

Predicting Possible Fraudulence in Financial Statements of selected Indian Companies

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ABSTRACT

In a Corporate Entity, there is separation of ownership from the management. Therefore, whatever decision taken by the executors will not be taken by the shareholders if they are managing the company. Sometime, financial statements contain falsifications such that their elements no longer represent the true picture of the company. In spite of several measures, frauds still occur in an Indian Economy. Therefore, this is a relevant area for the academicians and researchers. The main objective of this study is to identify the factors which affect the Possible Fraudulence in the financial statements of the selected Indian companies. Twenty-Five companies covering the ten-year data (2008-09 to 2017-18) have been selected for the study. Factor analysis and Logistic Regression Model has been used to predict the possible fraudulence. It is found that there is a significant positive effect of Asset Management and Working Capital Management and significant negative impact of Management Efficiency and Profitability on the prediction of probable fraudulence for the selected companies. Management Efficiency is the highest contributing factor affecting the probability of fraudulence for the selected companies. Assets Management and Management Efficiency are main determinants of probable Fraudulence for the selected companies.

Keywords: Financial ratios, Financial Statement, Frauds, Factor Analysis, Logistic Regression Analysis

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1. Introduction

In a Corporate Entity, there is separation of ownership from the management. The shareholders have voting rights in the company but the daily management is carried by the board of directors of the company (AladeSuleOmoye; Emmanuel Eragbhe, 2014). This leads to the way for conflicts of interest. Therefore, whatever decision taken by the executors will not be taken by the shareholders if they are managing the company (JENSEN; MECKING, 1976). Sometime the Financial statements prepared by management tend to be deceptive. Financial Statement Fraud (FSF) is a deliberate misstatement of some of material facts by the management in the books of company's account for the purpose of deceiving investors, creditors and other users of Financial Statements. Sometime financial statements contain falsifications such that their elements no longer represent the true picture of the company (AladeSuleOmoye; Emmanuel Eragbhe, 2014). Some of the high profile cases of fraud became known at the beginning of the 21st centuries, which are shattering the trust of the investors and at last, the cost of fraud is paid by the shareholders when the stock prices of companies are decreasing after the announcement of Securities and Exchange Commission (GERETY; LEHN, 1997). Thus, Financial Statement Fraud (FSF) are haunting auditors and other users of financial statements even if the complex monitoring system adopted in the publically traded companies. In spite of several measures, frauds still occur in an Indian Economy. Spathis (2002) notes that regardless of the type of company, the percentage of financial statements that contain false information is quite high. Against this background, researchers, management, lenders, workers, suppliers, clients and the community at large have demonstrated a great interest in the detection of false financial statements. While there are strong research concerns for detecting financial statement fraud

in developed countries, in India, very little attention has been given to this area in accounting research, especially the use of accounting ratios to predict the probability of fraudulence for the company (AladeSuleOmoje; Emmanuel Eragbhe, 2014). Therefore, this is a relevant area for the academicians and researchers.

2. Literature Review

- **Artur Filipe Ewald Wuerges and Jose Alonso Borba (2014)** studied on Accounting Fraud: An Estimation of detection probability. The objectives of study were to estimate the percentage of unreported frauds in U.S. companies, to check if the results obtained using a traditional logit model were qualitatively different from those obtained using a logit model with the misclassification parameter and to obtain reliable hypothesis tests regarding some variables that might be related to the financial statement fraud. The study revealed that only 1.43 percent of FSF were publicized by the SEC and when the firm's auditor issued an adverse and qualified report, the likelihood of FSF was 5.12 times higher.
- **Alade Sule Omoje and Emmanuel Eragbhe (2014)** investigated the financial statements fraud based on the Accounting Ratios in the selected companies of the Nigerian Stock Exchange. Accounting data were collected from the reported financial statements of 30 sampled firms in financial and nonfinancial sectors for the periods of five years (2007-2011). The statistical instrument employed was Pooled Data Binary Logit regression model. The findings revealed that investment and liquidity ratios were significantly related to financial statements fraud. It was recommended that accounting ratios should be critically examined by investors, stakeholders and Governments.
- **Jaber Mohammad Moosaee et al. (2017)** studied on Development of a Fraud Detection Model using an integrated approach based on the Factor Analysis Model and Artificial Neural Network Method for the firms listed in Tehran Stock Exchange. 140 companies had been selected as the research sample. The performance of Neural Network model was estimated and compared with Logistic regression model in order to review the precision of the Neural Network. The findings revealed that Artificial Neural Network had a higher performance in this regard as compared to the Logistic regression.
- **Ch. Spathis et al. (2002)** conducted a comparative study on detection of falsified financial statements using multicriteria analysis and multivariate statistical techniques. The objectives of this study were to explore the effectiveness of an innovate classification methodology in detecting firms that issue falsified financial statements (FFS) and the identification of the factors associated with FFS. Two classification methodologies namely Multicriteria Decision Aid (MCDA) and Utilities Additives Discriminates (UTADIS) were applied. A sample of 76 Greek firms was selected. Ten financial ratios were used for detecting factors associated with FFS. The study indicated that the proposed MCDA methodology outperforms traditional statistical techniques, which were widely used in detection of FFS and Total Debt to Total Assets, Inventories to Sales, Net Profit to Sales and Sales to Total Assets were possible indicators of FFS.
- **Zuraidah M. Zam et al. (2014)** studied the Factors of Fraud Occurrence and Corporate Governance Structures: Evidence from Emerging Market Malaysia. To examine the possible factors of corporate environment, which may contribute to the occurrence of fraud was a main objective of this study. T-test and Wilcoxon signed rank test were conducted to investigate the differences in characteristics of scandal and non-scandal firms. The study revealed that there was a significant difference in Corporate Governance, Earnings Management, Management Efficiency and no significant difference in the Compensation structure of the executors in both of the sample firms. Logistic Regression revealed that nature of dividend payment, effectiveness of independent committees and the influence of powerful / dominant positions in the company might be contributing factor in Fraud.

3. Research Methodology

3.1 Objectives of the study

- To identify the major factors explaining various aspects of the financial performance.
- To identify the major contributors that affects Possible Fraudulence for the selected Indian companies.
- To predict the probability of fraudulence for the selected Indian companies.

3.2 Sample selection and period of the study:

The main objective of this study is to identify the factors which affect the probabilities of fraudulence during the period under a study for the selected companies. The study is based on Descriptive and Causal Research Designs. It is based on secondary data. Five companies have been selected from each of Automobiles, IT, Oil and Gas, Pharmaceutical and Textile sectors of India. Total 25 companies covering the ten-year period (2008-09 to 2017-18) have been selected for the study.

Sr. No.	Name of Companies	Sector
1	Tata Motors Limited	Automobile
2	Bajaj Auto Limited	
3	Ashok Leyland Limited	
4	TVS Motor Company Limited	
5	Sundaram Clayton Limited	
6	Wipro Limited	IT
7	Infosys Limited	
8	Tata Consultancy Services Limited	
9	Tech Mahindra Limited	
10	Mindtree Limited	
11	Bharat Petroleum Corporation Limited (BPCL)	Oil and Gas
12	GAIL(India) Limited	
13	Oil and Natural Gas Corporation Limited (ONGC)	
14	Indian Oil Corporation Limited (IOCL)	
15	Hindustan Petroleum Corporation Limited (HPCL)	
16	Cipla Limited	Pharmaceutical
17	Sun Pharmaceutical Industries Limited	
18	Lupin Limited	
19	Dr. Reddy's Laboratories Limited	
20	Divi's Laboratories Limited (Divis)	
21	Arvind Limited	Textile
22	Grasim Industries Limited	
23	Raymond Limited	
24	Vardhman Textiles Limited	
25	Vijay Textiles Limited	

3.3 Data Collection of the study:

The data for the study have been collected from the annual reports of the respective companies.

3.4 Variables under study:

The following ratios have been selected for this study.

Table 1: Variables under study

No.	Ratio
1	Cost of goods sold to Sales (COGSAL)
2	Changes in Cost of goods sold to Sales(Δ COGSAL)
3	EBIT to Sales (EBITSAL)
4	EBIT to Total Assets (EBITTA)
5	Changes in EBIT to Total Assets (Δ EBITTA)
6	Return on Assets (ROA)
7	Changes in Return on Assets (Δ ROA)
8	Z Score
9	Current Assets to Current Liabilities (CACL)

10	Changes in current Assets to Current Liabilities (Δ CACL)
11	Cash to Total Assets (CASHTA)
12	Changes in Cash to Total Assets (Δ CASHTA)
13	Working Capital to Total Assets (WCTA)
14	Changes in Working Capital to Total Assets (Δ WCTA)
15	Total Liability to total Assets (TLTA)
16	Changes in Total Liability to Total Assets (Δ TLTA)
17	Total Liability to Total Equity (TLTE)
18	Changes in Total Liability to Total Equity (Δ TLTE)
19	Accounts Receivables to Total Assets (ARTA)
20	Inventory to Sales (INVSAL)
21	Changes in Inventory to Sales (Δ INVSAL)
22	Inventory to Total Assets (INVTa)
23	Current Assets to Total Assets (CATA)
24	Changes in Current assets to Total Assets (Δ CATA)
25	Fixed Assets to Total Assets (FATA)
26	Changes in Fixed Assets to Total Assets (Δ FATA)
27	Sales to Accounts Receivables (SALAR)
28	Interest Expense to Total Liability (IETL)

(Source: Artur Filipe Ewald Wuerges; Jose Alonso Borba, 2014)

3.5 Tools and Techniques:

A: Factor Analysis

B: Logistic Regression Analysis

4. Data Analysis and Interpretation

4.1 (A) Factor Analysis:

Initially, in order to identify the major factors reflecting various aspects of the financial performance of the selected companies, Factor analysis is carried out over 28 ratios indicating financial performance of the sample companies using VARIMAX rotation.

The following table-2 shows the result of Factor Analysis.

Table 2: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.689
Bartlett's Test of Sphericity	Approx. Chi-Square	5504.313
	Df	378
	Sig.	0.000

The above table 2 shows the result of Kaiser-Meyer-Olkin (KMO) and Bartlett's test. The result of Factor Analysis gives a value of 0.689 indicating that the pattern of correlation amongst the variables is relatively compact and hence, factor analysis yields distinct and reliable broad factors.

The Bartlett's test of Sphericity investigates whether the original correlation matrix is an identity matrix or not. The result of factor analysis shows that Bartlett's test has a chi square value of 5504.313, which is significant for $p < 0.05$ confirming that factor analysis is appropriate.

The following table 3 shows result of Total Variance explained.

Table 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.572	23.471	23.471	6.572	23.471	23.471	4.011	14.326	14.326
2	3.651	13.039	36.51	3.651	13.039	36.51	3.008	10.744	25.07
3	3.18	11.357	47.867	3.18	11.357	47.867	2.891	10.324	35.394
4	2.162	7.721	55.588	2.162	7.721	55.588	2.616	9.344	44.738
5	1.725	6.161	61.749	1.725	6.161	61.749	2.505	8.946	53.685
6	1.633	5.831	67.579	1.633	5.831	67.579	2.127	7.595	61.279
7	1.147	4.096	71.675	1.147	4.096	71.675	2.072	7.399	68.678
8	1.053	3.759	75.434	1.053	3.759	75.434	1.519	5.426	74.104
9	1.023	3.655	79.09	1.023	3.655	79.09	1.396	4.985	79.09
10	0.845	3.02	82.109						
11	0.704	2.513	84.622						
12	0.616	2.201	86.824						
13	0.51	1.823	88.646						
14	0.494	1.764	90.41						
15	0.472	1.686	92.096						
16	0.41	1.465	93.561						
17	0.311	1.11	94.671						
18	0.29	1.034	95.706						
19	0.247	0.883	96.588						
20	0.202	0.72	97.308						
21	0.192	0.685	97.993						
22	0.148	0.53	98.523						
23	0.096	0.343	98.866						
24	0.088	0.316	99.182						
25	0.077	0.277	99.459						
26	0.068	0.243	99.701						
27	0.051	0.181	99.882						
28	0.033	0.118	100						

The Eigen value associated with each factor represents variance explained by that particular linear component, extracting all the factors with Eigen Values greater than 1, which leaves us with nine factors which are again displayed as % of variance explained. Factor 1 explains 14.326% of total variance. Here first nine factors explain relatively large amount of variance, especially factor 1 whereas subsequent factors explain only small amount of variance. After rotation factor 1 accounted 14.326% as compared to 10.744%, 10.324%, 9.344%, 8.946%, 7.595%, 7.399%, 5.426%, 4.985% for factor 2, 3, 4, 5, 6, 7, 8 and 9 respectively.

They explain nearly 79% of the variability in the original twenty-eight variables. So, it will considerably reduce the complexity of the data set by using these components, with only a 21% loss of information. The following table 4 shows factor loadings for each of nine factors extracted from Total Variance explained.

Table 4: Rotated Component Matrix

	Component							8	9
	1	2	3	4	5	6	7		
TLTE	0.816	0.379	-0.117	0.147	-0.112	0.007	0.002	0.023	0.071
COGSAL	0.796	-0.057	0.031	0.131	-0.094	0.043	-0.130	0.001	-0.075
SALAR	0.783	-0.299	0.068	-0.070	-0.013	-0.268	-0.183	-0.144	-0.089
TLTA	0.770	0.321	-0.047	0.294	-0.253	0.016	-0.031	0.081	0.102
EBITSAL	-0.565	-0.025	0.552	-0.012	0.258	-0.148	-0.001	-0.194	-0.195
IETL	0.137	0.847	-0.035	0.111	-0.045	0.100	0.077	-0.011	-0.015
INVSAL	-0.065	0.839	-0.072	-0.041	0.071	-0.111	0.178	-0.156	0.199
Z Score	0.190	-0.646	0.512	0.047	0.110	0.101	0.236	-0.157	-0.038
INVTA	0.420	0.603	-0.010	0.140	0.015	0.440	-0.130	-0.179	0.011
ΔEBITTA	0.033	-0.021	0.863	0.031	0.060	0.027	0.008	0.186	0.101
ΔROA	0.012	-0.028	0.856	-0.026	-0.031	0.029	0.084	0.305	0.068
EBITTA	-0.291	-0.391	0.729	0.048	0.173	-0.052	0.217	-0.062	-0.182
ΔTLTA	0.147	0.006	-0.110	0.902	-0.045	0.085	0.032	0.114	0.188
ΔTLTE	0.232	0.087	-0.118	0.860	-0.048	0.078	0.064	0.068	0.205
ROA	-0.050	0.059	0.262	0.664	0.014	0.035	-0.136	0.022	-0.203
ΔCACL	-0.118	-0.047	0.051	0.105	0.847	0.124	0.117	0.241	0.239
ΔWCTA	-0.135	-0.100	0.113	-0.278	0.742	0.139	0.133	0.139	-0.103
CACL	-0.385	0.143	0.054	0.021	0.621	-0.143	0.275	-0.181	-0.232
ΔFATA	0.088	0.179	-0.020	0.145	-0.077	0.846	-0.319	0.018	-0.093
ΔCATA	0.027	0.049	0.068	0.295	0.460	0.728	-0.063	0.225	0.160
FATA	0.324	0.298	-0.004	0.154	-0.054	-0.643	-0.273	0.055	0.105
ARTA	-0.364	0.134	0.182	-0.020	0.026	0.063	0.786	0.083	0.077
CATA	0.038	-0.002	0.050	0.010	0.321	-0.203	0.783	0.076	-0.048
WCTA	-0.498	-0.001	0.112	-0.017	0.498	-0.138	0.524	-0.096	-0.238
ΔCASHTA	0.008	-0.019	0.227	0.091	0.204	0.029	0.027	0.786	-0.153
CASHTA	-0.291	-0.313	0.142	0.148	0.163	0.012	0.180	0.461	-0.445
ΔCOGSAL	0.161	-0.120	0.210	0.395	-0.019	0.065	0.080	0.450	0.185
ΔINVSAL	-0.037	0.124	0.067	0.216	0.027	-0.055	0.003	-0.076	0.796

After rotation, the next step is labeling the factors. The following Table-5 shows the list of Factors extracted from Factor Analysis:

Table 5: Name of Factor

No.	Name of Factor	Factor Loadings
1	Management Efficiency	TLTE (0.816), COGSAL (0.796), SALAR (0.783), TLTA (0.770), EBITSA (-0.565)
2	Earnings Management	IETL (0.847), INVSAL (0.839), INVTA (0.603), Z score (-0.646)
3	Profitability	ΔEBITTA (0.863), ΔROA (0.856), EBITTA (0.729)
4	Solvency.	ΔTLTA (0.902), ΔTLTE (0.860), ROA (0.664)
5	Liquidity	ΔCACL (0.847), ΔWCTA (0.742), CACL (0.621)
6	Assets Management	ΔFATA (0.846), ΔCATA (0.728)
7	Working Capital Management	ΔARTA (0.786), ΔCATA (0.783) and WCTA (0.524)
8	Cash Position	ΔCASHTA (0.786), CASHTA (0.461), ΔCOGSAL (0.450)
9	Growth in Sales	ΔINVSAL (0.796)

4.2 (B) Logistic Regression Analysis:

Factor analysis result gives Factor score for each of the Nine factors, which have been used in this study. These scores of Nine Factors have been used in carrying out Logistic Regression Model. In developed countries, SEC provides the list of fraudulent companies every year but in India, SEBI does not provide such information. Therefore, due to lack of a proper database to classify and identify possible fraudulence in the financial statements, fraudulence is measured based on fraud detection prediction models and

integrating the results of three models which are; Beneish M Score Model, Dechow F Score Model and Pustynick P Score Model. If the value of M Score is greater than negative 2.22, it indicates that the financial statements of the companies may have been manipulated (Beneish, 1999), the value of F Score greater than 1 indicates the possibility of material misstatements in the financial statements of the companies (Dechow et al. 2011) and If ΔP Score is greater than ΔZ Score, it means the possible existence of fraud in the financial statements of the companies (Pustynick I, 2011). The financial statements are considered fraudulent, if the result of any two models indicate the presence of fraud in these financial statements (Zaki, N. M. 2016). Integrated result of this three fraud detection prediction models is taken as a dependent variable and factor scores are taken as an independent variable.

The following Logistic Regression Model is used.

$$\text{Log}(p/(1-p)) = \alpha + \beta_1 \text{ Management Efficiency} + \beta_2 \text{ Earnings Management} + \beta_3 \text{ Profitability} + \beta_4 \text{ Solvency} + \beta_5 \text{ Liquidity} + \beta_6 \text{ Asset Management} + \beta_7 \text{ Working Capital Management} + \beta_8 \text{ Cash Position} + \beta_9 \text{ Growth in Sales} + \varepsilon_{it}$$

Where,

$p = \text{Pr}(\text{FSF}) = \text{Probability of Financial Statements Fraud.}$

$\text{FSF}_{ij} = 1$ when i^{th} company found fraudulent in j^{th} year

$= 0$ when i^{th} company found Non-Fraudulent in j^{th} year

$\alpha = \text{Constant}$

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ are the Regression Coefficients

$\varepsilon_{it} = \text{Error}$

Table 6: Model Summary			
Step	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
1	273.265	0.148	0.208

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

The above table 6 of Model Summary provides the -2LL and pseudo- R^2 values for the model. Nagelkerke R^2 suggest that the new model explains roughly 20.8% of the variation in the outcome i.e. prediction of the probability of FSF are being predicted by the Management Efficiency, Earnings Management, Profitability, Solvency, Liquidity, Asset Management, Working Capital Management, Cash Position and Growth in Sales. The Cox and Snell R square is 0.148. Thus, it can interpret that 14.8% predictability of the probability of the FSF are explained by the logistic variables. All of the Pseudo R-squares reported are smaller than 0.50 which indicate the estimated model is a good fit to data.

Table 7: Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	8.374	8	0.398

A Small Chi-squared values with a larger p-value closer to 1 indicate a good logistic regression model fit. The above table 7 of Hosmer & Lemeshow test of the goodness of fit suggests the model is a good fit to the data as $p=0.398$ which is greater than 0.05.

The following table 8 shows the classification matrix:

Table 8: Classification Table					
	Observed		Predicted		
			FRAUD		Percentage Correct
			Possible Non-Fraud	Possible Fraud	
Step 1	FRAUD	Possible Non-Fraud	152	18	89.40
		Possible Fraud	48	32	40.00
	Overall Percentage				73.60

a. The cut value is 0.500

The above Classification Table 8 shows that the model is accurate in classifying the total sample correctly with accuracy rate of 73.60%. Out of the 170 Possible non fraud observations, the model has identified 152 of them as not likely to have fraud. Similarly, out of 80 Possible fraud observations, the model has identified correctly 32 as likely to be possible fraud.

Table 9: Variables in the Equation							
		B	S.E.	Wald	Df	Sig.	Exp(β)
Step 1	Management Efficiency	-0.733*	0.195	14.089	1	0.000	0.480
	Earnings Management	-0.080	0.151	0.282	1	0.595	0.923
	Profitability	-0.347*	0.170	4.169	1	0.041	0.707
	Solvency	0.174	0.147	1.410	1	0.235	1.190
	Liquidity	-0.014	0.145	0.009	1	0.924	0.986
	Assets Management	0.454*	0.144	9.889	1	0.002	1.575
	Working Capital Management	0.290*	0.145	3.986	1	0.046	1.336
	Cash Position	-0.117	0.147	0.629	1	0.428	0.890
	Growth in Sales	0.298*	0.152	3.824	1	0.051	1.347
	Constant	-0.936	0.161	33.824	1	0.000	0.392

a. Variable(s) entered on step 1: Management Efficiency, Earnings Management, Profitability, Solvency, Liquidity, Assets Management, Working Capital Management, Cash Position and Growth in Sales.

The Prediction equation is as follow:

$\text{Log}(p/(1-p)) = -0.936 - 0.733 \text{ Management Efficiency} - 0.080 \text{ Earnings Management} - 0.347 \text{ Profitability} + 0.174 \text{ Solvency} - 0.014 \text{ Liquidity} + 0.454 \text{ Asset Management} + 0.290 \text{ Working Capital Management} - 0.117 \text{ Cash Position} + 0.298 \text{ Growth in Sales}$

The above table 9 provides the regression coefficient (β), the Wald statistic (to test the statistical significance) and the all-important Odds Ratio Exp (β) for the variables. The result shows that there is a significant positive effect of Asset Management, Working Capital Management and Growth in Sales while significant negative impact of Management Efficiency and Profitability on the prediction of probability of FSF of the selected companies. It also shows that Solvency is having positive impact whereas Earnings Management, Liquidity and Cash Position are having negative impact on the prediction of the probability of FSF. The Wald Chi-Square Statistics tests the null hypothesis that the constant equals 0. This hypothesis is accepted because the p-value is smaller than the critical p-value of 0.05. Hence, we conclude that the constant is 0. Exp(β) column represents the odds ratio for the individual variable. Asset Management is 1.575 times more likely to affect the predictability of the probability of FSF in comparison to other independent variables and Management Efficiency is 0.480 times less likely to affect the predictability of the probability of Financial Statement Fraud.

Management Efficiency is the highest contributing factor with negative significant impact on probability of FSF. It indicates that lower the efficiency of management, higher chances of likelihood of fraud in the financial statements and vice versa. Out of Five variables contributing to Management Efficiency, there is wide fluctuation in COGSAL. It indicates there are chances of fraudulent practices in one of the components of Cost of goods sold, which may be inventory valuation policy.

- Predicted probabilities of fraudulence for each of the selected twenty five companies have been obtained by averaging the values of the independent variables over the periods of ten years, and estimating the predicted probabilities using logit function $p = \log(p/(1-p))$.
- If the predicted probability is greater than cut off 0.50, it indicates likelihood of fraudulence in that respective company. The following prediction equation is calculated for the Tata Motors Ltd.

The Prediction equation is:

$\text{Log}(\text{odds of factors}) = -0.936 - 0.733 * 0.40799 - 0.080 * 0.82107 - 0.347 * (-0.26594) + 0.174 * (-0.0754) - 0.014 * (-0.45492) + 0.454 * 4.12074 + 0.290 * (-1.49548) - 0.117 * (-0.18494) + 0.298 * (-0.47368) = 0.102396$

Hence, $\log(p/(1-p)) = 0.102396$

Hence, $p = (\text{EXP}((0.102396))/(1+\text{EXP}(0.102396))) = 0.525577$

Table 10: Predicted Probability of Fraudulence

Sr. No.	Name of Companies	Probability of Fraudulence
1	Tata Motors Limited	0.525577
2	Bajaj Auto Limited	0.174706
3	Ashok Leyland Limited	0.177642
4	TVS Motor Company Limited	0.329665
5	Sundaram Clayton Limited	0.284627
6	Wipro Limited	0.515085

7	Infosys Limited	0.320228
8	Tata Consultancy Services Limited	0.470523
9	Tech Mahindra Limited	0.393884
10	Mindtree Limited	0.450251
11	Bharat Petroleum Corporation Limited (BPCL)	0.057154
12	GAIL(India) Limited	0.14488
13	Oil and Natural Gas Corporation Limited (ONGC)	0.213755
14	Indian Oil Corporation Limited (IOCL)	0.075493
15	Hindustan Petroleum Corporation Limited (HPCL)	0.058407
16	Cipla Limited	0.401793
17	Sun Pharmaceutical Industries Limited (SPIL)	0.529031
18	Lupin Limited	0.477034
19	Dr. Reddy's Laboratories Limited	0.527477
20	Divi's Laboratories Limited (Divis)	0.410408
21	Arvind Limited	0.221794
22	Grasim Industries Limited	0.300767
23	Raymond Limited	0.264909
24	Vardhman Textiles Limited	0.215353
25	Vijay Textiles Limited	0.242281

From the above table 10, it is found that the predicted probabilities of fraudulence are 0.525577, 0.515085, 0.529031 and 0.527477 in the case of Tata Motors Ltd., Wipro Ltd., Sun Pharmaceutical Industries Ltd. and Dr. Reddy's Laboratories Ltd. respectively, which are each greater than cut off 0.50. So, these companies are probable fraudulent companies while all other selected companies are not fraudulent companies.

5. Findings

- From the above analysis, it is found that Assets Management, Working Capital Management and Growth in Sales are having positive significant impact on the probability of FSF indicating that if the companies are strong in Portfolio Management and decision making, there are more chances of likelihood of FSF and vice versa.
- Management Efficiency and Profitability are having negative significant impact on the prediction of probability of FSF, which indicates the companies with lower profitability and management efficiency are facing more issue of Financial Statement Frauds.
- Management Efficiency is the highest contributing factor affecting the probability of Financial Statements Fraud for the selected companies. It indicates lower the efficiency of management, higher the chances of likelihood of fraud in financial statements and vice versa.
- Assets Management and Management Efficiency are main determinants of the probable Fraudulence for the selected companies.
- From the predicted probabilities calculated based on logistic regression analysis, out of total selected 25 companies, Tata Motors Ltd., Wipro Ltd., Sun Pharmaceutical Industries Ltd. and Dr. Reddy's Laboratories Ltd. are probable fraudulent companies. Investors may not completely rely on this but may also consider other methods of fraud detection.
- It is found that there is a fluctuation in all the variables of Management Efficiency for all of the probable fraudulent companies. Amongst them, COGSAL is having wide fluctuations for all the selected companies over a period of study. It indicates the possibilities of fraudulent practices in the inventory valuation method.

6. Conclusion

Financial Statements Fraud is a deliberate misstatement of material facts by management in the books of accounts of the company with the aim of deceiving investors, creditors and other users of financial statements. The present study is an attempt to identify the factors affecting the Financial Statement Fraud for the selected Indian companies. This study reveals that Management Efficiency, Assets management, Growth in Sales, Profitability and Working Capital Management are the most important determinants

influencing the likelihood of Fraud in the Financial Statements. On Analyzing the possibility of fraudulence, Tata Motors Ltd., Wipro Ltd., Sun Pharmaceutical Industries Ltd. and Dr. Reddy's Laboratories Ltd. are probable fraudulent companies from the selected companies. It can be concluded that probable fraud companies might be engaged in violating the accounting conservatism of consistency for inventory valuation to manipulate the financial statements.

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