IDENTIFYING PROBABLE FRAUDULENCE FOR SELECTED PHARMACEUTICAL COMPANIES

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Abstract

Management of earnings may mislead stakeholders about the true financial performance of the company. Earnings management is purposeful intervention by the management in the process of financial reporting in order to gain personal benefit or for the organization. Earnings management is not informative for shareholders, and therefore it's opportunistic. The present study is an attempt to demystify earnings management practices of selected pharmaceuticals companies in India. From the comparison of M-Score model and Discriminant analysis, it is found that Investors and Shareholders should take care of while investing in case of Lupin Ltd and Divis Lab Ltd. It is also found that majority of the selected companies confirm the results of Beneish M score model for being fraudulent company for almost all the years of study.

Key Words: Earnings management, Beneish M-Score Model, Discriminant Analysis, Control Charts

INTRODUCTION

Earnings management is the practice of managerial actions that are reflected in a company's financial reports either to give the impression of smooth periodic or annual earnings, to show high profits in a given year at the 'expense' of lowering reported earnings in the future or to show low profit in a given year so that in future years reported profits will be higher. In some cases, management uses various accounting methods in order to convey private information to financial report readers. Management of earnings may mislead stakeholders about the true financial performance of the company. If management gains anything from managing earnings, one must ask whether such gains are at the expense of anybody.

Discriminant analysis is used to predict group membership. This technique is used to classify individuals/objects into one alternative group on the basis of a set of predictor variables. The dependent variable in discriminant analysis is categorical and on a nominal scale, whereas the independent or predictor variables are either interval or ratio scale in nature. When there are two groups (categories) of dependent variable, we have two-group discriminant analysis and when there are more than two groups, it is a case of multiple discriminant analysis. In case of two-group discriminant analysis, there is one discriminant function, whereas in case of multiple discriminant analysis, the number of functions is one less than the number of groups.

REVIEW OF LITERATURE

➤ **Gulzada Baimukhamedova et al (2015)** examined that the importance of corporate governance is characterized by not only helping economies to attract foreign investments, but also by providing the means to ensure credibility of financial reporting and substantial impact on earnings management practices. This study used accounting accruals approach and multiple regressions to measure earnings management. The study found that it was important for Kazakhstani natural resources companies to improve agency theory related deviations and strive to develop international relationships which will definitely entail additional foreign capital investments international developing economy. **Jo-Lan Liu et al**

(2015) analysed the impacts of board member characteristics and ownership structure on real earnings management for firms listed in Taiwan. To investigate the hypotheses developed in this study, it used regression model. The results revealed that better board member quality results in greater suppression of real earnings management and indicate that study index has been successful in evaluating the effectiveness of the board member characteristics of firms in Taiwan. **Nabil Bashir Al-Halabi et al (2014)** aimed at finding out the impact of applying financial performance indicators on earnings management in manufacturing companies listed at Amman Stock Exchange. The study adopted a descriptive and analytical approach by analyzing financial statements and reports of a sample of Jordanian manufacturing companies used statistical tools to test the research hypotheses. Study found out that there was an impact of financial performance indicators (ROE) on the process of earnings management in manufacturing companies listed at Amman stock exchange and there was no impact of financial performance indicators (EPS and CR) on the process of earnings management in the sample studied. **Amarjit Gill et al (2013)** have conducted a study to identify that the practice of earnings management that affects and perhaps benefits management of Indian companies and has an effect on a firms' performance, and whether earnings management has an effect on other stakeholders. This study applied a co-relational research design. The findings of this study indicate that the more intense the practice of earnings management, the greater it's adverse effect on corporate rate of return on assets in the following year. The study also found that to some extent, the market realizes that management acts with selfish motives and responds by lowering share prices and corporate market value. **Sandra Alves (2012)** analysed whether a firm's ownership structure exacerbate or alleviate earnings management. Used a sample of 34 non-financial listed Portuguese firms for years from 2002 to 2007.The study used Ordinary Least Square regression model. The study's results suggest that both managerial ownership and ownership concentration improve the quality of annual earnings by reducing the levels of earnings management.

RESEARCH METHODOLOGY

The present study is an attempt to analyze earnings management of selected pharmaceutical companies in India. Earnings management is the use of accounting techniques to produce financial reports that present an overly positive view of a company's business activities and financial position.

Objectives of the study
1. To examine whether Discretionary Accruals in Pharmaceuticals companies are under control or not in relation to their average and range.
2. To compare companies as being prospective fraud and non-fraud based on M-Score and discriminant analysis.
3. To estimate the probabilities of the companies being fraudulent based upon fraudulent cases over the period of time.

Sample Size
To study earnings management of pharmaceuticals sector, 10 listed companies from Indian Pharmaceutical Sector have been selected for the year of 2006 to 2016. They are as follows:
1. Cipla Ltd
2. Lupin Ltd
3. Sun Pharmaceutical Industries Ltd
4. Cadila Healthcare Ltd
5. Divi's laboratories Ltd
6. Dr.Reddy's laboratories Ltd
7. Torrent Pharmaceuticals Ltd
8. Aurobindo Pharma Ltd
9. Biocon Ltd
10. Piramal Enterprises Ltd

This study is based Secondary data. This data have been collected from the published annual reports of the respective selected companies

Tools and Techniques
For identifying probable fraudulence the following techniques have been used.
1. The De-Angelo Model:
2. $\bar{X}$ chart
3. R Chart
4. Beneish M-Score Model
5. Discriminant Analysis

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DATA ANALYSIS AND INTERPRETATION

> The following De-Angelo model is used to estimate discretionary accruals. It is also referred to as discretionary accrual model. The discretionary portion of accruals in the DeAngelo Model is the difference between total accruals in the event year t scaled by total assets (Ait-1) and nondiscretionary accruals (NDAt). The measure of nondiscretionary accruals (NDAt) rests on the total accruals (TAt-1) of the last period. In other words,

<center>DACit = (TAit – TAit-1)/ Ait-1</center>

where,
DAC it is discretionary accruals for firm i in period t;
TAit and Ait-1 are total accruals and total assets for period t and t-l for firm i.

❖ In order to examine whether discretionary accrual in pharmaceuticals companies are under control or not in relation to average and range, $\bar{X}$ chart and R Chart have been used.
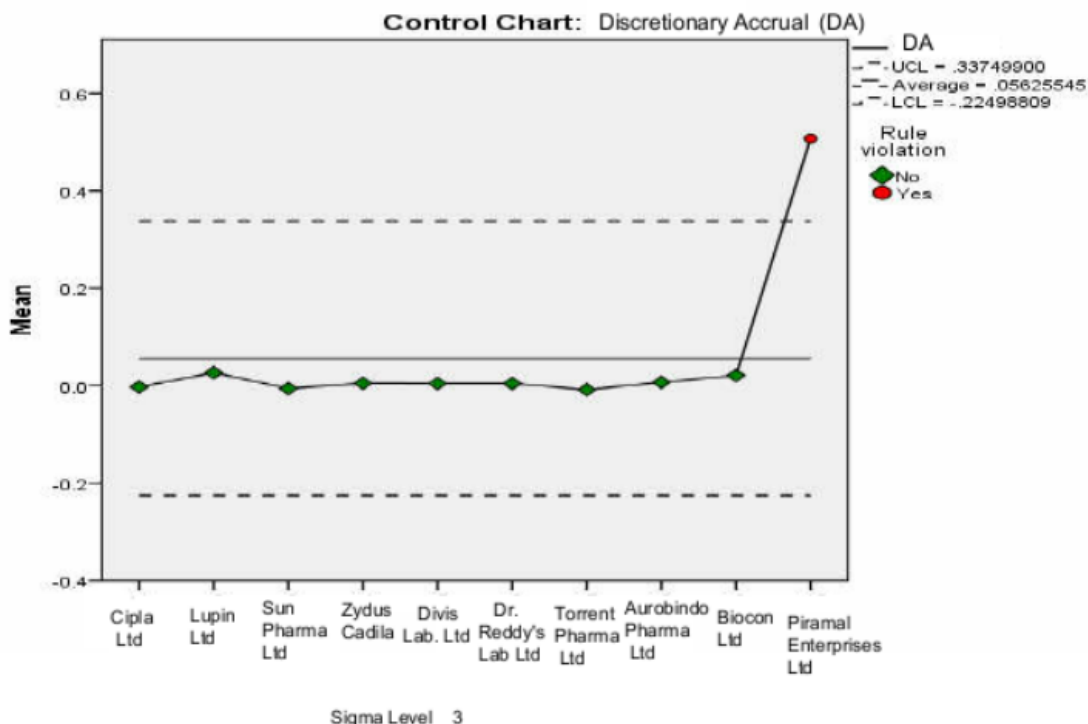
> $\bar{X}$ chart :

The measurable quality characteristic of the product is denoted by x. m samples each of size n are drawn at more or less regular interval of time. These samples are known as subgroups and each of these subgroups the values of mean $\bar{X}$ and rang R is obtained. If the distribution of the variable x is normal with mean μ and S.D. σ then the distribution of $\bar{X}$ is also normal with mean μ and S.D. σ /√n. The limits of X chart can be re-presented in a simplified form as follows:

Central Line = $\bar{\bar{X}}$
Lower Control Limit = $\bar{\bar{X}}$ - A₂$\bar{R}$
Upper Control Limit = $\bar{\bar{X}}$ + A₂$\bar{R}$

> $\bar{X}$ chart:

Control Chart: Discretionary Accrual (DA)

Interpretation

If all the points on X-Bar chart fall within the control limits and if they are randomly distributed on both the sides of the central line, then the process is said to be under statistical control. This shows that only chances causes are present in the process. If one or more points fall outside limits, the process is said to be out of control with respect to average. The above chart shows that the value of discretionary accrual on x-bar for Piramal enterprises falls outside the upper control limit. Hence the process is not under the control with respect to average.
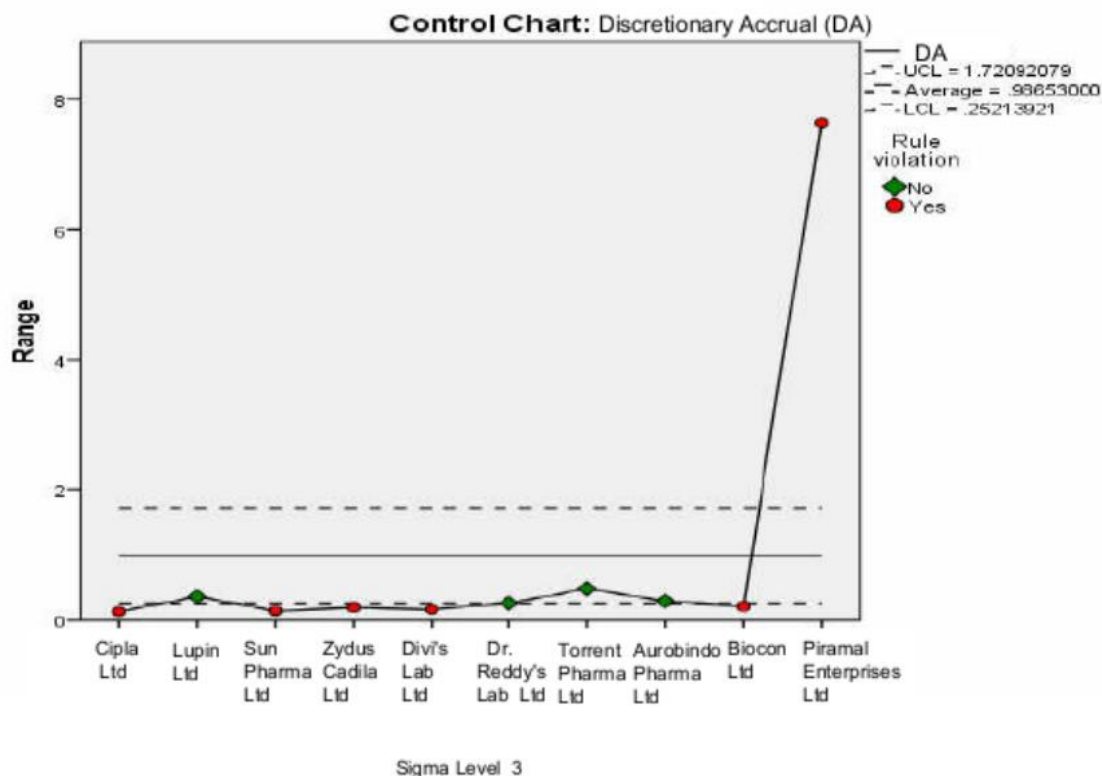
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➢ **R Chart :**

For R chart the values of range R are obtained from each sub group taken at a regular interval of time, from a production process. The range is the difference between the highest and the lowest observations of a sub groups. From values of R obtained from m subgroups, the average $\bar{R}$ is found out i.e. $\bar{R} = \sum R /m$. The control limits of R chart can be represented in a simplified form as follows:

Central Line = $\bar{R}$
Lower Control Limit = $D_3\bar{R}$
Upper control Limit = $D_4\bar{R}$

Here $D/_3$ and D_4 are constants which depend upon subgroup size n.

➢ **R Chart :**

Sigma Level 3

Interpretation:

For R chart the values of range R are obtained from each subgroup taken at a regular interval of time, from a production process. If values of discretionary accrual on R-chart fall within the control limits and if they are randomly distributed on both the sides of the central line, then the process is said to be under statistical control. If one or more points fall outside limits, the process is said to be out of control with respect to range. The above R-chart shows that Cipla Ltd, Sun pharma Ltd, Cadila Healthcare Ltd, Divis Lab Ltd and Biocon Ltd are falling outside the lower contol limits and also Piramal Enterprises falls outside the upper control limits. Hence the process is also not under control with respect to range.

❖ For comparing companies as being prospective fraud and non fraud following Beneish M-Score model and then discriminant analysis have been carried out to identify variables discriminating between fraud and non fraud companies.

➢ **Beneish Model (M-Score):**

The Beneish M-Score model (Beneish Model) ,deployed as a financial forensic tool, can assist in evaluating the probability of earnings manipulation in a company, as well as identifying areas that may require greater scrutiny.

The M-/Score is based on a combination of the following eight different indices:

These eight variables are calculated together using the following formula:

M = -4.84 + (0.92*DSRI) + (0.528*GMI) + (0.404*AQI) + (0.892*SGI) + (0.115*DEPI) - (0.172*SGAI) + (4.679*TATA) - (0.327*LVGI)

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A score greater than -2.22 (i.e. less negative than this) signals a strong likelihood of a firm being a manipulator. An M-Score of less than -2.22 suggests the company will not be a manipulator. The analysis of the financial statement require at least two period of financial reporting to detect unusual event. However, to identify the trend of the company's financial statement reporting, it is suggested to analyze the data for five reporting period.

➢ **Discriminant Analysis:**

The form of the equation of Discriminant function is:

A linear combination of the variables used is formed into an equation:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ldots\ldots + b_nX_n$

Where,

Y = Dummy Variable,

a = the Constant

b_i's are the Discriminant Coefficients; i=1,2,…n

X_i's = the independent Variables; i=1,2,…n

Where, the Dependent Variable Y is FRAUDDUMMY which is a dichotomous variable. The independent variables of this model are DSRI, GMI, AQI, SGI, DEPI, SGAI, TATA, and LVGI.

Discriminant Analysis is carried out to classify the companies as fraud companies and non-fraud companies on the basis of M-Score as a dependent variable, taking value 1 for the companies having M-Score greater than -2.22 and 0 for the companies having M-Score is less than the -2.22 according to the Beneish model for the entire Pharmaceutical sector.

$$FRAUD = \beta_0 + \beta_1 DSRI + \beta_2 GMI + \beta_3 AQI + \beta_4 SGI + \beta_5 DEPI + \beta_6 SGAI + \beta_7 TATA + \beta_8 LVGI + \acute{\varepsilon}_i$$

Where:

FRAUD	=	Dummy variable (1 for fraud-committed companies and 0 for nonfraud-committed companies)
DSRI	=	Sales Index
GMI	=	Gross Margin Index
AQI	=	Asset Quality Index
SGI	=	Sales Growth Index
DEPI	=	Depreciation Index
SGAI	=	Sales and General Administration Expenses Index
TATA	=	Total Accrual
LVGI	=	Leverage Index
$\acute{\varepsilon}_i$	=	Residual

Table 1: Description of Variables

Ratio	Formula	Interpretations
Discretionary Accruals(DA)	$\dfrac{Total\ Accrual\ (CY) - Total\ Accrual\ (PY)}{Total\ Asset\ (PY)}$	Proxy for Earnings management
Sales Index (DSRI)	$\dfrac{\frac{Accounts\ Receivable\ (CY)}{Sales\ (CY)}}{\frac{Accounts\ Receivable\ (PY)}{Sales(PY)}}$	A result of greater than 1.0 would indicate that accounts receivable, as a percentage of sales, has increased from the prior year.
Gross Margin Index (GMI)	$\dfrac{Sales(PY) - Cost\ of\ sales(PY)/Sales(PY)}{Sales(CY) - Cost\ of\ sales(CY)/Sales(CY)}$	The company's gross margin has deteriorated when the results are greater than 1.0. Gross margin deterioration is a negative indicator of a company's prospects, making such companies more prone to manipulate earnings.
Asset Quality Index (AQI)	$\dfrac{1 - \frac{Current\ Assets(CY) + PPE(CY)}{Total\ Assets(CY)}}{1 - \frac{Current\ Assets(PY) + PPE(PY)}{Total\ Assets(PY)}}$	An AQI greater than 1.0 indicates that the company has potentially increased its cost deferral or increased its intangible assets, and created earnings manipulation.
Sales Growth Index(SGI)	$\dfrac{Sales(CY)}{Sales(PY)}$	A result of greater than 1.0 represents sales growth compared to that of the prior year. However, growth companies are more likely to commit earnings manipulation.

Depreciation Index(DEPI)	$\dfrac{\dfrac{Depreciaton\ Expenses(PY)}{Depreciation\ Expenses(PY) + PPE(PY)}}{\dfrac{Depreciation\ Expenses(CY)}{Depreciation\ Expenses(CY) + PPE(CY)}}$	A DEPI greater than 1.0 may be an indication of an upward revision of the estimated lives of a company's property, plant and equipment, which would increase its income.
Sales, General and Administrative Expenses(SGAI)	$\dfrac{\dfrac{Sales, General\ and\ Administrative\ Expenses(CY)}{Sales(CY)}}{\dfrac{Sales, General\ and\ Administrative\ Expenses(PY)}{Sales(PY)}}$	A disproportionate increase in sales, as compared to SGAI, would serve as a negative indication concerning company's future prospects.
Total Accrual to Total Assets Index(TATA)	$\dfrac{\begin{array}{c}(Working\ Capital(CY) - (PY)) - \\ (Cash(CY) - (PY)) \\ - Depreciation\ and\ Amortiasation \\ Expenses(CY)\end{array}}{Total\ Assets(CY)}$	As a result, higher positive accruals are associated with the potential for earnings manipulation.
Leverage Index (LVGI)	$\dfrac{\dfrac{Long\ Term\ Debt(CY) + Current\ Liabilities(CY)}{Total\ Assets(CY)}}{\dfrac{Long\ Term\ Debt(PY) + Current\ Liabilities(PY)}{Total\ Assets(PY)}}$	When the LVGI is greater than 1.0, it indicates an increased leverage and, therefore, a company more prone to financial statement manipulation.

Discriminant Analysis:

The following table shows the result of Discriminant Analysis

Table 2: Group Statistics

Dummy	Index	Mean	Std. Deviation	C.V.
0(Non Fraud)	DSRI	0.939280	0.1783950	0.189927
	GMI	0.075539	3.3300727	44.08415
	AQI	1.132848	0.4112510	0.363024
	SGI	1.193371	0.1544986	0.129464
	DEPI	0.855784	0.5676591	0.663321
	SGAI	0.999935	0.0193317	0.019333
	TATA	-0.03556	0.0926798	-2.60659
	LVGI	1.063689	0.3649866	0.343133
1(Fraud)	DSRI	1.145900	0.3228243	0.281721
	GMI	2.051160	6.8774395	3.352951
	AQI	2.131850	6.7410978	3.162088
	SGI	1.229932	0.3151466	0.256231
	DEPI	0.914875	0.4263071	0.465973
	SGAI	1.005355	0.0198809	0.019775
	TATA	0.054755	0.0718833	1.312817
	LVGI	0.939037	0.2136133	0.227481
Total	DSRI	1.046347	0.2819237	0.269436
	GMI	1.099270	5.5293998	5.030065
	AQI	1.650512	4.8660760	2.948222
	SGI	1.212317	0.2504988	0.206628
	DEPI	0.886404	0.4979732	0.56179
	SGAI	1.002743	0.0197168	0.019663
	TATA	0.011241	0.0938481	8.348732
	LVGI	0.999097	0.3015137	0.301786

The Table-2 shows that TATA and SGAI are the most consistent variables with the least coefficient of variations in case 1 i.e. Non fraud committed companies.

In case 2 where Fraud committed companies, SGAI and LVGI has least value of C.V. and it shows that both are most consistent variable. GMI is the least consistent variables with the highest coefficient of variations in fraud committed companies and non-fraud committed companies. However, in terms of variability, the standard deviation of variables like Gross Margin Index (GMI) and Asset Quality Index (AQI) seem to vary a lot between Non fraud and Fraud.

Table 3: Eigen Values

Function	Eigen value	% of Variance	Cumulative %	Canonical

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				Correlation
1	0.715[a]	100.0	100.0	0.646

The last column of the above table indicates the canonical correlation which is the simple correlation coefficient between the discriminant score and their corresponding group membership. The square of the canonical correlation is $(0.646)^2$ = 0.417316 which means 41.73% of the variance in the discriminant model between the two categories of Companies is due to the changes in the above predictor (independent) variables.

Table 4: Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	0.583*	56.095	8	0.000

The value of Wilk's Lambda is 0.583 which indicates the significance of the discriminant function which is tested using Chi-square test with 8 degree of freedom at 5% level of significance. Since, the p-value is less than 0.05, it can be inferred that the discriminant function is significant and hence, can be used for further interpretation of the results.

Table 5: Unstandardized Discriminant Function

		(Constant)	DSRI	GMI	AQI	SGI	DEPI	SGAI	TATA	LVGI
Function	1	-14.105	1.794	0.092	0.050	1.958	0.316	9.068	10.595	0.179

The estimated Unstandardized Discriminant Function from the above table can be written as:
$$Y= -14.105+1.794DSRI+0.092GMI+0.050AQI+1.958SGI+0.316DEPI+9.068SGAI+10.595TATA+0.179LVGI$$

Total Accruals to Total Assets (TATA) followed by Sales, General and Administrative Expenses (SGAI) are found to be best predictors of manipulation score of above discriminating function.

Table 6: Classification Matrix

Classification Results[a,c]					
		FraudDummy	Predicted Group Membership		Total
			0	1	
Original	Count	0	44	9	53
		1	10	47	57
	%	0	83.0	17.0	100
		1	17.5	82.5	100
Cross-validated[b]	Count	0	42	11	53
		1	12	45	57
	%	0	79.2	20.8	100
		1	21.1	78.9	100

This table-6 is also called confusion table or classificatory table. It indicates that out of 57 observations of Category-2, 47 are correctly classified as in Category-2, whereas, 10 are wrongly classified as in category-1. Similarly, out of 53 observations of Category-1, 44 are correctly classified as in Category-1, whereas, 9 are wrongly classified as in Category-2. Thus, out of total 110 observations, 91 observations are correctly classified by the discriminant function. Therefore,

$$\text{Hit Ratio} = \frac{No.of\ correct\ predictions}{Total\ number\ of\ case}$$

$$= \frac{91}{110}$$

$$= 0.8273$$

Hence, The Hit Ratio is 82.73% .

From Discriminant analysis it is found that out of 53 observations of Non-fraud committed group 44 observations are correctly classified but remaining 9 observations are wrongly classified. According to M-Score this 9 observation are Non- Fraud committed observations but through discriminating analysis it is found fraud committed observations. Nine observations are as follows: Cipla in a year 2013, Lupin in a year 2006, Sun pharma in a year 2008, Cadila in a year 2011, Aurobindo in a year 2006, 2007 and 2013, Piramal in a year 2008 and 2015. Out of 57 observations of fraud committed group 47 observations are correctly classified but 10 observations are wrongly classified. M-Score model suggest that 10 observations are fraud committed observations but through discriminating analysis it is revealed that these are non-fraud committed observations. Ten observations are as follows: Sun pharma in a year 2009, Divis Lab in a year 2015, Dr.Reddy's in a year 2008, Torrent Pharma in a year 2011, 2012 and 2015, Aurobindo in a year 2012, Biocon in a year

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2008 and 2012, Piramal in a year 2006. By both the models, almost all the observations have correct classification as Fraud or Non-Fraud. Both the models indicate Divi's Laboratoris Ltd. Followed by Lupin Ltd are the companies committing fraud for maximum number of years in the period of study.

❖ In order to find out whether both the models give same result or not, Comparison of results of M-Score model and Discriminant analysis have been carried out as follows:

Table 7: Results of M-score and Discriminant Analysis

Company Name		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cipla Ltd	M-Score	F	F	F	F	NF	NF	F	NF	NF	NF	NF
	Discriminant Analysis	F	F	F	F	NF	NF	F	F	NF	NF	NF
Lupin Ltd	M-Score	NF	F	F	NF	F	NF	NF	F	F	F	F
	Discriminant Analysis	F	F	F	NF	F	NF	NF	F	F	F	F
Sun Pharmaceuticals Ltd	M-Score	NF	F	NF	F	NF	F	NF	F	NF	F	NF
	Discriminant Analysis	NF	F	F	NF	NF	F	NF	F	NF	F	NF
Cadila Healthcare Ltd	M-Score	F	NF	F	F	NF	NF	NF	NF	NF	NF	F
	Discriminant Analysis	F	NF	F	F	NF	F	NF	NF	NF	NF	F
Divi's Laboratoris Ltd	M-Score	F	F	F	F	NF	F	F	NF	F	F	F
	Discriminant Analysis	F	F	F	F	NF	F	F	NF	F	NF	F
Dr. Reddy's Ltd	M-Score	F	F	F	F	NF	NF	NF	F	F	NF	NF
	Discriminant Analysis	F	F	NF	F	NF	NF	NF	F	F	NF	NF
Torrent Pharmaceuticals Ltd	M-Score	NF	F	NF	F	NF	F	F	F	F	F	NF
	Discriminant Analysis	NF	F	NF	F	NF	NF	NF	F	F	NF	NF
Aurobindo Pharma Ltd	M-Score	NF	NF	F	F	NF	NF	F	NF	F	F	NF
	Discriminant Analysis	F	F	F	F	NF	NF	NF	F	F	F	NF
Biocon Ltd	M-Score	F	F	F	F	NF	NF	F	NF	NF	NF	NF
	Discriminant Analysis	F	F	NF	F	NF	NF	NF	NF	NF	NF	NF
Piramal Enterprises Ltd	M-Score	F	F	NF	F	NF	F	NF	NF	NF	NF	NF
	Discriminant Analysis	NF	F	F	F	NF	F	NF	NF	NF	F	NF

The table-7 indicates that majority of the selected companies confirm the results of Beneish M score model for being fraudulent company for almost all the years of study. The above table also indicates that Cipla Ltd. and Piramal Ltd.have change in the possibility of being converted to fraudulent companies in the years 2013 and 2006 respectively as per the discriminant analysis.

❖ To predict the probabilities of the selected companies being fraudulent based upon fraudulent cases following group membership table have been used over the period of time.

Table 8: Comparision of Both Models

Company Name	Discriminant Analysis		M-Score	
	No. Of Time Incurring Fraud	Probabilities	No. Of Time Incurring Fraud	Probabilities
Cipla Ltd	6	0.545	5	0.455
Lupin Ltd	8	0.727	7	0.636

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Sun Pharmaceuticals Ltd	5	0.455	5	0.455
Cadila Healthcare Ltd	5	0.455	4	0.364
Divi's Laboratoris Ltd	8	0.727	9	0.818
Dr. Reddy's Ltd	5	0.455	6	0.545
Torrent Pharmaceuticals Ltd	4	0.364	7	0.636
Aurobindo Pharma Ltd	7	0.636	5	0.455
Biocon Ltd	3	0.273	5	0.455
Piramal Enterprises Ltd	5	0.455	4	0.364

 The above table-8 shows that according to discriminant anaysis Lupin Ltd and Divis Lab Ltd have the highest probabilities of committing fraud which indicates highest manipulation in financial statements in these companies whereas Biocon Ltd has least probability of committing fraud among all companies which indicates that it is less manipulator. Whereas M-Score model shows that Divis lab, Lupin Ltd and Torrent pharma Ltd have the highest probabilities of committing fraud while Piramal enterprises Ltd has least probabilities of committing fraud. On the analysis of both models, Investors and Shareholders should take care of while investing in case of Lupin Ltd and Divis Lab Ltd because these companies financial statement may show overly painted picture that misguide all investors and shareholders.

FINDINGS AND CONCLUSION

- Total Accrual to Total Assets is the most important determinants in discriminating between the two categories of Fraud and Non-fraud companies.
- M-Score and Discriminant Analysis, reveals that almost all the observations have correct classification as Fraud or Non-Fraud. The result found that Divis Lab. followed by Lupin ltd is the companies committing fraud for maximum number of years in the period of study. Hence, they can be expected to commit fraud in future.
- It is also found that majority of the selected companies confirm the results of Beneish M score model for being fraudulent company for almost all the years of study
- From comparison of M-Score model and Discriminant analysis, it is found that Investors and Shareholders should take care of while investing in case of Lupin Ltd and Divis Lab Ltd

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