

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market



Thi Huong Tram Le¹, Thuy Vinh Nguyen², Thi Xuan Huong Le³

^{1,2}Accounting Department, University of Labour and Social Affairs, Vietnam

³Insurance Department, University of Labour and Social Affairs, Vietnam

ABSTRACT: The reliability of financial statements is important to many people such as investors, corporate shareholders, and auditors. A reliable financial report is free from problems of fraud and manipulation by corporate management. Using the methodology and meta-analysis, the research team found that the application of the M-score model in Vietnam is not yet popular. The number of research papers on the M-score model is small and there is no research using this model to assess the reliability of financial statements. Research results with actual data from the unaudited financial statements of a typical enterprise show that the application of the M-score model to assess the reliability or detect fraud of financial statements is an appropriate fit. However, the research team also found that the M-score model also has a high probability of incorrect identification of unreliable financial statements. Therefore, from the research results, we recommend that investors, shareholders, and stakeholders use a combination of the M-score model together with other technical analysis tools to be able to identify whether a financial statement is reliable.

KEYWORDS: Financial statements, listed companies, M-score model, Reliability, Vietnam

1. INTRODUCTION

Professor Messod Beneish developed the M-score model in 1999. The model is a technical tool with the objective of protecting shareholders, investors, and the professional performance of institutional employees. state administration. Nowadays, the application of the M-score Model is more and more popular in the world, in addition to using M-score in conducting research, it is also used to detect inconsistencies and errors in reports and early financial statements of the enterprise before publication. The reliability of a financial statement will greatly affect the results of investment activities of individuals and organizations in the economy. Therefore, an accurate financial report both shows corporate social responsibility and contributes to the stability of the financial market. With the objective of evaluating the effectiveness of the M-score model in testing the reliability of the financial statements of enterprises listed on the Vietnamese stock market. The research team adopted the methodology to conduct a review of the literature related to the Beneish model and find research gaps. Next, we conduct an empirical analysis on the application of the M-score model to assess the reliability of financial statements at typical enterprises in Vietnam.

2. RESEARCH OVERVIEW

Author Holda (2020) used the Beneish M-score model to study non-financial companies listed on the Warsaw Stock Exchange (p.389-401). From the series of fraudulent financial statements before the 2008 financial crisis, people interested in financial information have increasingly focused on whether the financial statements have been manipulated. Therefore, many researchers have used models to help test the reliability of financial statements. Along with that goal, the author presented the working principle and the ability to use Beneish's M-score model in practice in Poland. The study used data on more than 30 businesses on a list of businesses that have been found to be manipulated and businesses that are not believed to have manipulated their financial statements for comparison. With the quantitative research method, the results of the study confirmed the effectiveness of the M-score model in detecting fraud and manipulating financial statements in Poland (Holda, 2020, pp.389-401).

Research by Ezrien (2016) on evaluating the reliability of the M-score model in detecting fraudulent financial statements of listed companies in Malaysia (pp.23-32). The author recognizes that there are many tools to predict financial statement fraud through

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market

the manipulation of profit figures, and an M-score model is also an effective tool in this regard. From a database of 76% of businesses found to have fraudulent and manipulated financial statements when using the M-score model, this model proves to be a good tool. Conducted field research with 17 listed companies in Malaysia to demonstrate the reliability of Beneish's M-Score model in detecting earnings manipulation and financial reporting fraud. This sample includes businesses that have been accused and prosecuted for reporting fraud between 1996 and 2014. The results show that the M-score model is reliable in detecting fraud and reporting manipulation. finance at the rate of 82%. The author also believes that applying the Beneish model will help the company's management to check for any irregularities in the financial statements and make timely adjustments, preventing legal risks that may cause harm the business reputation. In addition, the research results also show the appropriateness when applying the M-score model in auditing activities in Malaysia (Ezrien, 2016, pp23-32).

Research by Alfian & Triani (2019) on using the M-score model to detect financial statement fraud (pp.27-42). The objective of this study is to test the reliability of the M-score model in detecting financial statement fraud. The sample size in this study included 55 companies that were sanctioned by the regulator for fraudulent financial reporting between 2012 and 2016 and 55 companies that were not manipulated for comparison. Research results show that more than 50% of manipulative companies and 60% of non-manipulator companies are identified through the M-score model. The research results also show that the company often cheats on the sales and administrative expenses index (SGAI), the depreciation index (DEPI) and the asset quality index (AQI). Finally, the research results confirm that the Beneish M-Score model is an easy-to-use and low-cost model to detect the possibility of fraudulent financial reporting. Investors can apply this model before determining investment decisions (Alfian & Triani, 2019, pp.27-42).

Research by Sujeewa & Kawshalya (2020) in detecting fraud in financial information published in Sri Lankan enterprises (pp.71-81). To provide more information to support investors, auditors, and related entities with tools to support the verification of the reliability of financial statements in enterprises. The study identifies fraudulent financial statements as a current concern in financial markets. Detecting financial statement fraud is difficult because it is highly concealed and requires the examiner to have knowledge and understanding of the nature of the fraud. Using the M-score model to identify signs of fraud will help minimize financial losses for investors. The results of the sample analysis have shown that the Days Sales Receivable Index (DSRI), Gross Margin Index (GMI), Sales Growth Index (SGI), Leverage Index (LVGI), and Total Accrual on Total Assets (TATA) have differences significant between manipulated and non-manipulated firms. Therefore, the research results also emphasize the use of a risk assessment tool to identify signs of fraud using the M-score model in Sri Lanka (Sujeewa & Kawshalya, 2020, pp71-81).

Research by Lotfi & Chadegani (2018) on using Beneish's M-score model to detect financial statement fraud (29-34). The study recognizes that detecting fraud in financial statements is an important issue and ignoring this issue will cause serious losses to investors. To test the ability of the M-score model in detecting financial fraud among listed companies. With a sample size of 137 companies from 2005 to 2015 and using the logistic regression analysis method to test the research hypothesis at a 5% error. The analysis results show that the accuracy of the M-score model is 66%. However, Lotfi & Chadegani believes that applying the M-score model to detect fraudulent financial statements at listed companies in the sample is not feasible. In other words, the research results indicate that the M-score model is not suitable and not reliable enough to detect fraud. The author also proposes the development of a new model to assist in detecting fraud in financial statements (Lotfi & Chadegani, 2018, pp.29-34).

Research by Nguyen & Nguyen (2016) on using the M-score model in detecting income from non-financial companies listed on the Vietnam stock market (pp.14-23). The article identifies earnings management as an important issue affecting financial statements. Although this issue is very important, it has not been studied much in Vietnam. The objective of this paper is to evaluate the effectiveness of using the M-score model to detect income index management in Vietnamese enterprises listed on the Ho Chi Minh City Stock Exchange. With a sample size of 229 Vietnamese non-financial enterprises in the period 2013-2014, the research results showed that 48.4% of enterprises in the sample participated in income adjustment. The conclusion of the study also shows that the M-score model is an effective model in detecting the earnings manipulation behavior of companies and can be applied to improve reporting quality. finance or protect investors (Nguyen & Nguyen, 2016, pp.14-23).

From the research overview, we can see that in Vietnam, there are very few research topics on the M-score model and especially, there has been no research using this model to assess the reliability of financial statements. Therefore, it is necessary to conduct research on the content "Application of the M - Score model to check the reliability of financial statements in enterprises listed on the Vietnamese stock market".

3. METHODS

The research team used two research methods, namely the methodology and the method of analysis and synthesis. Based on the literature review, the research team has drawn conclusions from studies on the M-score model of Vietnamese and international

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market

authors. At the same time, through the research review, our team also found a suitable gap to conduct the research. Through the method of analysis, synthesis and data collected in the unaudited financial statements of the selected enterprises for testing. Combining actual data from Vietnamese enterprises listed on the stock market and the theory of Beneish's M-score model, the research team has calculated, analyzed and evaluated 8 indicators of the model at the enterprise selected for the experimental study.

4. M-SCORE MODEL

The M-score model was built by Messod Daniel Beneish through the development of the underlying theory in 1999. The purpose of this model is to test the reliability of financial statements and detect fraud and intentional manipulation by corporate management (Beneish, 1999, pp.24-36). Today, the M-score model is used by many people around the world such as investors, auditors, and financial regulators. Beneish's model includes 8 variables related to financial indicators which are explained in detail by the author as follows.

Days Sales Receivable Index [DSRI]

According to Beneish (1999), the DSRI index measures the ratio of receivables year t/net sales in year t to accounts receivable year t-1/net sales in year t-1. DSRI's rating is 1. If $DSRI \leq 1$ shows no anomalies in the day's sales for receivables. Conversely, if $DSRI > 1$ means that the receivables to net sales ratio of year t are higher than this ratio of year t-1, then there is a possibility of a sales inflation problem. When seeing abnormally high DSRI results, we need to pay attention to combining them with other indicators to accurately assess the financial status of the business (pp.24-36).

Gross Margin Index [GMI]

In Beneish's M-score model, the GMI measures the ratio between the two criteria groups: annual sales t-1 minus COGS in year t-1 to annual sales t-1 versus a group of similar indicators of year t. Or it can be understood that GMI measures the ratio between the gross profit margin in year t -1 to the gross profit margin in year t (Beneish, 1999, pp.24-36). In calculating the GMI we use It is also possible to use the Gross Profit Margin indicator because the Gross Profit Margin has the same meaning as the Gross Profit Margin index.

Asset Quality Index [AQI]

According to Beneish (1999), the AQI is an indicator of the quality of a company's assets published in its financial statements. AQI is the ratio of the asset quality of year t to the asset quality of year t-1. If $AQI \leq 1$ means that the asset quality of the enterprise is reasonable, not overvalued compared to the market value. Conversely, if $AQI > 1$, the asset quality of the enterprise is inflated. Businesses with an $AQI > 1$ may have recorded an increase in deferred expenses or an increase in long-term assets, the figures on the financial statements will show stability, and the income target may be subject to business management manipulation (pp.24-36).

Sales Growth Index [SGI]

According to Beneish (1999), the SGI measures the growth of sales revenue. The calculation of SGI is the ratio of sales in year t to sales in year t-1. The result of $GMI \leq 1$ indicates poor revenue growth, and vice versa if $GMI > 1$, it means that sales in year t grow strongly compared to year t-1. However, good GMI results can also be affected by revenue growth pressure due to the expectations of shareholders and investors on corporate management and lead to them having the incentive to manipulate earnings to better financial reporting (pp.24-36).

Depreciation Index [DEPI]

According to Beneish (1999), the DEPI index measures through the criteria of the depreciation rate of year t-1 compared with the depreciation rate of year t. The way to calculate the depreciation rate for year t is the fraction between the depreciation in year t over the sum of the depreciation in year t and long-term fixed assets minus the accumulated depreciation over many years. If the result of $DEPI \leq 1$ means that the accumulated depreciation of year t is deducted by the enterprise based on the useful life of the fixed asset determined since the asset is put into use. Conversely, if $DEPI > 1$, it means that depreciation in year t has decreased sharply compared to year t-1. This may be due to a revaluation of the asset that reduces the useful life of the asset, or it may also be due to the corporate management intentionally reducing the useful life of the asset (pp.24-36).

Sales, General and Administration Expense Index [SGAI]

In the M-score model, the SGAI Index is calculated through the cost of selling and general administrative expenses [SG&A] index and sales revenue. The result of her SGAI number > 1 shows that the ratio between expenses and sales in year t increased

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market

compared to year t-1, and more specifically here, SGAI > 1 is due to an increase in SG&A costs or sales. decrease compared to year t-1 (Beneish, 1999, pp.24-36). However, in this situation, we understand that there can only be an increase in SG&A costs because if sales decrease, it means selling expenses can decrease. Thus, according to Beneish, corporate management can approve an increase in SG&A to increase income targets in the enterprise (pp.24-36).

Leverage Index [LVGI]

The LVGI index is very susceptible to manipulation because it uses financial leverage with the goal of increasing profit margins with the expectation that asset values will exceed borrowing costs. However, many businesses have abused the use of financial leverage to manipulate financial statements in their businesses. According to Beneish (1999), LVGI is measured as the ratio of leverage year t to leverage year t-1. Where leverage is the fraction of Debt to Assets. So increasing Debt will make LVGI >1 and this could be indicative of manipulation of financial statements (pp.24-36).

Total Accrual on Total Assets [TATA]

The TATA index measures the ratio of accrual variables to total assets. TATA is calculated based on going concern income, operating cash flow and total assets. Where Income from going concerned = Current assets – Cash and Operating Cash Flow = EBIT (1-t) + non-cash expenses. Beneish (1999) hypothesized for TATA that higher accruals are related to income management ability (pp24-36).

Finally, Beneish (1999) provides a model that combines eight variables as follows:

$$\text{M-score} = -4.84 + 0.92 \times \text{DSRI} + 0.528 \times \text{GMI} + 0.404 \times \text{AQI} + 0.892 \times \text{SGI} + 0.115 \times \text{DEPI} - 0.172 \times \text{SGAI} + 4.679 \times \text{TATA} - 0.327 \times \text{LVGI} \text{ (pp.24-36)}$$

The M-score model has a clear division into two groups. The first group is a group that helps identify fraud, including DSRI, AQI, DEPI, and TATA criteria. The second group is the group that reflects the motives of fraud and manipulation of financial statements of enterprises, namely GMI, SGI, SGAI and LVGI.

5. EXPERIMENTAL STUDY AT VIETNAM DAIRY PRODUCTS JOINT STOCK COMPANY

In this section, the question will be answered whether the M-score model helps to assess the reliability of financial statements at companies listed on the Vietnamese stock market. To answer this question, we used data from the financial statements of Vietnam Dairy Products Joint Stock Company for the years 2021 and 2022. The research team used balance sheets, business results and reports of the company's unaudited cash flow statement. Calculation results of 8 indicators of the M-score model at enterprises conducting research and empirical evaluation are shown in Table 1.

Table 1: Analysis of unaudited financial statements at Vietnam Dairy Products Joint Stock Company Unit: billion

Variable	Calculation formula	Gear change
DSRI	$\frac{\text{Net Receivables } t}{\text{Net Revenue } t} / \frac{\text{Net Receivables } t-1}{\text{Net Revenue } t-1}$	$\frac{6,139}{59,956} / \frac{5,839}{60,919}$
GMI	$\frac{\text{Gross profit margin } t-1}{\text{Gross profit margin } t}$ <p>In there: Gross profit margin = $\frac{\text{revenue} - \text{Cost of goods sold}}{\text{revenue}}$ Or Gross profit margin = $\frac{\text{Net Revenue} - \text{Cost of goods sold}}{\text{Net Revenue}} * 100\%$</p>	$\frac{(61,012 - 34,641)/61,012}{[59,956 - 34,641/59,956] * 100\%}$
AQI	$\frac{1 - (\text{PPE } t + \text{CA } t)}{\text{Total assets } t} / \frac{1 - (\text{PPE } t-1 + \text{CA } t-1)}{\text{Total assets } t-1}$ <p>In there: PPE: long-term fixed assets minus the value of accumulated depreciation over many years CA: Current assets</p>	$\frac{1 - (11,903 + 31,560)}{48,483} / \frac{1 - (12,707 + 36,)}{53,332}$
SGI	$\text{Sales } t / \text{Sales } t-1$	60,075/61,012

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market

DEPI	$\frac{\text{Depreciation rates } t - 1}{\text{Depreciation rates } t}$ $\text{Depreciation rate} = \frac{\text{Depreciation}}{\text{Depreciation} + \text{PPE}}$	$\frac{16,280}{16,280 + 12,707} / \frac{17,953}{17,953 + 11,903}$
SGAI	$\frac{\frac{\text{SGA } t}{\text{Sales } t}}{\frac{\text{SGA } t - 1}{\text{Sales } t - 1}}$ <p>In there: SGA is the cost of sales and general management expenses</p>	$\frac{14,144}{60,075} / \frac{14,518}{61,012}$
LVGI	$\frac{\text{leverage } t}{\text{leverage } t - 1}$ <p>In there: Leverage = debts/assets</p>	$\frac{15,666/48,483}{17,482/53,332}$
TATA	$\frac{\text{Continuous operating income } t - \text{Operating cash}}{\text{Total Assets } t}$ <p>In there: Continuous operating income = Current assets – Cash Operating cash flow = EBIT (1-t) + non-cash expenses Non-cash costs are depreciation, depreciation and depreciation EBIT = profit before tax + Interest expense t is the tax rate of corporate income tax</p>	$\frac{30,233 - 10,625}{48,483}$ <p>Continuous operating income = 31,560 - 1,327 = 30,233 Operating cash flow = 10,662 * (1 - 0.2) + 2,095 = 10,625 EBIT = 10,496 + 166 = 10,662 t is the tax rate of corporate income tax</p>

Source: Beneish, 1999, pp.24-36 and financial report of Vietnam Dairy Products Joint Stock Company

From the data included in the formulas, we analyze their results as follows:

DSRI = 1.068. With DSRI > 1, it means that the ratio of receivables to sales in year t is higher than this ratio in year t-1 and there is a possibility of revenue inflation at Vietnam Dairy Products Joint Stock Company.

GMI = 1.02. With GMI = 1.02, the gross profit margin in year t-1 is greater than the gross profit margin in year t.

AQI = 0.979. The quality of the enterprise's assets is well managed and recorded at the right value compared to the market price. In addition, AQI < 1 shows that Vietnam Dairy Products Joint Stock Company does not overvalue operating expenses and does not capitalize assets.

SGI = 0.98. We have a GMI ≤ 1, which means that revenue growth is a little lower than the previous year and Vietnam Dairy Products Joint Stock Company does not manipulate earnings to make better financial statements.

DEPI = 0.933. DEPI index measures through the criteria of the depreciation rate of year t-1 compared with the depreciation rate of year t. The result of DEPI ≤ 1 means that the accumulated depreciation of year t is deducted by Vietnam Dairy Products Joint Stock Company based on the useful life of the fixed asset determined since the asset is put into use.

SGAI = 0.99. As Beneish noted, SGA < 1 means that SG&A costs do not increase. Thus, Vietnam Dairy Products Joint Stock Company did not approve the increase in SG&A to increase the income target of the enterprise.

LVGI = 0.98. The result LVGI < 1 and this means that Vietnam Dairy Products Joint Stock Company does not have any manifestation of manipulation of financial statements through this indicator.

TATA = 0.4. The result of the accrual target is quite low, so we believe that enterprises do not affect this indicator to increase income.

Substitute the results of 8 indicators into the M-score model and calculate the results.

M-score = -4.84 + 0.92 × 1.068 + 0.528 × 0.01 + 0.404 × 0.979 + 0.892 × 0.98 + 0.115 × 0.93 - 0.172 × 0.99 + 4.679 × 0.4 - 0.327 × 0.98

M-score = - 0.995

Application of the M-Score Model to Test the Reliability of Financial Statements at Companies Listed on the Vietnamese Stock Market

6. CONCLUSION

According to Beneish (1999), M-Score should remain below -1.78 (pp24-36). So, if the standard level of the M-score model is applied, the financial statements of Vietnam Dairy Products Joint Stock Company are likely to be manipulated. However, Beneish (1999) believes that his model is also a probabilistic model, so with a sample size of less than 10, the ability to accurately determine whether financial statements have been manipulated or not is only 37.5%. pp.24-36). In addition to us, considering the group of indicators reflecting the motives of fraud and manipulation of financial statements of enterprises, which are GMI, SGI, SGAI, and LVGI, all have good results. Therefore, in addition to using the M-score model, we need to use a combination of several indicators and ancillary models to be able to accurately assess the reliability of the financial statements.

REFERENCES

- 1) Alfian, F., & Triani, N. N. A. (2019). Fraudulent financial reporting detection using beneish m-score model in public companies in 2012-2016. *Asia Pacific Fraud Journal*, Volume 4, Nomor 1 (January-June) 2019, pp.27-42
- 2) Beneish, M. D. (1999). The Detection of Earnings Manipulation. *Financial Analysts Journal*, Vol. 55, No. 5 (Sep. - Oct., 1999), pp.24-36. Published by: CFA Institute Stable
- 3) Ezrien, M., Kamal, M., Salleh, M.F.M., & Ahmad, A. (2016). Detecting financial statement fraud by Malaysian public listed companies: The reliability of the Beneish M-Score model. *Jurnal Pengurusan*, 46, pp.23-32.
- 4) Hołda, A. (2020). Using the Beneish M-score model: Evidence from non-financial companies listed on the Warsaw Stock Exchange. *Investment Management & Financial Innovations*, 17(4), pp.389-401.
- 5) Lotfi, N., & Chadegani, A. (2018). Detecting corporate financial fraud using Beneish M-score model. *International Journal of Finance & Managerial Accounting*, 2(8), pp.29-34.
- 6) Nguyen, H. A., & Nguyen, H. L. (2016). Using the M-score model in detecting earnings management: Evidence from non-financial Vietnamese listed companies. *VNU Journal of Economics and Business*, 32(2). pp.14-23
- 7) Sujeewa, M., & Kawshalya, P. (2020). Detecting red flags of corporate financial statement frauds using Beneish M score model in Sri Lanka. *International Journal of Accounting & Business Finance*. Vol.6. No.2 December 2020 Issue, pp. 71 - 81



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0 (<https://creativecommons.org/licenses/by-nc/4.0/>)), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.