

The Effects of Beneish's M-Score Model and Financial Ratio Analysis on Fraudulent Financial Statement Indications

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Abstract. The aim of this research was to collect empirical evidence on the effects of Beneish's M-Score Model that was calculated using the eight formulas that come with it and of financial ratio analysis based on the indicators financial leverage, profitability, asset composition, liquidity, and capital turnover on fraudulent financial statement indications in manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange over the period 2017–2020. The dependent variable in this research was a dummy variable, where a score of 1 was assigned to a company which restated its financial statements and a score of 0 was assigned to a company that did not perform any restatement. The research results showed that only the variable financial leverage had a significant effect on fraudulent financial statement indications. Meanwhile, Beneish's M-Score Model did not have any significant effect on fraudulent financial statement indications. Data analysis in this study used STATA (Statistics Data Analysis) software version 16 which was used to perform statistical data tests.

1 Introduction

Financial statement is defined as the reporting activity of a company which provides information on the company's results, financial conditions, and operating performance [1]. As stated in the Indonesia Statement of Financial Accounting Standards 1 (revised 2017), making available of information on a company's finances and the changes thereof as well on the company's performance to be used by financial statement users for decision-making is the purpose of financial statement. A company's financial statements are useful both for the company's internal and external parties. Particularly for external parties such as investors, creditors, and governmental agencies, financial statements serve considerations for decision-making regarding capital investments, giving loans, and making government policies [2] One of the obligations of a company that has gone public is to ensure transparency of financial statements to provide all shareholders with necessary information; therefore, financial statements are among the most important things for go-public companies [3]. [4] state that the financial performance of a company is the chief concern for stakeholders, especially existing and potential investors. The obligation above unquestionably urges companies to constantly maintain or even improve their value. As a result, there has been a tendency for companies to enhance their financial statements to project an attractive picture for potential financial investors [5]. Such an inclination might drive the companies to make fraudulent compromises, particularly in financial statements.

Fraud can take a variety of manifestations designed by human shrewdness for the purpose of profits-gaining by making false representations in the manner of manipulation, fabrication, or modification of accounting records [6]. Fraudulent financial statement can be defined as false presentation or purposeful removal of a piece of information which might significantly affect the financial statement of a company or errors in the application of accounting principles which result in divergences in presentataion, disclosure, and classification [7]. Fraudulent financial statements can be significantly influential and even calamiteous to a company's value due to a loss of public's trust [8]. Not only is it adversely impactful to the company's position and reputation, fraud is also harmful to the company's employees, investors, creditors, suppliers, and customers [1]. The employees will lose their jobs, the investors will not earn optimal returns, and the creditors will not get their due payments [8]. [9] state that fraud will increase business costs, result in distrust and systemic failures, undermine credibility, and cause performance loss in the organization. In addition, fraudulent financial statements can pose a problem to external auditors or other professional agencies due to the potential failure in detecting fraud in financial statements, which can cause public's dissatisfaction because of the undetected fraud and ultimately damage their professional reputation [10].

As stated by the Director of Publication Association of Certified Fraud Examiners (ACFE) Randy Rizki, fraudulent financial statements, although with fewer cases than corruption and asset misappropriation, have resulted in the greatest amount of loss. The ACFE

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Report to the Nations on Occupational Fraud and Abuse 2020 data in Figure 1 support that the number of global financial statement fraud cases was lower in comparison to the numbers of asset misappropriation and corruption cases, accounting to only 10%. However, the hugest median loss was generated by fraudulent financial statements at nearly \$1,000,000 in 2020. Fraudulent financial statements were also declared as the highest in monthly average rate of loss among all fraud schemes in Indonesia. The results of the ACFE Indonesia survey presented in Figure 2 indicate that as much as 67.4% of loss valued under Rp10,000,000 was caused by fraudulent financial statements. Fraudulent financial statements also generated a total loss value in excess of Rp5 billion at a rate of 5%.

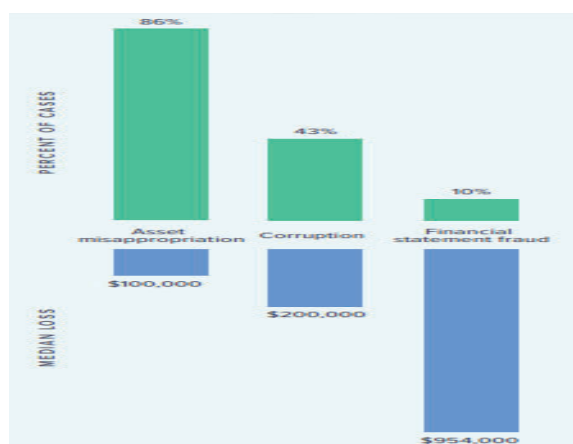


Fig. 1. How is occupational fraud committed?

Source: [11]

Many fraudulent financial statement cases both overseas and at home have caused substantial losses to the financial statement users. Therefore, it becomes critical to use calculation instruments or methods based on various financial statement indicators to detect indications of financial statement fraud in order to minimize financial statement fraud and to recognize it from early on, lest it becomes too big a trouble that causes a considerable loss in the future. Several calculation approaches or methods are commonly employed to detect financial statement fraud indications. In this research, the researchers utilized two approaches, namely Beneish's M-Score Model and Financial Ratio Analysis.

As stated by [12], Beneish's M-Score Model is a popular model proven to be effective at detecting indications of financial statement fraud that is committed by manipulation. The former is widely implemented all over the globe to detect manipulations in financial statements, particularly in India, the United States, and Italy. [13] states that it is also used by bank credit departments and official agencies in Greece to provide protection against games of speculation. Although it is fair to say that Beneish's M-Score Model is popular and widely used abroad, the results of the review by Sari revealed that the number of published research papers in Indonesia on Sinta-indexed journals

during the period 2008–2018 concerning fraud detection employing Beneish's M-Score Model is small, that is, four. The most researched fraud detection methods have been the fraud diamond and the fraud triangle, with appearances in 11 papers. It was these reasons that drove the researchers to study in more depth the effect of Beneish's M-Score Model on the detection of fraudulent financial statement indications.

In research conducted by [14] stated that the Depreciation Index has an effect on fraudulent financial statements, which when assets depreciate has slowed, it increases the possibility that the company has revised the estimated useful life of assets or used new methods to increase revenue. The next indicator in the Beneish M-Score is the Sales General and Administrative Expenses Index, in which an increase in sales, administration, and general costs that is not simultaneous with an increase in sales will indicate fraudulent financial statements because the relationship between these costs and sales is static [12].

Meanwhile, the latter of the two approaches, financial ratio analysis, is defined as the systematic utilization of ratios to interpret financial statements, allowing the determination of the advantages and disadvantages, historical performance, and financial conditions of a company [15]. The financial ratio analysis conducted in the research by [16] was divided into five sections, each involving a unique calculation, namely financial leverage, profitability, asset composition, liquidity, and capital turnover. It is the most common method used.

The problems formulated in this research are as follows:

1. Does Beneish's M-Score Model (MSCORE) affect fraudulent financial statement indications?
2. Does Financial Leverage (LEV) affect fraudulent financial statement indications?
3. Does Profitability (PROF) affect fraudulent financial statement indications?
4. Does Asset Composition (AC) affect fraudulent financial statement indications?
5. Does Liquidity (LIQ) affect fraudulent financial statement indications?
6. Does Capital Turnover (CAPT) affect fraudulent financial statement indications?

Below are the hypotheses proposed by this research:

- H₁: Beneish's M-Score Model significantly affects fraudulent financial statement indications.
- H₂: Financial Leverage significantly affects fraudulent financial statement indications.
- H₃: Profitability significantly affects fraudulent financial statement indications.
- H₄: Asset composition significantly affects fraudulent financial statement indications.
- H₅: Liquidity significantly affects fraudulent financial statement indications.
- H₆: Capital turnover significantly affects fraudulent financial statement indications.

Table 1. Independent Variables Operationalization

Independent Variables	Formulas
Beneish M-Score Model	$-4.84 + 0.92 \text{ DSRI} + 0.528 \text{ GMI} + 0.404 \text{ AQI} + 0.892 \text{ SGI} + 0.115 \text{ DEPI} - 0.172 \text{ SGAI} - 0.327 \text{ LVGI} + 4.697 \text{ TATA}$
Financial Leverage	Total Debt / Total Equity
Profitability	Net profit / Revenue
Asset Composition	Inventory / Total Assets
Liquidity	Working Capital / Total Assets
Capital Turnover	Revenue / Total Assets

2 Research Methods

The method of sample collection carried out by the researcher is by conducting documentation, namely the researcher collects data or collects information that already exists in the audited company's annual financial statements which are available on the official website of the Indonesia Stock Exchange and the official website of consumer goods companies. This research is a quantitative study. The data used in this research were of the secondary type. The population employed in this research consisted of manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange in the period 2017–2020. From the population, a research sample was extracted using the purposive sampling method, in which case the researchers set certain criteria to select the sample of the research. The sampling criteria used in this research are as follows:

1. Manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange in the period 2017–2020.
2. Manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange consecutively or without experiencing delisting throughout the period 2017–2020.
3. Manufacturing companies publishing complete audited financial statements in the period 2017–2020 that were accessible via the official website of the Indonesia Stock Exchange or the official website of each company.
4. The financial statements used the currency Rupiah.
5. The financial statements had complete components according to the variables investigated.

The variables in this research consisted of dependent and independent variables. The dependent variable was fraudulent financial statement (Y) that was proxied by restatement as a dummy variable, in which case a score of 1 was assigned to a company that made a restatement and a score of 0 was assigned to a company that did not make any restatement. Meanwhile, the independent variables were Beneish's M-Score Model and Financial Ratio Analysis.

3 Results and Discussion

From the sampling process, 45 companies were found to have met the criteria. Because this research used a period of 4 years, a total of 180 financial statements of manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange were used as the research sample.

3.1 Statistical-Descriptive Analysis

A statistical-descriptive analysis was carried out to provide an overview of each variable used in this research. The results consisted of means, standard deviations, min. values, and max. values.

Table 2. Statistical-Descriptive Analysis Results

Variable	Obs	Mean	Std. Dev.	Min	Max
MSCORE	180	-2.089633	2.204385	-18.404	18.471
LEV	180	.8360667	.810637	-2.127	5.37
PROF	180	.0588111	.288416	-2.683	1.901
AC	180	.2000889	.1239998	.011	.568
LIQ	180	.2594444	.3456171	-2.416	.869
CAPT	180	1.054594	.5203195	.14	3.105
RESTATE	180	.05	.2185529	0	1

Source: Data processed by the researchers (2022)

Based on table 2, there were a total of 180 observation data used in this research, described as follows:

1. The variable Beneish's M-Score Model (MSCORE) had a min. value of -18.404, a max. value of 18.471, a mean of 2.089633, and a standard deviation of 2.204385.
2. The variable Financial Leverage (LEV) had a min. value of -2.127, a max. value of 5.37, a mean of 0.8360667, and a standard deviation of 0.810637.
3. The variable Profitability (PROF) had a min. value of -2.683, a max. value of 1.901, a mean of 0.0588111, and a standard deviation of 0.288416.
4. The variable Asset Composition (AC) had a min. value of 0.011, a max. value of 0.568, a mean of 0.2000889, and a standard deviation of 0.1239998.
5. The variable Liquidity (LIQ) had a min. value of -2.416, a max. value of 0.869, a mean of 0.2594444, and a standard deviation of 0.3456171.
6. The variable Capital Turnover (CAPT) had a min. value of 0.14, a max. value of 3.105, a mean of 1.054594, and a standard deviation of 0.5203195.

3.2 Goodness of Fit Test of the Regression Model (Hosmer and Lemeshow's Goodness of Fit Test)

The goodness of fit test of the regression model would be acceptable if the significance level was greater than 0.05. If the value was less than 0.05, the model would be declared as unfit to be used. The following are the results of the goodness of fit test of the regression model to be used in this research.

Table 3. Goodness of Fit Test Results

Logistic model for RESTATE, goodness of fit test	
(Table collapsed on quantiles of estimated probabilities)	
number of observations = 180	
number of groups = 10	
Hosmer-Lemeshow $\chi^2(8) = 9.69$	
Prob > $\chi^2 = 0.2877$	

Source: Data processed by the researchers (2022)

According to the goodness of fit test results in Table 3, Prob > $\chi^2 = 0.2877$ (greater than 0.05). It can be said that the regression model to be used was fit with the observation data. Therefore, the regression model of the research was considered fit to be used in the next tests.

3.3 Coefficient of Determination Test (McFadden R-Squared)

A coefficient of determination test was carried out to figure out the extent to which the independent variables used in this research were able to explain the dependent variable.

Table 4. Coefficient of Determination Test Results

Number of obs =	180
Wald $\chi^2(2) =$	9.23
Prob > $\chi^2 =$	0.1610
Pseudo R2 =	0.1292

Source: Data processed by the researchers (2022)

The coefficient of determination test results in Table 4 showed that the Pseudo R² value was 0.1292 or 12.92%, meaning that the dependent variable fraudulent financial statement was explainable by the independent variables in this research at a rate of 12.92%.

3.4 Classification Matrix Test

A classification matrix test was carried out to see how accurate the prediction of the regression model used in this research was at detecting whether a company made a restatement or not.

Table 5. Classification Matrix Test Results

Logistic model for RESTATE			
Classified	D	~D	Total
+	1	0	1
-	8	171	179
Total	9	171	180
Classified + if predicted Pr(D)	>= .5		
True D defined as RESTATE != 0			
Sensitivity	Pr(+ D)		11.11%
Specificity	Pr(- ~D)		100.00%
Positive predictive value	Pr(D +)		100.00%
Negative predictive value	Pr(~D -)		95.53%
False + rate for true ~D	Pr(+ ~D)		0.00%
False - rate for true D	Pr(- D)		88.89%
False + rate for classified +	Pr(~D +)		0.00%
False - rate for classified -	Pr(D -)		4.47%
Correctly classified			95.56%

Source: Data processed by the researchers (2022)

Based on Table 5, it was concluded that the regression model used in this research predicted 172 of 180 financial statements accurately. Hence, the accuracy level of the model was 95.56%.

3.5 Logistic Regression Analysis

In the final stage, a logistic regression analysis was carried out to see the significance level of each independent variable against the dependent variable.

Table 6. Logistic Regression Analysis Results

REST ATE	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
MSCO RE	-.3700 953	.2833 092	-1.31	0.191	.9253 711	.1851 804
LEV	.4706 08	.2298 107	2.05	0.041	.0201 874	.9210 287
PROF	.8465 885	1.266 834	0.67	0.504	1.636 361	3.329 538
AC	-.3780 147	3.550 678	-0.11	0.915	7.337 216	6.581 186
LIQ	1.177 115	.6921 633	1.70	0.089	2.533 731	.1794 997
CAPT	.1147 546	.8017 768	0.14	0.886	1.456 699	1.686 208
_cons	4.245 528	.8237 432	5.15	0.000	5.860 035	- 2.631 021

Source: Processed data (2022)

Based on Table 6, the logistic regression equation generated is as follows.

$$Y = -4.245 - 0.370 X_1 + 0.470 X_{2,1} + 0.846 X_{2,2} - 0.378 X_{2,3} - 1.177 X_{2,4} + 0.114 X_{2,5} + \epsilon$$

3.6 The Effect of Beneish's M-Score Model on Fraudulent Financial Statement Indications

The logistic regression analysis results showed that the variable Beneish's M-Score Model (MSCORE) had a significance level of 0.191, which was greater than $\alpha = 0.05$. Hence, the first hypothesis (H_1) proposed in this research was rejected. It was concluded that Beneish's M-Score Model did not have any significant effect on fraudulent financial statement indications. [14] state that one cannot use indications of increased income or earnings, deferred asset acquisition costs, and payables to detect fraudulent financial statement indications. In addition, they also state that indicators of depreciation, cost of sales, and accruals in accounting policies will only undermine the ability to detect financial statement fraud. Therefore, it is likely that the application of Beneish's M-Score Model along with its eight indicators is less accurate at detecting whether a financial statement is fraudulent or not.

3.7 The Effect of Financial Leverage on Fraudulent Financial Statement Indications

The logistic regression analysis results showed that the variable Financial Leverage (LEV) had a positive coefficient of 0.470 and a significance level of 0.041, which was smaller than $\alpha = 0.05$. Hence, the second hypothesis (H_2) proposed in this research was accepted. It was concluded that Financial Leverage had a significant effect on fraudulent financial statement indications. [16] state that a high level of leverage can indicate a high potential for loan agreement violations and a low company ability to earn additional capital from loans. A high level of leverage reflects that a company has a greater amount of debt than equity. This means that most of the company's activities are funded by debt, which will put the company at greater risk. As a result, it is more likely for the company to commit fraud in its financial statement [17].

3.8 The Effect of Profitability on Fraudulent Financial Statement Indications

The logistic regression analysis results showed that the variable Profitability (PROF) had a positive coefficient of 0.846 and a significance level of 0.504, which was greater than $\alpha = 0.05$. Hence, the third hypothesis (H_3) proposed in this research was rejected. It was concluded that Profitability did not have any significant effect on fraudulent financial statement indications. In the research by [10] as well as [18], it is stated that profitability ratio did not have any effect on fraudulent financial statement, hence unfit to be used to

detect fraudulent financial statement indications. In line with those findings, [19] state that the ratio of net income to sales is not suitable to be used as a means to detect fraudulent financial statement indications. [10] explains further that the value of the net income used in this calculation must be positive and large in order to cover all of the company expenditures. This ratio will help investors predict the company performance in the future [15].

3.9 The Effect of Asset Composition on Fraudulent Financial Statement Indications

The logistic regression analysis results showed that the variable Asset Composition (AC) had a negative coefficient of -0.378 and a significance level of 0.915, which was greater than $\alpha = 0.05$. Hence the fourth hypothesis (H_4) proposed in this research was rejected. It was concluded that Asset Composition did not have any significant effect on fraudulent financial statement indications. According to [20], one cannot use asset composition ratio to detect possible financial statement fraud. This is because there are a number of factors in the variability of company assets. In general, more dynamic companies are in need of greater amounts of current assets to deal with rapid changes and greater degress of competitiveness. It was posited by [17] that big asset composition is reflective of a company's inability to convert its inventories into sales. Thus, inventories that stay in the pile will undergo depreciation and see price declines, which will also eventually lower down the income and earnings of the company. However, in [2] it is stated that declines in income and earnings can also be caused by diminishing people's purchase power, and therefore no significant effect is resulted from asset composition on fraudulent financial statement.

3.10 The Effect of Liquidity on Fraudulent Financial Statement Indications

The logistic regression analysis showed that the variable Liquidity (LIQ) had a negative coefficient of -1.177 and a significance level of 0.089, which was greater than $\alpha = 0.05$. Hence the fifth hypothesis (H_5) proposed in this research was rejected. It was concluded that liquidity did not have any significant effect on fraudulent financial statement indications. According to [19], liquidity ratio, which is one of the indicators in the financial ratio analysis in this research, is unusable for detecting financial statement fraud. Similarly, [18] also found that liquidity ratio did not influence fraudulent financial statement and therefore was unusable for detecting fraudulent financial statement indications. [2] state that liquidity is a ratio that reflects a company's ability to pay off its short-term liabilities in a timely manner. Since a certain term is usually allowed for the fulfilment of a liability, which implies that a company is not obliged to pay off a debt at an exact point in time, it is likely that timely short-term liabilities fulfilment is

not so big a concern for the company when it is committing financial statement fraud.

3.11 The Effect of Capital Turnover on Fraudulent Financial Statement Indications

The logistic regression analysis results showed that the variable Capital Turnover (CAPT) had a positive coefficient of 0.114 and a significance level of 1.456, which was greater than $\alpha = 0.05$. Hence, the sixth hypothesis (H_6) proposed in this research was rejected. It was concluded that Capital Turnover did not have any significant effect on fraudulent financial statement indications. [18] opine that a number of aspects such as juridical form, inventory policy, sales policy, among other aspects, are at play in the diversity of optimal capital turnover values. Therefore, the indicator capital turnover is unusable for detecting fraudulent financial statement indications. In the work of [21] it is stated that capital turnover had an effect on fraudulent financial statement. Companies with low capital turnover were assumed to be inefficient at utilizing their working capital and as such they would attempt to cover it up. Another finding by [22] revealed that the higher the capital turnover of a company, the lower the likelihood would be that the company would commit financial statement fraud.

4 Conclusion and Suggestions

Based on the results of the tests and analysis performed, it was concluded that only the variable Financial Leverage had a significant effect on fraudulent financial statement indications in manufacturing companies in the consumer goods sector listed on the Indonesia Stock Exchange in the period 2017–2020. The variable Beneish's M-Score Model and other indicators of the variable Financial Ratio Analysis—Profitability, Asset Composition, Liquidity, and Capital Turnover—on the other hand were found to have no significant effects on fraudulent financial statement indications.

This research came with some limitations that might influence its results, one of which was that the independent variables used were able to explain the dependent variable only at a level of 12.92%, meaning that the remaining 87.08% of the dependent variable was explainable by independent variables unexplored in this research. The dependent variable employed in this research was proxied by restatement, which was a dummy variable, in which case restatement of financial statements only depicted indications of fraudulent financial statement and it could not by any means be said that it was capable of detecting fraudulent financial statement accurately. Furthermore, keeping in mind that there are a great variety of calculations in financial ratio analyses, the researchers calculated the variable Financial Ratio Analysis based on the research works published on international journals. Therefore, the results of this research are ungeneralizable for financial ratio analyses outside this research. According to the

conclusion and limitations above, the following suggestions are offered for future research:

1. Future research is expected to use different independent variables, given that, based on the coefficient of determination test conducted, the independent variables used in this research were only able to explain 12.92% of the dependent variable, fraudulent financial statement indications. There may be other independent variables unexplored in this research that can influence fraudulent financial statement indications.
2. It is also expected that this research can be of use to companies, especially manufacturing companies in the consumer goods sector that were used as objects in this research, to consider their financial leverage level prior to making decisions and to conduct examinations from an early stage by calculating various ratios in order to detect certain areas with greater possibilities of fraudulent financial statement indications before such fraud causes more losses in the future.

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