows that redundant fixed effect cross section F is 0.0008 which is less than 0.05 which shows that the result is significant and fixed effect model is suitable over pooled OLS model

Table- 8 Fixed effect model

Cross-section fixed effects test equation:				
Dependent Variable: ROCE				
Method: Panel Least Squares				
Date: 11/01/18 Time: 00:58				
Sample: 2013 2021				
Periods included: 9				
Cross-sections included: 5				
Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROCE	27.73893	26.90443	1.031017	0.3096
DPR	0.011632	0.010586	1.098803	0.2794
DPS	0.022084	0.230060	0.095994	0.9241
EPS	0.034660	0.057287	0.605027	0.5491
EV	-2.368272	6.652034	-0.356022	0.7240
GROWTH	0.027399	0.030611	0.895083	0.3769
LEV	-4.067811	5.169957	-0.786817	0.4367
TOBIN_S_Q	0.341835	0.431957	0.791364	0.4341
ROA	0.696975	0.170945	4.077201	0.0002
SIZE	-3.091227	6.571368	-0.470408	0.6410
Root MSE	6.293722	R-squared		0.672268
Mean dependent var	16.46111	Adjusted R-squared		0.587994
S.D. dependent var	11.11803	S.E. of regression		7.136410
Akaike info criterion	6.961427	Sum squared resid		1782.492
Schwarz criterion	7.362907	Log likelihood		-146.6321
Hannan-Quinn criter.	7.111095	F-statistic		7.977171
Durbin-Watson stat	1.435898	Prob(F-statistic)		0.000003

Table No-8 shows that the result of fixed effect model explains that ROA has significant effect on ROCE but other independent variables like Enterprise value and firm size have negative but insignificant effect on ROCE. DPR, DPS, EPS, Growth and Tobin's q have positive but insignificant effect. Thus ROA is the only determinant of ROCE.

Panel cross section dependency test:

Table No - 9 Residual Cross-Section Dependence Test

Null hypothesis: No cross-section dependence (correlation) in			
Periods included: 9			
Cross-sections included: 5			
Total panel observations: 45			
Cross-section effects were removed during estimation			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	12.63046	10	0.2451
Pesaran scaled LM	0.588189		0.5564
Bias-corrected scaled LM	0.275689		0.7828
Pesaran CD	2.610997		0.0090

This test is used to know panel cross sectional dependence among residual at the time of number of cross sectional units are large. Presence of cross sectional dependence has a grave effect on the model building which may lead to inefficient estimator and invalid result. In the model null hypothesis is that there is no sufficient evidence of cross sectional dependency and alternative hypothesis is that there is a sufficient evidence of cross sectional dependency.

The result of the test shows that p value is 0.05 which is greater than the probability value. Hence Pesaran CD has smaller value than LM which means that we failed to reject null hypothesis.

Multiple indicators multiple cause models: The researcher has also used MIMIC model to estimate the effect of indicator on predictors' variables.

Table-10 Predictor coefficients

Predictor	Estimate	Std. Error	z-value	p	Lower	Upper
ROCE	0.136	0.027	5.085	< .001	0.083	0.188
Indicator coefficients						
Indicator	Estimate	Std. Error	z-value	p	Lower	Upper
DPR	14.428	9.174	1.573	0.116	-3.552	32.409
DPS	2.571	0.806	3.19	0.001	0.991	4.151
EPS	13.561	3.213	4.221	< .001	7.264	19.858
EV	-0.052	0.021	-2.505	0.012	-0.093	-0.011
ROA	5.534	0.957	5.782	< .001	3.658	7.41
LEV	0.01	0.025	0.404	0.686	-0.039	0.059
GROWTH	2.645	4.206	0.629	0.529	-5.599	10.889
tobinsq	-0.373	0.271	-1.375	0.169	-0.904	0.159
SIZE	-0.043	0.025	-1.739	0.082	-0.091	0.005

Figure 4

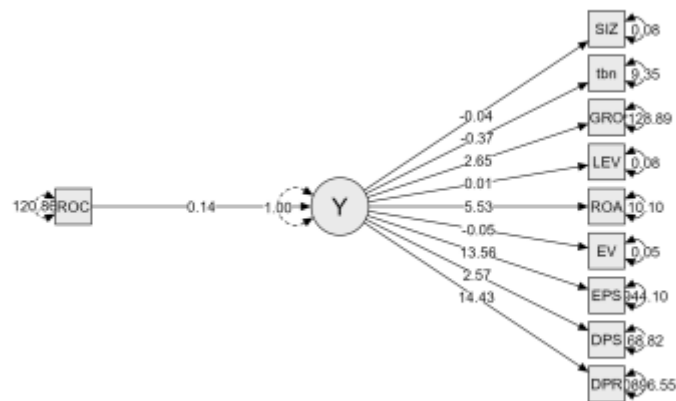


Table No. 10 shows MIMIC model which indicates that EPS and ROA are significant to ROCE. Other variables like DPR, DPS, EV, LEV, Growth, Tobin's Q and firm size have insignificant effect on ROCE.

Conclusion: Researcher has analyzed secondary data of selected companies of Pharma sector. To study the determinants of financial efficiency, researcher has identified profitability ratio which such as ROCE, DPR, DPS, EPS, EV, ROA, Lev, growth rate, Tobin's q and firm's size. Financial efficiency is measured through return on capital employed and other ratios are taken as independent variables. Researcher has calculated descriptive statistics, correlation matrix, Unit root test, OLS regression mode, Redundant Fixed Effects, fixed effect model; Residual Cross-Section Dependence Test. Descriptive statistics explains that ROCE, EPS, Growth rate and Tobin's q are satisfactory. Correlation matrix explains that ROCE has significant relationship with DPS, EV and ROA. Unit root test explain that ROCE, DPR, Lev and ROA are stationary variables whereas DPS, EPS, Growth rate Tobin's q and firm size are non stationary variables. The Result of the regression explains that only ROA is the determinant of financial efficiency. The adjusted R² is 0.672 which means that all independent variables have caused 67.20% variance in ROCE. F test shows that the model is fit. The result of Redundant Fixed Effects Tests

significant which means that fixed effect model is appropriate over OLS regression. The fixed effect model explains that adjusted R square is 0.6720 which means that independent variable caused 67.20% fluctuations in ROCE. Researcher has also used panel cross section dependency test which results significant and there is no sufficient evidence of cross sections dependency in model.

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