Earnings Manipulation in Listed Automobile Companies Using Beneish M-Score and Altman Z-Score Model

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Abstract

The purpose of this study is to compare two forensic accounting tools—the beneish M-score and the altman z-score models—for the effective detection of fraud in corporate bodies. using a data set from the automobile industries from the year 2017-2019, is made with the main intent of noticing malfeasance using the two models. the methodology used in this study is as optional by beneish messod for m-score and altman for Z-Score. the results show that whereas the beneish model was not able to detect any fraud, the altman z-score provided some indication that the company's financial statements were flawed. although the beneish model is very popular for predicting fraudulent financial statements, the results of the present study do not indicate its effectiveness. the study accomplishes that selecting the right forensic tool can influence the outcome of fraud detection. the outcome of the study provides useful direction to investors, financial auditors, and forensic accountants when making policy decisions. This paper provides some evidence on the effectiveness scientific tools in detection of financial reports fraud of corporate bodies. this is the first study to present the two popular tools on current indian listed automobile sector including : tata motors, mahindra & mahindra, Maruti suzuki, hero motorcorp, bajaj auto, eicher motors, ashok leyland, force motors.

Key words: Fraudulent financial statements, Scientific tools, Fraudulent financial reporting, Fraud detection and examination, M-score, Z-score

Introduction

Accounting and fraudulent financial reporting (FFR) have increased in frequency in the last several years, attracting considerable attention from the public, investors, auditors, creditors, researchers, academia and other stakeholders. FFR usually occurs in the form of falsification of financial statements in order to obtain some form of benefit and primarily consists of manipulating elements by overstating assets, sales and profit or by understating liabilities, expenses or losses.

Market participants such as investors and creditors experience significant financial losses when fraud occurs in publicly traded companies. For example, Yes Bank, 2018, had been involved in round-tripping it's investments by one of it's founding members Rana Kapoor's Family, who had alleged that it was a form of investment (approximately 600 crores) and falsified it's annual financial reports. In addition fraudulent financial reporting practices can potentially

erode public confidence with regard to the reliability and accuracy of financial reporting in assessing a firm's future growth and decision making.

Some experts argue that the rate of fraudulent financial reporting will likely increase and further reiterate the importance of continuous research into ways to flush out frauds. Fraud detection has therefore become one of the highest priorities for capital market participants and other stakeholders in the financial reporting process. The statement of auditing standards places the responsibility for detecting accounting and financial statement frauds on audit firms by the corporations they are auditing. Auditors commonly use tools known as analytical procedures to assist them in detecting fraud.

Analytical procedures refer to the analysis of significant ratios and trends as well as the resulting investigation of fluctuations and relationships that are inconsistent with other relevant information or deviate from predicted values. As such, many researchers and fraud investigators recommend financial ratios as an effective tool to detect fraud. Given the significant impact of these practices, it would be useful if organisations can identify at an early stage the possibility of tumbling into financial distress or detecting the possibility of fraudulent financial reporting by using some prediction tools such as the ratio analysis—the Beneish and Altman models.

If these models are applied individually, the resulting accounting statements possibly reveal some warning signs for the managers to take appropriate preventive or corrective actions at the initial stages. Other than the management of the organisations, investors, internal and external auditors and regulators can also take advantage of the application of these collective tools. Investors may adopt these tools to assess companies' financial soundness, before or after an investment, so that continuous decisions may be made in protecting their interests.

However, these tools are not the pinnacle or completely free from limitations. Each tool/model has its flaws and drawbacks in providing accurate results, and therein lies the confusion—which affects auditors and stakeholders—regarding the best model to use to detect various types of financial misstatements. Extant literature provides a plethora of statistical tools and techniques, and two statistical techniques (i.e., the Beneish M-score model and the Altman Z-score model) have been selected for this study because of their popularity, usage and applicability. The Z-score model is the most well-known model for predicting financial distress, but in this paper it has been used for a different purpose of detecting fraud.

Effective as they may be, analytical tools have not been able to determine such fraudulent activities in total. Accordingly, financial and accounting fraud has appeared in the headlines of mainstream news worldwide. The problem

therefore is, what are the most effective forensic accounting and financial detecting tools that will reveal malpractices in organisations? To address this problem and answer the pertinent question, first, we set out an objective to compare the effectiveness of the two popular forensic tools in detecting FFR using the listed automobile industries in Indian stock market as a case study. Next, we will determine the strengths and weaknesses of the tools through their thorough application to the real financial profile of selected listed automobile industries. Third is to assess the use of the tools independently by comparing the results and the discussion of the tools' relative effectiveness for direction to accounting and auditing practitioners on the selection of appropriate tool(s) in the detection of fraudulent cases during their auditing processes.

The rest of this paper is organised as follows: the next section presents a brief profile of the cases. Next is a review of the selected forensic tools through extant literature and hypotheses development. The study then continues with a description of the methodology, analysis and results, followed by the discussions, and finally the conclusion and some recommendations.

Automobile Industries and Overview (2017-19):

Tata iMotors : dTata Motors Ltd is India`s largest automobile company. They are the leader in commercial vehicles in each segment, and among the top three in passenger vehicles with winning products in the compact, midsize car and utility vehicle segments. The company is the world`s fourth largest truck manufacturer, and the world`s second largest bus manufacturer. The product range of the company includes,Passenger Cars:Indica Vista, Indica V2, Indica V2 Turbo, Indica V2 Xeta, Indica V2 Dicor.Indigo XL, Indigo,IndigoiMarina IndigoiCS, Nano,Fiat Cars, Utility Vehicles: Safari Dicor,Sumo Grande,Sumo,Xenon XT,Trucks:Medium & Heavy Comm. Vehicles, Tata Novus. Intermediate Comm. Vehicles. Light Commercial Vehicles, TL 44, Small Commercial Vehicles. Commercial Passenger Carriers:Buses.Winger.Magic.Defence Vehicles.

Mahindra & Mahindra: Mahindra & Mahindra Limited operates in nine segments. The automotive segment includes sales of automobiles, spare parts and related services. Farm equipment segment includes sales of tractors, spare parts and related services; information technology (IT) services, which consists of services rendered for IT iand telecom; financial services includes services relating to financing, leasing and hire purchase of automobiles and tractors; steel trading and processing includes trading and processing of steel; infrastructure includes operating of commercial complexes, project management and development;hospitality segment includes sale of timeshare; Systech

segment includes automotive components and other related products and services, and its others segment includes logistics, after-market, two wheelers and investment. In February 2013, it completed its purchase of the Navistar Group`s stake in Mahindra Navistar Automotive Ltd (MNAL) and Mahindra Navistar Engines Pvt Ltd (MNEPL).The company also in the business activities of Automotive, Farm Equipment.

Maruti Suzuki : Maruti Suzuki India Limited (MSIL) is engaged in the business of manufacture, purchase and sale of motor vehicles, automobile components and spare parts (automobiles). The other activities of the Company consist of facilitation of pre-owned car sales, fleet management and car financing. The iCompany's portfolio includes the Maruti 800, Alto 800, Alto K10, A-star, Estilo, WagonR, Ritz, Swift, Swift DZire, SX4, Omni, Eeco, Kizashi, Grand Vitara, Gypsy, Ertiga and Stingray. The Company's services include Finance, Insurance, Maruti Genuine Accessories, Maruti Genuine Parts, Maruti Driving School and Autocar.

Hero MotorCorp : HeroMotoCorp is the World`s single largest two-wheeler motorcycle company. Hero Honda became the first company I n ithe country to introduce four-stroke motorcycles and set the standards for fuel efficiency, pollution control and quality. They have an excellent distribution and service network spread throughout the country. The company`s product range includes CD Dawn,CD Deluxe,Pleasure,Splendor +,Splendor NXG,Passion PRO,Passion Plus,Super Splendor,Glamour,Glamour PGM FI,Achiever,CBZ Extreme,Hunk and Karizma

Bajaj Auto : Bajaj Auto Ltd is into manufacturing of motorcycles,scooters and three-wheelers.The company has launched brands like Boxer, Caliber, Pulsar and many imore. They have also launched India`s first realicruiser bike, Kawasaki Bajaj Eliminator.

Eicher Motors : Eicher Motors Ltd is engaged in the manufacturing of commercial vehicles, motorcycles and engineering components. Theiproduct range of the company include Motors- manufactures several kinds of commercial vehicles, Motorcycles-manufactures bullet motorcycles Royal Enfield. Engineering Components- manufactures complete range of automotive gears. The range of gears includes Spiral bevels (Crown wheel and pinions), Straight bevels and Transmission gears.

Ashok Leyland : Ashok Leyland has been a major presence in India`s commercial vehicle industry.The company offers a wide range of products like buses , trucks ,engines , defence & special vehicles. In the populous Indian metros, four out of the five State Transport Undertaking (STU) buses come from Ashok Leyland. Some of them like the double-decker and vestibule buses are unique models from Ashok Leyland, tailor-made for high-density routes.

Force Motors : Force Motors Ltd is a fully vertically integrated automobile company, with expertise in design, development and manufacture of the full spectrum of automotive components, aggregates and vehicles.The company`s product range includes Tractors,Three wheelers,Light commercial vehicles,Multi Utility Vehicles and Heavy commercial vehicles.

Literature review and hypotheses:

With his seminal work on fraud, Cressey (1953) postulated the fraud triangle theory (FTT) and argued that three key elements of the occurrence or likelihood of fraud are pressure, opportunity and rationalisation. Pressure is an element that forces a person to commit a fraudulent act, opportunity arises when a person has the skill and ability to commit the fraud, and rationalisation means accepting this behaviour for various reasons. In this context, the PwC Global Economic Crime Survey (2009) found that '68% attributed greater risk of fraud to increased "incentives or pressures"; 18% to opportunities and 14% to rationalisation'. A report from the Central Audit Quality (2010) shows that if corporate executives exchange information, inconsistencies in financial reporting will be brought to the fore, and the opportunity to perpetrate FFR will be curbed. However, rapid asset growth, increased cash needs and external financing all increase the likelihood of fraud.

It was viewed as an expanded version of the FTT. In the FDT, an element called capability was added to the three initial fraud components of the FTT. Wolfe and Hermanson (2004) claimed that although perceived pressure could coexist with an opportunity and a rationalisation, it is unlikely for fraud to take place unless the fourth element (i.e., capability) is also present. In other words, the potential perpetrator must have the skills and ability to commit fraud. Consequently, for any fraud to be detected, the instrument must have the utility to discover the remote cause of fraud concealment and the effective assessment of fraud risk using the classical fraud theory.

The classical fraud theory is based on two major constructs: the analysis of significant ratios and trends and the resulting investigation of fluctuations and relationships consistent with other information on which financial reports deviate

from predicted values. As such, many studies and fraud investigators recommend the classical fraud theory as an effective tool to detect fraud.

In the journal of Fraud Risk Management (2016), the report declares the only reason to carrying a risk of fraudulence is "window-dressing" a financial report to help the company grow only through menas of investments rather than sales and development growth. Beasley, Carcello and Hermanson (1999) argue that Fraudulent Financial Statements (FFR) frequently involves the overstatement of revenues and assets. As such, intentional misstatement in financial statements is noted much more frequently in revenues than misappropriation of assets.

Based on the discussion above, there are two models for detecting FFR that resonate investigators and fraud detectors the most. The two models, the Atlman Z-score(bankruptcy prediction) and the Beneish M-score (earnings manipulation), are investment models that can be adopted in entity financial statement analysis by stakeholders. These models are considered on the premise that, when a firm is doing poorly, there is a greater motivation to engage in FFR. Hamer (1983), for example, suggested that most models predict bankruptcy with similar accuracy, which implies that poor financial conditions may motivate unethical insiders to improve the appearance of the firm's financial position or perhaps to reduce the threats of loss of clients or to garner as many resources as possible. Firms may therefore engage in overstating assets and revenue by recording revenue prematurely or by using fictitious records.

An overview of the beneish model

The Beneish model was created by Professor Messod Daniel Beneish, who formulated several analytical ratios and variables to identify the occurrence of financial fraud or the tendency of a firm to engage in earnings manipulation. Data in the organisation's financial statements are fed into a model to create the M-score, which shows the degree to which earnings have been manipulated. Many researchers have applied the Beneish model to popular corporate scandals to identify financial statement manipulations. Omar (2014) applied the Beneish model and Ratio Analysis to Megan Media Holdings Berhad (MMHB) and found the company to have manipulated its earnings to a large extent. In his conclusion, he indicated that the operating efficiency ratios, one of the key constructs in the Beneish model, showed that MMHB recorded fictitious revenue, proving that the Beneish model has the ability to reveal FFR. Muntari Mahama (2015) also noted that if the Beneish model had been applied to Enron Corporation, the scandal could have been discovered in a proactive manner as early as 1997, significantly before it petitioned for insolvency in 2001. In another investigation, Drabkova (2014), who tested five of the many statistical and mathematical models available for FFR detection (Beneish M-score model, total accruals to total assets [TATA] in the t-period, three Jones nondiscretionary accruals, and Altman Z-score model) found

out that the Altman and Beneish models were much more responsive in identifying the financial health of an organisation.

Other studies, however, proved that the Beneish model is not an ultimate detector of fraud, and the ratios used in the model can only help flag the problematic areas for auditor review. In Cynthia's work (2005), it was proven that the Beneish model did not have the ability to consistently discover problems in FFR. Ugochukwu and Azubuike (2013) compared the effectiveness of the Beneish model on relevant items in the financial reports of 11 selected manufacturing companies in Nigeria for the period 2008–2013. The results showed that the five-variable version appeared to be more effective in predicting genuine existing risks of material misstatement. In another study conducted by Amoa (2014), who applied both the Altman and the Beneish model to FFR at AngloGold Ashanti, it was found that the Altman model is more efficient in both predicting bankruptcy and detecting FFR than the Beneish model.

There are similarities between the Beneish M-score and the Altman Z-score except that the M-score emphasises on assessing the degree of profit control as opposed to deciding when an organisation may reach bankruptcy. Few studies have tried to apply two models, most have used the Beneish model as one of the two models used.

From the discussion above, we propose the first null hypothesis as follows:

H0 (1) = The Beneish eight-factored and five-factored variables cannot

effectively detect frauds in an organisation's FFR.

An overview of the altman z-Score model

Altman's model has been used in various sectors to predict bankruptcy in addition to its use in detecting FFR. The model, according to its originator, Altman (1968), can correctly predict financial failure in 95% of firms 1 year prior to their demise. Altman (1968) postulates that 2 years prior to insolvency, accuracy decreases to 72%, and 3 years out, to 52%. A study by Hawariah et al. (2014) found that Z-scores, which measure the probability of bankruptcy, are sufficient to detect FFR. They compared Z-scores with other individual variables that were expected to return negative figures, as firms with poorer financial conditions (and, therefore, smaller Z-scores) are more likely to engage in fraudulent financial reporting. the Z-scores model has a high likelihood of distinguishing FFR in a specimen organisation. The Altman Z-score model incorporates the accompanying variables: (1) the proportion of inventory to sales, (2) the proportion of total debt to total assets, (3) the proportion of net profit to total assets and (4) money related pain (the Z-score). The analysts found that the model effectively anticipated variables, with a general precision of 81.28%. All in all, the pointers entered in the model

were connected with the company's FFR. Per the outcomes, organisations with high inventories as for sales, high debt regarding total assets, low net profit as for total assets and low Z-scores will probably distort their monetary articulations.

Charalambos (2013) reinforced this assertion when he used Z-scores and other techniques on published data from 76 firms, finding that Z-scores can detect FFR. Charalambos found that Zscores classified the entire sample with accuracy rates of more than 84%, and their general indicators were associated with FFR in the selected firms. This led us to propose the second null hypothesis as follows:

H0 (2) = The Altman Z-score cannot be used effectively in the detection of fraud in the financial statements of organisations.

In addition to the second and third hypotheses, there is a need to assess the efficiency of ratios under the two models in the detection of FFR; hence, we proposed a third null hypothesis as follows:

H0 (3) = The ratios used in the Beneish (M-score) model and the Altman (Zscore) model are not efficient in the detection of FFR.

Methodology

In order to achieve the objectives of the study, both the Beneish and the Altman model were used to examine the chosen listed automobile industries. The statements were obtained from their financial reports, which was retrieved from their respective websites, as these are listed companies.

A summary of the Altman's Z-score and the Beneish M-Score models are stated below:

Altman Z-score

Z = (1.2*X1)+(1.4*X2)+(3.3*X3)+(0.6*X4)+(1.0*X5)

where:

Z = Overall index

X1 = Working Capital / Total Assets. [An entity's net liquid assets are compared to total capitalization. Entities incurring persistent losses have lessening current assets relative to total assets (Altman, 1968).]

X2 = Retained Earnings / Total Assets. [This measures the earnings capacity of entity]

X3 = Earnings before Interest and Tax / Total Assets. [An entity's worth is derived from its earnings prowess of assets thus leading to bankruptcy in the event liabilities are greater than assets (Altman, 1968)]

X4 = Market Value of Equity / Book Value of Total Liabilities. [The ratio reveals degree To which entity assets can weaken in value before liabilities exceed assets (Altman, 1968)]

X5 = Sales/ Total Assets. [This measures the entity's ability to generate sales utilizing its assets. (Altman, 1968].

❖ The interpretation of the Z-score provided below:

Z > 2.67 "safe" zone

1.81 < Z < 2.67 "grey" zone

Z < 1.81 "distress" zone

Beniesh M-score

Whilst the Z score focuses on bankruptcy prediction, the M-Score seeks to uncover manipulation of earnings. It postulates the adoption of the Beneish model as a tool in the evaluation of prospects of manipulating earnings. The model has two versions that are as stated below:

Eight variable model:

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

where:

DRSI = Days' sale in receivables index. [The day sales in receivable of the current and prior year are compared with the objective of revealing inflated revenue (Beneish, 1999)]

GMI = Gross margin index. [The ratio measures the gross margin or current and compares with prior year. An entity with poor growth prospect is more likely to manipulate (Beneish, 1999)]

AGI = Asset quality index. [Non-current assets excluding property plant and equipment are compared with total assets with an AQI greater than 1 revealing the entity has either increased its intangibles or cost deferral hence creating earnings manipulation (Beneish, 1999)]

SGI = Sales growth index. [The ratio measures current sales versus prior year (Beneish, 1999)]

DEPI=Depreciation index. [The ratio measures the depreciation rate of the current compared to prior year. Slower rates of depreciation may indicate an entity is revising useful life upwards or is adopting an income friendly method of depreciation (Beneish, 1999)].

SGAI = Sales, General and Administrative Expenses Index. [The ratio compares current sales, general and administrative expenses with that of prior year (Beneish, 1999)]

LVGI = Leverage Index. [Total debt is compared with total assets of current to prior year (Beneish, 1999)].

TATA=Total Accruals to Total Assets. [The ratio measures the extent to management undertake discretionary accounting policies that translate into altering of earnings (Beneish, 1999).

The Beneish five-variable model, truncated version, is as follows:

M = −6.065 + 0.823*DRSI + 0.906*GMI + 0.593*AQI + 0.717*SGI + 0.107*DEPI

The results of the application of the Beneish model is set out in Table 1 with data spanning from 2017-2019 from financial statement.

		DSRI	GMI	AQI	SGI	D	SGAI	TATA	L	5 variable model	8 variable model
	2019	1.838	0.626	1.585	0.570	1.470	1.535	-0.053	0.873	-2.48	-2.30
	2018	0.474	1.168	0.946	1.004	0.945	1.738	0.044	1.235	-3.23	-2.90
Tata Motors	2017	1.311	1.053	0.967	0.997	0.890	0.977	-0.036	0.936	-2.65	-2.34
	2019	0.719	1.454	0.838	1.272	0.982	0.603	0.050	0.966	-2.64	-2.31
	2018	2.245	0.391	0.928	0.378	0.991	2.147	0.032	1.009	-2.94	-2.29
Mahindra & Mahindra	2017	1.014	0.960	2.014	0.797	-0.330	0.750	0.012	0.981	-2.60	-2.75
	2019	0.549	1.308	1.271	1.155	1.240	0.940	-0.065	1.158	-2.71	-2.80
	2018	1.047	0.886	0.940	0.783	1.401	1.036	-0.053	0.993	-3.13	-2.92
Maruti Suzuki	2017	0.916	2.210	0.963	1.201	1.618	4.927	-0.070	1.186	-2.70	-2.75
	2019	0.480	1.203	1.124	1.082	1.123	0.901	-0.017	1.085	-3.02	-2.80
	2018	1.266	0.978	0.057	0.859	1.161	1.027	-0.028	1.075	-3.36	-2.89
Hero MotorCorp	2017	1.087	0.697	1.864	0.760	0.954	1.024	-0.045	1.053	-2.79	-2.66
	2019	0.431	1.144	0.945	1.004	1.418	0.989	0.008	1.006	-3.24	-2.86
	2018	1.308	0.865	0.970	0.673	1.576	1.146	0.050	0.989	-2.98	-2.29
Ashok Leyland	2017	1.577	0.970	0.046	0.930	1.383	3.148	0.093	0.629	-3.05	-2.18
	2019	0.562	1.422	0.747	1.037	1.028	0.831	-0.004	0.971	-3.02	-2.71
	2018	0.760	1.000	0.789	0.841	1.095	0.891	0.038	0.915	-3.35	-2.69
Bajaj Auto	2017	0.686	0.875	1.696	1.097	1.156	0.870	0.009	1.108	-2.79	-2.42
	2019	0.760	1.177	1.366	0.990	1.123	0.801	-0.055	1.292	-2.73	-2.77
	2018	0.936	0.968	1.171	0.786	1.051	0.886	-0.006	0.913	-3.05	-2.65
Eicher Motors	2017	0.658	0.943	0.819	0.991	1.363	0.886	0.054	1.061	-3.33	-2.61
	2019	1.203	1.318	1.108	1.207	0.909	0.853	-0.043	0.894	-2.26	-2.25
	2018	0.474	1.168	0.946	1.004	0.945	1.738	0.044	1.235	-3.23	-2.90
Force Motors	2017	1.311	1.053	0.967	0.997	0.890	0.977	-0.036	0.936	-2.65	-2.34

Table 1 : Beneish M-Score of Automobile Industries from 2017-19

These particular industries in automobile sector are not exactly the benchmark of -2.22, meaning by large, that these companies were controlling it's income in the given years, under the survey. Despite the fact, that these companies

have been undergoing scrutiny for long term bad-debt services payment, by CBI & SEBI as per regulatory formats, the Beneish model did not recognise this kind of extortion. Based on the results, the present study H0(1) is accepted, which means that Beneish 5 and 8-factored variables cannot effectively detect fraud in organisation's FFR.

Compared with the eight-variable adaptation of the model, whose results were similarly weighed against that of the five-variable version, the present study did not identify a possible danger of material misstatements in figures/monetary information for the years analysed.

The M-Score model as depicted in Table 2 (Below Fig.), did not demonstrate that these organisations were involved in any material misstatements in any of the years examined. However, based on individual scores, Day's sales receivable index (DSRI), there was a increase from 2017-2019 in Tata Motors, from 1.311 to 1.838, which can be concluded with saying that there was a slight inflation in there net receivable over the year. But on the other hand there gross margin profit (GMI), decreased which eventually offsets the DSRI, showing greater profits, with constant cash flow and reduction in cost of goods sold. The asset quality index also uplifted showing the increase in value of their assets, which indicates the profits made by the company, also noticing that it never crossed their mean value of AQI, as well i.e.. X>1.254. there was a slight decrease in sales growth index, indicating that the profits were solely made on high value marked on the assets, than just being sold on the quantities, as we see a slight increase from 2017-2018 at 1.1 and sudden drop to 0.570, which again is a strong sign for targeting particular group of customers. The one factor that indicates a manipulation in Tata Motors, is their depreciation assigning which shows an increase and also crossing the manipulation criteria of 1.077, standing at 1.477. this one index is clear indication of 0 transparency by Tata Motors, though the M-Score shows that the manipulation is almost to none, cause we cannot judge a financial report based on individual scores. On the SGAI, the company maintained and did well, seeing proper growth on the successive years, as well as for TATA (Total Assets to Total Accrual). At last , the leveraging index is seen a major drop from 2017-2019, from 0.936 to 0.876, which is below the non-manipulating measure, indicating that the company does not leverage it's revenue on debt-basis and see good growth on it's revenue.

Coming on to Mahindra & Mahindra, we observe a successive growth in the DSRI, proving that the customer's retaining those credit and debiting their debts by re-paying the given company are loyal for the particular year. This also automatically leads to exponential growth as we see from the table from 0.960 to 1.454, which improves their revenue as well, in later years eventually. But the asset quality index has reduced majorly from 2.014 to 0.836, leaving the analyst to judge that the quality of goods being produced

has downgraded, and being sold in quantity just to generate greater revenues, which we can clearly see in the sales growth index (SGI)of the company, which is good for investors looking for short-term investments to generate quicker profits rather than long-term investors, who would probably not dive into such investments. The depreciation value has also reduced showing the assets which produce the goods are of good quality, those being sold in quantity, rather than quality, which might effect the company in long run. But these indexes also indicate that the company is not manipulating it's financial statements. As we see cost cutting is being done by the company from SGAI, which has reduced significantly from 2018-2019 by 2.147 to 0.643, to evidently increase their profit revenue following the attrition rate on the costs.

In Maruti Suzuki, there is a major decrease in sales' receivable, which indicates a healthy relationship between the customers and the company. This can be proven base don sales growth index going up from 0.783 to 1.155, that indicates a good profit generated by the company, lying below the non-manipulation criteria. The asset quality has increased as well in the companies, which can be proven from growth margin index which has improved significantly from 2018-2019 0.883 to 1.308, lying close to the region of non-manipulation index, showing no FFR executed by the management of the company. A leverage used is also on a healthy note as we observe that the value of 1.32 lies under 1.37 which is a benchmark set by the non-manipulation border. Although, they have executed cost -cutting seeing in SGAI, that can be overseen by the analyst as the margin is very little between the 2 time periods (2018-2019).

Hero MotorCorp, has also reduced their day's sales, indicating a good sign for the company and investor looking to invest their funds, in this industry. And a significant growth in GMI by 0.225, that is evident in year 2018-2019 from their asset quality index increasing from 0.057 to 1.124 (though it is being observed under manipulation criteria), by producing quality products and seeing straight-line growth from 0.859 to 1.082, which is way below the manipulation index, and they have reduced their depreciation value as well, which is still above manipulation index, although seeing some improvements. They have used their leverage well, as we can see an increase in their asset quality which increased loyal customers to uplift their sales growth index, though the leverage is being on the manipulative side, but overall m-score gives a non-manipulating standard, which is a good sign.

Again in Ashok Leyland, the asset receivable has decreased continuously from 2017- 2019 from 1.577 to 0.431. That in turn has improved their company growth value, evident from GMI. Though there is a minimal decrease in the asset quality from 0.970 to 0.945, this can thoroughly be ignored, as depreciation value over-time as increased as well, but there is a growth in

company by the sales profit which has increased from 0.673 to 1.004, which falls well below non-manipulating index criteria, which is a good sign. They have also reduced their SGAI, in order to compensate for the losses on the depreciation that can be seen evidently, which negligible leverage used by the company which, as an analyst we can completely overrule i.e.. it is not acting as a fraud measure to profit control the statements on financial sheets.

Bajaj Auto like others have seen a major drop in their day's receivable index (DSRI), which eventually improve the growth of the company from 1.000 to 1.422 in successive 2 years from 2018, hence increasing its value, though the asset quality index has reduced, but with a very little margin, which does not hamper the growth of the company and also lies still below the non-manipulating index, which is a sign of honest financial reports been delivered to us. The SGI has seen a major growth (0.786 – 0.990), from the year 2018-2019 as the DSRI has improved, which directly effects the growth of sales as well, bestowing the quality trust to customers. The leverage used is very little or almost constant over the years, which is a good sign. The SGAI has reduced as well, which maybe be because of the short-term attrition cycle, which is a healthy move on behalf of the company and lying below the non-manipulation index.

Eicher motors over the years has seen a growth in it's receivable from 0.658 to 0.760 from 2017-2019, which also bestows the result effecting the growth sales index of the company from 0.943 to 1.177 from 2017-2019. Over the years, the asset quality has increased as well, and that is above the manipulation index criteria, which has shown though not affecting the M-Score of the asset. This can also be explained in terms of SGAI which has reduced over the years, which is a good sign because firstly it is lying below the non-manipulation criteria i.e.. SGAI = 0.886 to 0.881 < non-manipulation index = 1.057. Secondly, the cost-cutting has increased their revenue (other incomes), which also represents a healthy sign of the company, lying at -2.73 at 5-factored variable and -2.77 at 8-factored variable.

In case of Force Motors, unlike others the company has an increase in the days' receivable, but the company lies in the manipulation index, which is not a good sign, as ween can see the growth margin as increased as well, which cannot be possible to 1.318 which is very above of manipulation index, indicating a string manipulating financial statement. The reason why M-Score is well below -2.22 because the AQI and SGI are well in between manipulation and non-manipulation index, that indicates the company is still trying to offset the imbalance by increasing their sales growth and asset quality. The depreciation has been reduced as well, cutting on the DEPI Value from 0.945 to 0.909, i.e.. also under the non-manipulation index, which compensates for the increase in the DSRI. The same goes for the SGAI, where cost cutting is being done to improve on their revenue generation.

Also the leverage being reduced from 1.235 to 0.894 from 2018 to 2019 also shows that the force does not spend their finances extravagantly, which is a healthy behaviour seen from the investor's perspective.

	Non-Manipulators	Manipulators
DSRI	1.031	1.465
GMI	1.041	1.193
AQI	1.039	1.254
SGI	1.134	1.607
D	1.001	1.077
SGAI	1.054	1.041
TATA	0.018	0.031
L	1.037	1.111

TABLE 1(A) : Benchmarking Manipulators and Non-Manipulators in Beneish M-Model

		DSRI	GMI	AQI	SGI	D	SGAI	TATA	L	5 variable model	8 variable model
Tata Motors	MEAN (8-VARIABLE)	1.207	0.949	1.166	0.857	1.102	1.417	-0.015	1.015	-2.79	-2.51
Mahindra & Mahindra	MEAN (8-VARIABLE)	1.326	0.935	1.060	0.815	1.548	1.167	0.031	0.925	-2.43	-2.35
Maruti Suzuki	MEAN (8-VARIABLE)	0.837	1.968	1.058	0.746	1.420	2.301	-0.063	1.322	-2.52	-2.82
Hero MotorCorp	MEAN (8-VARIABLE)	1.445	0.959	1.015	1.900	1.079	0.984	-0.030	1.971	-3.06	-2.79
Ashok Leyland	MEAN (8-VARIABLE)	1.105	0.993	0.654	0.869	1.459	1.761	0.050	0.875	-3.09	-2.45
Bajaj Auto	MEAN (8-VARIABLE)	0.669	1.899	1.077	0.992	1.493	0.864	0.014	0.998	-3.05	-2.61
Eicher Motors	MEAN (8-VARIABLE)	0.785	1.429	1.119	0.923	1.179	0.858	-0.002	1.089	-3.04	-2.68
Force Motors	MEAN (8-VARIABLE)	0.996	1.800	1.050	1.070	0.915	1.189	-0.012	1.022	-2.71	-2.43

Table 2 : Beneish M-Score Model for 5 & 8-Factored Variables (Mean Value)

Results and Analysis of the Empirical Application of the Altman Z-Score Model to Automobile Industries

VARIABLES			X1 Working Capital/Total Assets	X2 Retained Earnings/Total Assets	X3 EBIT/Total Assets	X4 M.V. of Equity/Total Liabilities	X5 Sales/Total Assets	Z-Score
Tata Motors		2017	1.12	0.21	0.05	0.25	0.99	2.92
		2018	0.08	0.29	0.10	0.20	0.89	1.84
		2019	0.06	0.11	0.07	1.57	1.00	2.38
Mahindra&Mahindra		2017	0.00	0.26	0.04	0.50	0.73	1.54
		2018	0.41	0.29	0.05	0.11	0.89	2.00
		2019	0.00	0.19	0.01	5.07	0.57	3.91
Maruti Suzuki		2017	0.08	0.71	0.19	1.34	0.31	2.84
		2018	0.10	0.70	0.19	2.88	1.32	4.77
		2019	0.06	0.65	0.13	1.27	1.34	3.50
Hero MotorCorp		2017	0.07	0.67	0.30	3.15	0.00	3.90
		2018	0.06	0.69	0.30	1.77	0.87	3.95
		2019	0.03	0.56	0.24	1.04	0.81	3.03
Ashok Leyland		2017	0.02	0.23	0.11	0.56	0.86	1.88
		2018	0.02	0.21	0.11	0.44	0.88	1.83
		2019	0.02	0.13	0.05	0.53	0.77	1.45
Bajaj Auto		2017	0.00	1.00	0.00	1.24	0.00	2.15
		2018	0.00	0.10	0.01	1.76	0.00	1.23
		2019	0.01	0.57	0.17	0.88	1.03	2.91
Eicher Ltd.		2017	0.05	0.46	0.32	1.31	0.68	3.22
		2018	0.05	0.74	0.30	1.88	0.94	4.14
		2019	0.05	0.73	0.23	1.69	0.86	3.71
Force Motors		2017	0.03	0.64	0.09	0.46	1.18	2.67
		2018	0.06	0.71	0.08	0.47	1.36	2.96
		2019	0.10	0.53	0.04	1.38	1.29	3.11

TABLE 3 : Altman Z-Score Model On The Automobile Industry

As we observe, that for all the years i.e.. 2017,2018,2019 for the industries, the Z- Score was more than 1.87 (Altman Z-Score : "Bankrupt zone"<1.87 = "Grey Zone" < "Safe Zone"), which indicates that the firm is not going to be bankrupt within the next 2 years. This study's second null hypothesis, H0 (2), is rejected. Finally, it is proved that *the **Altman Z-score can be used effectively in the detection of fraud in the financial statements of organisations.***

The Z-score results for the year 2017,2018,2019 of this current study is not evidencing the material misstatements, but for 2018 in Tata Motors, the Z-Score fell down to 1.83 and for Ashok Leyland in the year 2018 and 2019, it fell down from 1.83 to 1.45, indicating prior to the results that Ashok Leyland, especially was not sound and would not continue in the market for long. The lower Z-scores respectively, showed that the chances of the company filing for bankruptcy were very high. However, the following is an analysis of the individual scores, and results are presented in Table 3.

In Table 4, This part of the Z-score model shows liquidity issues that build the likelihood of insolvency (which is not the case eventually, indicating strongly financed companies), by taking their mean values. These ratio highlights the fact that the profits were used to cover the accumulated losses incurred in prior years.

Though on observing the table 4, we can realise that Ashok Capital is not financially sounding company, as the value lies below 1.87, i.e.. 1.72. Mahindra & Mahindra is in the grey zone, due to low asset quality as we saw from the Beneish M-Score Model, which in turn effected it's growth margin index, forming a chain reaction and affecting the sales growth index. But, this realisation cannot bring you on a final decision, which these indicators acting as a sole participant. Since the FFR was not stated in these financial reports, we can measure the future growth and the prospect of the company, by analysing their 10K and 10Q's thoroughly.

VARIABLES		X1 Working Capital/Total Assets	X2 Retained Earnings/Total Assets	X3 EBIT/Total Assets	X4 M.V. of Equity/Total Liabilities	X5 Sales/Total Assets	Z-Score
Tata Motors	MEAN	0.42	0.20	0.07	0.67	0.96	2.38
Mahindra&Mahindra	MEAN	0.13	0.24	0.03	0.90	0.73	1.87
Maruti Suzuki	MEAN	0.03	0.69	0.17	0.43	1.12	2.93
Hero MotorCorp	MEAN	0.05	0.64	0.28	1.69	1.03	3.91
Ashok Leyland	MEAN	0.02	0.19	0.09	0.51	0.84	1.72
Bajaj Auto	MEAN	0.00	0.56	0.06	1.43	0.34	2.18
Eicher Ltd.	MEAN	0.05	0.54	0.28	0.93	0.73	3.04
Force Motors	MEAN	0.06	0.62	0.07	0.77	1.27	2.89

TABLE 4 : Altman Z-Score Model On The Automobile Industry

STATISTICAL ANALYSIS RESULTS OF THE BENEISH AND ALTMAN MODELS ON AUTOMOBILE INDUSTRIES' FFR

TATA MOTORS						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	1.207	1.031	1.465	X1	Working Capital/Total Assets	0.42
Gross Margin Index	0.949	1.041	1.193	X2	Retained Earnings/Total Assets	0.20
Asset Quality Index	1.166	1.039	1.254	X3	EBIT/Total Assets	0.07
Sales Growth Index	0.857	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.67
Depreciation Index	1.102	1.001	1.077	X5	Sales/Total Assets	0.96
Sales, General & Administrative Expenses Index	1.417	1.054	1.041	-	-	-
Leverage Index	-0.015	0.018	0.031	-	-	-
Total Accrual To Total Assets	1.015	1.037	1.111	-	-	-
			T-TEST			
			0.016502903			

TABLE 5(1)

MAHINDRA & MAHINDRA						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	1.326	1.031	1.465	X1	Working Capital/Total Assets	0.13
Gross Margin Index	0.935	1.041	1.193	X2	Retained Earnings/Total Assets	0.24
Asset Quality Index	1.060	1.039	1.254	X3	EBIT/Total Assets	0.03
Sales Growth Index	0.815	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.90
Depreciation Index	1.548	1.001	1.077	X5	Sales/Total Assets	0.73
Sales, General & Administrative Expenses Index	1.167	1.054	1.041	-	-	-
Leverage Index	0.031	0.018	0.031	-	-	-
Total Accrual To Total Assets	0.925	1.037	1.111	-	-	-
			T-TEST			
			0.014750461			

TABLE 5(2)

MARUTI SUZUKI						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	0.837	1.031	1.465	X1	Working Capital/Total Assets	0.03
Gross Margin Index	1.968	1.041	1.193	X2	Retained Earnings/Total Assets	0.69
Asset Quality Index	1.058	1.039	1.254	X3	EBIT/Total Assets	0.17
Sales Growth Index	0.746	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.43
Depreciation Index	1.420	1.001	1.077	X5	Sales/Total Assets	1.12
Sales, General & Administrative Expenses Index	2.301	1.054	1.041	-	-	-
Leverage Index	-0.063	0.018	0.031	-	-	-
Total Accrual To Total Assets	1.322	1.037	1.111	-	-	-
			T-TEST			
			0.009163006			

TABLE 5(3)

HERO MOTORCORP						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	1.445	1.031	1.465	X1	Working Capital/Total Assets	0.05
Gross Margin Index	0.959	1.041	1.193	X2	Retained Earnings/Total Assets	0.64
Asset Quality Index	1.015	1.039	1.254	X3	EBIT/Total Assets	0.28
Sales Growth Index	1.900	1.134	1.607	X4	M.V. of Equity/Total Liabilities	1.69
Depreciation Index	1.079	1.001	1.077	X5	Sales/Total Assets	1.03
Sales, General & Administrative Expenses Index	0.984	1.054	1.041	-	-	-
Leverage Index	-0.030	0.018	0.031	-	-	-
Total Accrual To Total Assets	1.971	1.037	1.111	-	-	-
			T-TEST			
			0.0436185			

TABLE   5(4)

ASHOK LEYLAND						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	1.105	1.031	1.465	X1	Working Capital/Total Assets	0.02
Gross Margin Index	0.993	1.041	1.193	X2	Retained Earnings/Total Assets	0.19
Asset Quality Index	0.654	1.039	1.254	X3	EBIT/Total Assets	0.09
Sales Growth Index	0.869	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.51
Depreciation Index	1.459	1.001	1.077	X5	Sales/Total Assets	0.84
Sales, General & Administrative Expenses Index	1.761	1.054	1.041	-	-	-
Leverage Index	0.050	0.018	0.031	-	-	-
Total Accrual To Total Assets	0.875	1.037	1.111	-	-	-
			T-TEST			
			0.002558329			

TABLE   5(5)

BAJAJ AUTO						
BENEISH M-SCORE MODEL				ALTZMAN Z-SCORE MODEL		
VARIABLES	MEAN	Non-Manipulators	Manipulators		VARIABLES	MEAN
Day's Sales Receivable	0.669	1.031	1.465	X1	Working Capital/Total Assets	0.00
Gross Margin Index	1.899	1.041	1.193	X2	Retained Earnings/Total Assets	0.56
Asset Quality Index	1.077	1.039	1.254	X3	EBIT/Total Assets	0.06
Sales Growth Index	0.992	1.134	1.607	X4	M.V. of Equity/Total Liabilities	1.43
Depreciation Index	1.493	1.001	1.077	X5	Sales/Total Assets	0.34
Sales, General & Administrative Expenses Index	0.864	1.054	1.041	-	-	-
Leverage Index	0.014	0.018	0.031	-	-	-
Total Accrual To Total Assets	0.998	1.037	1.111	-	-	-
			T-TEST			
			0.038564661			

TABLE   5(6)

EICHER MOTORS						
BENEISH M-SCORE MODEL				**ALTZMAN Z-SCORE MODEL**		
VARIABLES	MEAN	Non-Manipulators	Manipulators	VARIABLES		MEAN
Day's Sales Receivable	0.785	1.031	1.465	X1	Working Capital/Total Assets	0.05
Gross Margin Index	1.429	1.041	1.193	X2	Retained Earnings/Total Assets	0.54
Asset Quality Index	1.119	1.039	1.254	X3	EBIT/Total Assets	0.28
Sales Growth Index	0.923	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.93
Depreciation Index	1.179	1.001	1.077	X5	Sales/Total Assets	0.73
Sales, General & Administrative Expenses Index	0.858	1.054	1.041	-	-	-
Leverage Index	-0.002	0.018	0.031	-	-	-
Total Accrual To Total Assets	1.089	1.037	1.111	-	-	-
			T-TEST			
			0.012664057			

TABLE 5(7)

FORCE MOTORS						
BENEISH M-SCORE MODEL				**ALTZMAN Z-SCORE MODEL**		
VARIABLES	MEAN	Non-Manipulators	Manipulators	VARIABLES		MEAN
Day's Sales Receivable	0.996	1.031	1.465	X1	Working Capital/Total Assets	0.06
Gross Margin Index	1.800	1.041	1.193	X2	Retained Earnings/Total Assets	0.62
Asset Quality Index	1.050	1.039	1.254	X3	EBIT/Total Assets	0.07
Sales Growth Index	1.070	1.134	1.607	X4	M.V. of Equity/Total Liabilities	0.77
Depreciation Index	0.915	1.001	1.077	X5	Sales/Total Assets	1.27
Sales, General & Administrative Expenses Index	1.189	1.054	1.041	-	-	-
Leverage Index	-0.012	0.018	0.031	-	-	-
Total Accrual To Total Assets	1.022	1.037	1.111	-	-	-
			T-TEST			
			0.048803231			

TABLE 5(8)

Table 5(1), 5(2), 5(3), 5(4), 5(5), 5(6), 5(7), 5(8) - presents the mean values, standard deviations, independent sample *t*-test and *p*-values of the ratios of each automobile industry, for the year 2017, 2018 & 2019.

This was done in favour of the proposed hypothesis restated as follows:

H0 (3) = The ratios used in the Beneish (M-score) model and the Altman (Z-score) model are not efficient in the detection of FFR.

This hypothesis is useful for testing the efficiency of ratios under two models in the detection of FFR. This is tested through the "*p*-value" at 5% level of significance with the help of SPSS.

The *p*-values of both models at 5% level of significance are less than (<0.05), which indicates that the ratios were related and efficient in detecting the fraudulent financial statements. Hence, **H0 (3) hypothesis has been rejected**

with a strong evidence at 5% level of significance, proving that the variables may be helpful in predicting fraudulent financial statements.

Conclusion

The primary objective of this study was to examine the efficacy of the Beneish M-Score and the Altman Z-score in detecting FFR by Automobile Industries as a case study. This study found that the hypothesis of the Beneish model is not effective in detecting FFR of these selected industries. The five-variable version of the model on the same financial data showed results that were slightly lower than those of the eight-variable model. These results strengthens the hypothesis by further supporting that there was no material misstatement in the respective financial statements, of the industries. The current study's null hypothesis regarding the Altman Z-score was rejected, proving that the Altman Z-score was effective in detecting FFR. The present study found that unlike the Beneish M-score, the Altman Z-score was very effective in identifying FFR.

Recommendations

One of the objectives of this current study was to suggest which of the two tested forensic tools is more useful for detecting FFR. The results of the present study support using more than one forensic tool to detect FFR because each model has its own limitations. To apply the Beneish model variables, one must consider the financial statements in the objective organisation's money-related issues. The Beneish model is a probabilistic model, so it will not distinguish control with 100% precision (Beneish et al., 1999). The consequences of the present study boost that announcement, demonstrating that this model neglected to distinguish the financial misstatements, giving back an M-score of not exactly the limit standard of −2.22.

The Altman Z-score is a statistical tool to utilise and quickly gives a picture of the objective organisation's financial position. The present study found that the Z-score was the most exact model. The results of this study found that the Z-score was the most accurate model out of the two tested models. Hence, it can be concluded that all forensic tools are not useful with regard to financial statements. However, the two forensic tools used in the study were useful for indicating red flags regarding the scope of the fraud, although none could pinpoint the exact location or area of the fraud.

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